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Headache Medicine



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Proceedings of the 40th Brazilian Headache Congress (2026)

It is with great satisfaction that we publish the *Proceedings of the 40th Brazilian Headache Congress*, which brings together the 201 studies selected for presentation at the congress, held in Aracaju, Sergipe, Brazil, from August 13 to 15, 2026.

Throughout its history, the Brazilian Headache Society has established itself as a scientific, educational, and institutional reference by bringing together specialists committed to clinical excellence, evidence-based research, and patient-centered care. This Congress reaffirms that commitment by providing a qualified environment for the exchange of experiences, the discussion of scientific advances, and critical reflection on current and future challenges in the diagnosis and treatment of headache disorders.

The Scientific Committee carefully developed the scientific program and encompasses relevant topics, distinguished speakers, and discussions that integrate innovation, clinical practice, and a humanistic approach to patient care. Its purpose is to foster continuous learning, scientific thinking, and collaboration among professionals from different regions of Brazil.

We hope this Congress represents a meaningful opportunity for scientific updates, inspiration, and strengthening the bonds that unite the community dedicated to the study and treatment of headache disorders, always with the shared goal of improving patients' quality of life.

With esteem and enthusiasm,

Mauro Eduardo Jurno
President, Brazilian Headache Society (2024–2027)

The 40th Brazilian Headache Congress was designed to broaden perspectives and deepen scientific discussion through a high-quality educational program that offers relevant updates, clinical debates, and practical approaches to managing headache disorders. Throughout the meeting, our commitment remains firmly grounded in evidence-based medicine while recognizing the enduring value of the art and humanism of medical practice.

Because science is built through collaboration, this Congress also provides an exceptional opportunity for meaningful networking—bringing together colleagues, reconnecting with mentors and collaborators, fostering new partnerships, and further strengthening our scientific community.

We sincerely hope that the studies presented in these proceedings will contribute to the dissemination of knowledge generated by researchers and clinicians from across Brazil, inspiring new ideas, collaborations, and advances in headache research and patient care.

Cordially,

Alan Chester Feitosa de Jesus
President, 40th Brazilian Headache Congress (2026)

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Comorbidities associated with headaches

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Headache as a multifactorial condition: a report of a transdisciplinary approach at a university center specialized in headache and orofacial pain treatment

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Introduction

Headaches are common, disabling clinical conditions with a multifactorial etiology that may involve neurological, musculoskeletal, dental, emotional, behavioral, pharmacological, and sleep-related components. In patients with chronic pain, the association of headache with orofacial pain, temporomandibular disorders, parafunctional habits, cervical alterations, and psychosocial distress may complicate the differential diagnosis and contribute to symptom persistence. A transdisciplinary approach promotes a broader understanding of pain by integrating different health disciplines in the collaborative development of therapeutic decision-making.

Case presentation

This report describes the experience of providing transdisciplinary care to patients with headache complaints followed at the UEPB Pain Clinic. The care pathway begins with a detailed medical history and a standardized clinical form covering pain phenomenology, functional impact, medication history, sleep quality and lifestyle habits, parafunctional habits, and emotional aspects, assessed using validated questionnaires. After the initial assessment, cases are discussed jointly by professionals from dentistry, medicine, physiotherapy, psychology, and pharmacy. Clinical management includes pain education, guidance on lifestyle changes, sleep hygiene, self-care, rational medication use, management of parafunctional habits, and specific referrals according to the needs identified.

Discussion

Headache should be understood as a complex biopsychosocial condition. Medicine contributes to headache diagnosis, the identification of possible warning signs, and the indication for further investigation. Dentistry contributes to the assessment of orofacial pain, bruxism, masticatory muscle pain, possible odontogenic pain, and temporomandibular disorders. Physiotherapy evaluates cervical, postural, and musculoskeletal components. Psychology contributes to the understanding of emotional and behavioral factors and pain-coping strategies. Pharmacy participates in the assessment of medication use, self-medication, treatment adherence, and the risk of medication-overuse headache. This integration broadens the identification of pain-triggering, perpetuating, and modulating factors, supporting individualized management.

Conclusion

Transdisciplinary care for patients with headache enables a broad, integrated, patient-centered assessment, allowing for better diagnosis and treatment planning. This model is especially relevant when headache is associated with orofacial pain, temporomandibular disorders, musculoskeletal alterations, sleep disturbances, emotional factors, parafunctional habits, and recurrent medication use. Thus, the transdisciplinary approach contributes to care that is more humane, effective, and consistent with the multifactorial nature of pain.

Keywords:
Headache
Orofacial pain
Chronic pain
Transdisciplinary team
Temporomandibular disorders

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Comorbid relationship between migraine and gastrointestinal disorders: how nutrition can contribute to its management - a case report

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Introduction
Migraine affects approximately 12% of the global population, predominantly affecting women in young adulthood. Gastrointestinal comorbidities occur in 25–50% of patients with primary headache disorders, suggesting a common pathophysiological axis. Although recognized, subclinical exocrine pancreatic insufficiency and post-cholecystectomy biliary dysfunction remain underdiagnosed in neurological protocols. This case report demonstrates the clinical relevance of integrated identification of gastrointestinal dysfunction in migraine-prone individuals.

Case presentation
Female, 23 years old, 67 kg, 1.73 m, BMI 22.4 kg/m². History of chronic migraine since menarche, with significant worsening following COVID-19. Currently using the following medications for approximately one year: topiramate 100 mg/day, amitriptyline 50 mg/day, metoprolol 50 mg/day, through which she achieved reduction in migraine frequency from daily to once weekly. Gastrointestinal symptoms: alternating constipation and diarrhea, abdominal distension, flatulence, and heartburn. History of cholecystectomy at age 17. Complementary examinations: functional stool analysis revealed undigested muscle fiber, undigested starch, undigested cellulose, and yeast; fecal pancreatic elastase-1 350 mcg/g (lower limit of normal); vitamin D 18.9 ng/mL; vitamin C 5 mg/L.

Discussion
Following 3 months of integrated nutritional intervention (behavioral reeducation, elimination of hidden dairy, vitamin and mineral supplementation, digestive enzymes to compensate for subclinical exocrine pancreatic insufficiency, and nutrients supporting gastrointestinal mucosal integrity), the patient demonstrated: reduction in migraine frequency (0 episodes in 3 months versus 1 episode/week prior to intervention); normalization of bowel pattern (Bristol 4, once daily versus Bristol 1–2 every 2–3 days); resolution of abdominal discomfort, distension, and flatulence; maintenance of optimal body composition; and absence of fungal growth on follow-up culture. Clinical improvement occurred without medication adjustment, suggesting that gastrointestinal dysfunction was a perpetuating factor in migraine episodes.

Conclusion
Multifactorial post-cholecystectomy gastrointestinal dysfunction, characterized by impaired bile acid reabsorption, subclinical exocrine pancreatic insufficiency, and dysbiosis, perpetuates migraine through the gut-brain axis. Integrated nutritional intervention targeting behavioral modification, elimination of hidden antigens, enzymatic support, and restoration of mucosal integrity resulted in significant clinical improvement. This case underscores the necessity for structured gastrointestinal evaluation in migraine patients with abdominal complaints and suggests nutritional modulation as a complementary therapeutic strategy.

Keywords:
Migraine
Nutrition
Gastrointestinal
Pancreatic
Cholecystectomy

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Migraine and cerebrovascular vulnerability in young adults from the Amazon: case reports of carotid artery dissection and reversible cerebral vasoconstriction syndrome

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Introduction

Migraine has increasingly been recognized as a potential marker of cerebrovascular vulnerability and has been associated with a higher risk of ischemic events in young individuals. Conditions such as cervical artery dissection and reversible cerebral vasoconstriction syndrome (RCVS) often initially present with headache, mimicking primary headache disorders and delaying etiological diagnosis

Case presentation

We report two cases of young patients admitted to a specialized stroke unit in Roraima presenting with acute neurological deficits preceded by headache. The first case involved a 30-year-old woman with a history of migraine who developed an ischemic stroke in the right middle cerebral artery territory secondary to right internal carotid artery dissection. She presented with a headache distinct from her usual pattern followed by sudden left hemiparesis. Vascular imaging confirmed extracranial carotid dissection. The second case involved a 27-year-old man presenting with sudden severe thunderclap headache followed by seizure and left-sided hemiparesis. Neurovascular imaging demonstrated multifocal arterial vasoconstriction compatible with RCVS. Both patients received specialized treatment and showed favorable clinical outcomes.

Discussion

These cases highlight the importance of investigating secondary causes of headache in young patients, particularly when focal deficits, seizures, or changes in headache pattern are present. Cervical artery dissection is an important cause of ischemic stroke in young adults, whereas RCVS is characterized by reversible segmental vasoconstriction associated with thunderclap headache and neurological complications. Early recognition requires a high index of clinical suspicion and prompt vascular neuroimaging.

Conclusion

Comprehensive etiological evaluation and early vascular imaging are essential to distinguish arterial cerebrovascular syndromes from reversible vascular disorders, enabling prompt treatment and reducing the risk of severe neurological sequelae.

Keywords:
Migraine
Stroke
Carotid artery dissection
Reversible cerebral vasoconstriction syndrome
Young adult

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Bilateral septic cavernous sinus thrombosis: a case report

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Introduction

Cavernous sinus thrombosis (CST) is a rare, life-threatening condition. Headache is the most common presenting symptom, occurring in 50-90%. Early recognition can reduce morbidity and mortality

Case presentation

Patient male, 18-year-old, was admitted with a 10-day history of Thunderclap headache, associated with vomiting, binocular diplopia, and subsequently left eyelid ptosis and fever with chills. The patient had been using amoxicillin-clavulanate for the treatment of sinusitis. On admission, he was afebrile, with improvement of the headache. Neurological examination revealed that he was alert and oriented, with isolated left-sided III, IV, and VI cranial nerve palsies, without associated motor or sensory deficits. Brain MRI showed enlargement and heterogeneity of the cavernous sinuses bilaterally, with irregular peripheral enhancement and areas of diffusion restriction, suggestive of bilateral CST. Laboratory tests revealed elevated C-reactive protein and leukocytosis, and cerebrospinal fluid analysis showed mild lymphocytic pleocytosis, with no microbial isolation.

Discussion

Given the clinical and radiological findings suggestive of CST of probable infectious etiology, antibiotic therapy with ceftriaxone at central nervous system dosing was initiated, without full anticoagulation, along with neurological monitoring and supportive care. The patient showed favorable clinical evolution, characterized by progressive improvement of cranial nerve deficits, as well as inflammatory markers and neuroimaging findings. Cavernous sinus thrombosis is a rare but potentially fatal condition, characterized by thrombus formation in intracranial venous structures, often associated with infectious processes of the face, orbit, or paranasal sinuses, as well as prothrombotic states. In the present case, there is a severe and atypical clinical presentation, marked by bilateral involvement, suggesting greater severity and association with a worse prognosis. The involvement of cranial nerves III, IV, and VI reflects impairment of the neurovascular structures that traverse the cavernous sinus.

Conclusion

From a diagnostic perspective, early identification can be challenging, especially in the initial stages, and the differential diagnosis includes other causes of painful ophthalmoplegia, such as Tolosa–Hunt syndrome and orbital infectious processes. MRI is the most sensitive imaging modality for diagnostic confirmation. Therapeutic management is mainly based on the early initiation of broad-spectrum antibiotic therapy, considering infectious etiology as the most frequent, and may be associated with anticoagulation in selected cases, although this approach remains debated in the literature. Clinical evolution may be unfavorable, with a high risk of permanent neurological complications and mortality. In this context, the present report reinforces the importance of early recognition, rapid diagnostic investigation, and immediate institution of appropriate therapy in order to reduce morbidity and mortality.

Keywords:
Cavernous sinus thrombosis
Septic thrombosis
Cranial nerve palsy
Headache

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Hemiplegic migraine associated with Usher syndrome: a case report

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Introduction

Migraine is a common and disabling primary headache disorder. Migraine with aura is characterized by recurrent attacks of fully reversible visual, sensory, or other central nervous system symptoms that usually develop gradually and are followed by headache and associated migrainous symptoms. When aura includes motor weakness, the condition is classified as hemiplegic migraine. Usher syndrome is a rare autosomal recessive ciliopathy characterized by sensorineural hearing loss, retinitis pigmentosa, and sometimes vestibular dysfunction.

Case presentation

A 58-year-old woman presented with chronic migraine with aura since age 14. In 2005, she experienced paraplegia lasting 24 hours. In 2009, she developed recurrent focal neurological deficits, including paraplegia and hemiparesis, also lasting 24 hours. Between 2011 and 2012, further focal deficits occurred, resulting in persistent left-sided hypoesthesia. Between 2016 and 2018, she experienced headache episodes associated with aphasia and left facial paralysis. Her medical history included Usher syndrome (retinitis pigmentosa and left-sided sensorineural hearing loss), hypertension, dyslipidemia, myocardial infarction (2004), fibromyalgia, eosinophilic asthma, severe obstructive sleep apnea, irritable bowel syndrome, nutcracker esophagus, temporomandibular joint disorder, hepatic steatosis, Ménière's disease, and probable bilateral metachronous type 4 Ménière's disease. Family history was unknown, although her son had migraine. Neurological examination revealed mild divergent strabismus and reduced visual acuity. Brain MRI was unremarkable. Cervical spine MRI demonstrated cervical disc disease with an extruded C7–T1 disc herniation. MRI angiography showed a developmental venous anomaly in the right frontal lobe. Based on the recurrent reversible motor deficits and absence of structural lesions, a diagnosis of hemiplegic migraine was established. Current treatment includes lamotrigine, clopidogrel, and onabotulinumtoxinA every three months. Previous treatments included valproic acid, amitriptyline, nortriptyline, gabapentin, duloxetine, and topiramate. The patient currently has satisfactory headache control with botulinum toxin therapy.

Discussion

Migraine is frequently associated with comorbid conditions at rates higher than those observed in the general population. The coexistence of migraine and Usher syndrome appears exceptionally rare; a literature review identified only one previous case report describing this association. Recurrent focal neurological deficits in this patient were initially interpreted as cerebrovascular events but were later recognized as manifestations of hemiplegic migraine due to complete or near-complete symptom recovery and the absence of structural brain lesions.

Conclusion

This case illustrates a rare coexistence of hemiplegic migraine and Usher syndrome, highlighting the importance of considering hemiplegic migraine in patients with recurrent transient neurological deficits and normal neuroimaging findings.

Keywords:
Migraine
Hemiplegic migraine
Usher syndrome

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Cross-cultural adaptation and reliability of the Leiden Visual Sensitivity Scale (l-VISS) in Brazilian individuals with migraine

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Introduction
Migraine is a highly disabling primary headache characterized by intense episodes of throbbing pain, accompanied by photophobia, a prevalent symptom that contributes to increased disability. To assess this symptom it could be the use of questionnaires such as the Leiden Visual Sensitivity Scale (L-VISS). However, it is not available in Portuguese for assessing photophobia in this population.

Objective
Therefore, the objective of this study was to conduct the translation into Brazilian Portuguese, the cross-cultural adaptation, and the reliability assessment of the L-VISS questionnaire.

Methods: A total of 130 individuals diagnosed with migraine (aged>18 years) by a headache specialist were selected, in accordance with the criteria established by the ICHD-III, all of whom had experienced at least one migraine attack in the past month. The study was conducted in two phases: (1) translation and cross-cultural adaptation (n=30) and (2) reliability analysis (n=100). The first phase followed the guidelines proposed by Beaton et al. (2000). Reliability was established through internal consistency, test-retest reliability, and standard error of measurement, in accordance with the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN).

Results
The L-VISS questionnaire was translated and cross-culturally adapted. Regarding reliability, the questionnaire demonstrated adequate internal consistency of the items (Cronbach's =0.865), an intraclass correlation coefficient (ICC2,1) of 0.714, considered satisfactory, and a standard error of measurement of 3.740.

Conclusion
The Leiden Visual Sensitivity Scale (L-VISS) questionnaire has been translated and cross-culturally adapted into Brazilian Portuguese. The Brazilian version of the instrument demonstrated adequate internal consistency and satisfactory test-retest reliability, proving to be a useful and reliable tool for the objective assessment of photophobia in Brazilian patients with migraine; its use in clinical practice is therefore recommended.

Keywords:
Migraine
Questionnaires
Translation
Photophobia

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Irritable Bowel syndrome and migraine: a gut–brain axis-mediated comorbidity

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Introduction
Irritable Bowel Syndrome (IBS) is a functional gastrointestinal disorder characterized by recurrent abdominal pain associated with changes in bowel habits, without identifiable structural abnormalities. It is currently recognized as a disorder of gut-brain interaction involving visceral hypersensitivity, intestinal dysbiosis, altered gastrointestinal motility, immune activation, and psychosocial factors. Migraine, in turn, is a chronic and disabling neurological disease frequently associated with gastrointestinal manifestations. Recent evidence has demonstrated a high coexistence between these conditions, suggesting shared pathophysiological mechanisms mediated by the gut-brain axis, including serotonergic dysfunction, neuroinflammation, increased intestinal permeability, and alterations in the gut microbiota. Furthermore, emotional factors such as anxiety and stress appear to contribute to symptom modulation in both disorders.

Objective
To analyze the association between irritable bowel syndrome and migraine, highlighting the shared pathophysiological mechanisms related to the gut-brain axis.

Methods
A systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and guided by the PICO strategy. Searches were performed in the PubMed, SciELO, and UpToDate databases using the descriptors "Irritable Bowel Syndrome", "Migraine", "Gut-Brain Axis" and "Brain-Gut Interaction Disorders", combined with the Boolean operator AND. Studies published between 2022 and 2026, available in full text, in English or Portuguese, and addressing the clinical and pathophysiological relationship between IBS and migraine were included. Duplicate, incomplete, or unrelated studies were excluded. After applying the eligibility criteria, 18 articles were selected for analysis.

Results
The reviewed studies demonstrated a higher prevalence of migraine among individuals with IBS compared with the general population. Shared mechanisms involving the gut-brain axis were consistently identified, including alterations in gut microbiota composition, visceral hypersensitivity, serotonergic dysfunction, increased intestinal permeability, and systemic inflammatory activation. The involvement of the autonomic nervous system and psychosocial factors, such as anxiety, depression, and chronic stress, was also observed, contributing to the exacerbation of both gastrointestinal and neurological symptoms. Additionally, a negative impact on quality of life was reported, characterized by a higher frequency of chronic pain, sleep disturbances, and functional impairment.

Conclusion
The literature demonstrates a consistent association between IBS and migraine through shared gut-brain axis mechanisms. These findings highlight the importance of multidisciplinary management addressing neuroimmune, emotional, and microbiological factors. Targeted therapies may improve symptom control and quality of life in affected patients.

Keywords:
Migraine
Gut-brain axis
Irritable Bowel syndrome

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High prevalence of pain catastrophizing and sleep disturbances in patients with trigeminal neuralgia: clinical implications

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Introduction
Trigeminal neuralgia (TN) is a complex and debilitating neuropathic condition characterized by paroxysmal episodes of intense, unilateral facial pain, resulting from specific neurophysiological alterations of the trigeminal pathway. Beyond the physical impact, evidence points to a high prevalence of psychological comorbidities, including anxiety and depressive symptoms, pain catastrophizing, and sleep disturbances, factors that can potentiate pain perception and exacerbate global suffering. Despite its clinical relevance, the condition remains frequently underdiagnosed or misdiagnosed as other dental and otolaryngological conditions, favoring inadequate interventions and delaying specialized treatment.

Objective
To investigate the correlation between pain intensity, catastrophizing levels, anxiety, depressive symptoms, and sleep quality in patients with TN.

Methods: Systematic review study based on cross-sectional and observational epidemiological data. The search was performed in PubMed and SciELO databases (2013-2025) using the descriptors "trigeminal neuralgia", "facial pain", and "comorbidities". Following the inclusion criteria, five relevant studies were selected for multidimensional analysis based on validated scales: Visual Analog Scale (VAS), Pain Catastrophizing Scale (PCS), Hospital Anxiety and Depression Scale (HADS), and Pittsburgh Sleep Quality Index (PSQI).

Results
The synthesis of the studies revealed, in a reference sample of 38 patients (68.4% women; mean age 64.4 years), a predominance of right-sided involvement (57%) and the V2+V3 branches (52.6%). In the PCS assessment, 73.7% showed high catastrophizing (> 20), with a median score of 32.5. Regarding the PSQI, 86.8% exhibited poor sleep quality (≥ 6), with rumination being the central predictor of unsatisfactory sleep ($p<0.05$). Using the HADS scale, anxiety was identified in 28.9% (HADS-A ≥ 9) and depression in 34.2% (HADS-D ≥ 9) of the sample. Pain intensity, measured by VAS, was classified as moderate/severe (≥ 4) by 50% of the patients and showed a significant correlation with catastrophizing ($p=0.03$), anxiety ($p=0.04$), and depression ($p=0.01$). Underdiagnosis led 30% to 60% of individuals to undergo iatrogenic dental procedures before clinical confirmation. Additionally, data from an educational intervention showed that 75% of the monitored patients (n=8) achieved symptom control and a drastic reduction in the frequency of hospital visits.

Conclusion
There is a strong correlation between pain scores (VAS), catastrophizing (PCS), and psychiatric disorders (HADS) in patients with TN, which reinforces the need for cognitive-behavioral interventions and educational programs to optimize coping and reduce the helplessness associated with recurrent crises.

Keywords:
Facial pain
Trigeminal neuralgia
Comorbidities

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Association between migraine and cardiovascular risk: a systematic review

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Introduction

Migraine is a common, chronic, and disabling neurological condition manifested as a throbbing and intense headache that affects 12% of the global population. In about one-third of cases, migraine is preceded by transient neurological symptoms, predominantly visual disturbances, known as migraine aura. Beyond the direct burden of the disease, migraine — both with and without aura — has been associated with an increased risk of cardiovascular diseases (CVD), including stroke, transient ischemic attack, sinus tachycardia, atrial fibrillation and other cardiac arrhythmias. In this context, although the association between migraine and cardiovascular risk is firmly established on an epidemiological basis, the pathophysiological mechanisms remain a subject of ongoing investigation.

Objective

To evaluate the association between migraine and cardiovascular risk in the affected patients.

Methods

A systematic review of randomized clinical trials and observational studies was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and structured according to the PICO strategy. The population consisted of patients with migraine, the intervention was presence of migraine compared to individuals without migraine and the outcomes were cardiovascular and cerebrovascular events. The literature search was performed in the PubMed/MEDLINE, Lilacs/BVS and Cochrane Library databases through the combination of the following descriptors: "migraine" AND "cardiovascular risk", resulting in 2044 articles identified. Eligibility criteria included studies whose content was pertinent to the research theme, published within the last five years, and available in full text. A total of 12 articles were selected for analysis.

Results

The studies analyzed indicate that migraine has an intrinsic association with cardiovascular risk. The evidence retrieved demonstrated that individuals with migraine presented a significantly higher risk of peripheral artery disease (119%), ischemic heart disease (117%), and atrial fibrillation (84%). Notably, the prevalence of sinus tachycardia was considerably higher among this population compared to controls (30% vs. 11.8%), and affected individuals with visual aura had a 30% higher cardiovascular risk than controls. Furthermore, ischemic stroke resulting from a migrainous attack with aura accounts for approximately 13% of cerebrovascular events of unusual etiology in young adults.

Conclusion

Migraine has a significant association with cardiovascular risk and affected individuals with aura present even higher vulnerability, reinforcing the importance of cardiovascular risk assessment in migraine management.

Keywords:
Migraine
Cardiovascular risk
Cerebrovascular
Heart disease

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Association between temporomandibular disorders and headache severity: a systematic review

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Introduction
Headache is a highly prevalent disorder classified as either primary (idiopathic) or secondary (caused by another condition). Furthermore, temporomandibular disorders (TMD) involve the temporomandibular joint and associated structures, representing the second most common musculoskeletal disorder associated with pain and disability. In this context, headache emerges as one of the most prevalent symptoms in TMD patients, since both conditions affect the same nociceptive system and utilize trigeminocervical structures involved in central pain modulation.

Objective
To evaluate the association between TMD and headache severity.

Methods
A systematic review of randomized clinical trials and observational studies was conducted, in accordance with de Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, structured according to the PICO strategy, considering: population (patients with headache), intervention/exposure (presence of TMD), comparison (patients without TMD), and outcomes (headache severity). Furthermore, a literature search was performed in the PubMed/MEDLINE, Lilacs/BVS and Cochrane Library databases through the combination of the following descriptors: "Temporomandibular Joint Disorders" AND "headache", resulting in 3.086 articles identified. The eligibility criteria included studies whose content was pertinent to the research theme, published within the last five years, and available in full text. A total of 11 articles were selected for final analysis.

Results
In accordance with the studies conducted, a significant and bidirectional association between TMD and headache severity was identified. TMD was associated with increased headache intensity and frequency, affecting 97.6% of patients. A monthly frequency of ≥1 day was reported by 62.6% of individuals, and 8.5% experienced episodes on more than 15 days. The lack of a direct association between these conditions and age or gender was evident. Notably, one study specifically aimed to assess the prevalence and type of TMD in pediatric patients due to headache, in which the latter was reported as a major complaint in 55% of cases, suggesting that this relationship extends to younger groups. TMD was also analyzed as a possible trigger factor for the manifestation of tension-type headache, as well as a predictor of it becoming chronic. In parallel, TMD was identified in 25% of headache patients, with a higher incidence observed among those with migraine compared to other primary headache diagnoses. Moreover, interventions targeting tension-type headache produced significant improvements in TMD scores, with statistical analysis showing meaningful benefits across all intervention groups (F=5.1, p=0.03), reinforcing their bidirectional association and suggesting that treating one condition may influence the other.

Conclusion
A significant and bidirectional association between TMD and headache severity highlights the need of multidisciplinary management of individuals when both conditions coexist.

Keywords:
Temporomandibular joint disorders
Headache
Comorbidities

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Association between migraine and autism spectrum disorder: a case series of 10 patients

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Introduction

Migraine is a common neurological disorder marked by severe headaches, nausea, and sensitivity to light and sound. Autism Spectrum Disorder (ASD) Level 1 support is characterized by difficulties in social interaction, communication, and restricted behaviors, often accompanied by sensory hypersensitivity and emotional dysregulation. This case series explores the overlap between migraine and ASD Level 1 support in 10 patients, emphasizing sensory hypersensitivity and emotional dysregulation.

Objective

This study aims to explore the association between migraine and subsequent diagnosis of ASD Level 1 support, with a focus on sensory hypersensitivity and emotional dysregulation observed during clinical follow-ups. The coexistence of migraine and ASD Level 1 support, with pronounced sensory hypersensitivity and emotional dysregulation, suggests a potential interrelation between these conditions. Understanding the overlap in symptoms can facilitate early identification and comprehensive management, improving patient outcomes. The findings underscore the importance of recognizing sensory and emotional symptoms in patients with migraine, which may indicate an underlying ASD diagnosis.

Methods

We included 10 patients with a confirmed diagnosis of migraine. These patients were followed up regularly and assessed for symptoms indicative of ASD Level 1 support. The focus was on identifying signs of sensory hypersensitivity and emotional dysregulation, which are common in both migraine and ASD.

Results

The study included 10 patients, with a mean age of 32 years, comprising 7 females and 3 males. Migraine with aura was present in 60% of cases, with an average duration of migraine diagnosis of 5 years. The average time to ASD diagnosis was 2 years after the migraine diagnosis. All patients exhibited heightened sensitivity to light and sound during migraine episodes, and these sensory sensitivities persisted as characteristics of ASD. Additionally, 100% of the patients showed aversion to certain textures, sounds, and lights. Emotional dysregulation, including difficulties in managing emotions, frequent mood swings, and episodes of anxiety and irritability, was reported by 90% of the patients. This emotional instability significantly affected their social interactions and daily functioning.

Conclusion

Identifying ASD in patients with migraine, particularly considering sensory hypersensitivity and emotional dysregulation, can significantly influence treatment strategies and improve quality of life. Further research is essential to elucidate the mechanisms linking these conditions and develop integrated therapeutic approaches. Early intervention and multidisciplinary care are crucial for managing these overlapping conditions effectively.

Keywords:
Migraine
Autism Spectrum Disorder (ASD)
Case series

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The presence of headache intensifies central sensitization in individuals with temporomandibular disorders

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Introduction
Temporomandibular disorder (TMD) is a multifactorial condition frequently associated with chronic pain conditions, including headaches, which may contribute to central sensitization processes and the occurrence of cutaneous allodynia (CA).

Objective
To investigate the influence of headache on the presence of cutaneous allodynia and central sensitization in individuals with temporomandibular disorder.

Methods
This was a cross-sectional study conducted with a non-probabilistic sample composed of young adults aged between 18 and 40 years, of both sexes. Individuals with other chronic diseases, such as fibromyalgia, and those undergoing treatment for TMD were excluded. Participants were divided into two groups: a group with TMD and headache (GTMD) and a control group (CG), composed of individuals with headache without TMD. TMD diagnosis and severity were assessed using the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD); cutaneous allodynia was investigated using the Brazilian version of the Allodynia Symptom Checklist (ASC-12/Brazil); central sensitization was assessed using the Central Sensitization Inventory (CSI); and headache presence was identified through the Headache Screening Questionnaire. Statistical analysis included the Shapiro-Wilk test to verify data normality and Pearson's correlation test to analyze associations between variables, adopting a significance level of $p \leq 0.05$.

Results
A total of 163 individuals were evaluated, including 113 in the GTMD group and 50 in the CG. The groups were homogeneous regarding age, height, body mass index, and sex ($p > 0.05$), except for body weight ($p = 0.023$). A strong and statistically significant positive correlation was observed between TMD associated with headache, cutaneous allodynia ($r = 0.875$), and central sensitization ($r = 0.911$), compared with the control group ($p < 0.001$).

Conclusion
Individuals with TMD and headache showed a greater association with cutaneous allodynia and central sensitization compared to those with headache without TMD, highlighting the importance of evaluating TMD in patients with headache in order to contribute to more targeted therapeutic strategies and improved clinical prognosis.

Keywords:
Central sensitization
Headache
Chronic pain
Temporomandibular disorder
Cutaneous allodynia

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Clinical, behavioral, and metabolic determinants of migraine chronification: a systematic review

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Introduction
Migraine is a highly prevalent and potentially progressive neurological disorder, whose chronification—defined as the transition from episodic to chronic forms—poses a major clinical challenge. Multiple risk factors, particularly modifiable ones such as high attack frequency, inadequate management, and comorbid conditions, play a central role in this process and are critical targets for preventive strategies.

Objective
To evaluate clinical, behavioral, and metabolic risk factors associated with migraine chronification, with emphasis on modifiable determinants and their impact on disease progression.

Methods
This systematic review included studies retrieved from PubMed and LILACS databases using the descriptors "Risk Factors," "migraine," and "chronification" combined with the Boolean operator AND, yielding 84 records. The research question was structured using the PICO framework: in patients with episodic migraine (P), does exposure to modifiable risk factors and triggers (I), compared with non-exposure (C), increase the risk of migraine chronification, defined by higher attack frequency and disability (O). Studies published between 2021 and 2026, with full-text availability and in English, were considered eligible. After applying inclusion and exclusion criteria, 17 studies were selected for full analysis.

Results
Migraine chronification was predominantly associated with modifiable factors. Medication overuse emerged as a major determinant, increasing the risk of progression by up to threefold (OR≈3.0). Higher baseline attack frequency and disability were also strongly linked to chronification (OR≈2.08 for high disability). Psychiatric comorbidities, including depression (OR≈1.33–1.42) and anxiety (OR≈1.24), showed increasing prevalence with rising attack frequency. Additional contributors included allodynia, greater interictal burden, multiple pain-related comorbidities (OR≈1.24–1.30), and increased body adiposity, which was associated with up to a 2.8-fold higher risk. Behavioral factors such as stress, insomnia, smoking, and physical inactivity were also related to increased attack frequency. Conversely, preventive therapies demonstrated a protective effect (OR≈0.69–0.82), underscoring the relevance of prevalent and modifiable epidemiological factors in disease progression.

Conclusion
Migraine chronification is strongly associated with modifiable risk factors, particularly medication overuse, high attack frequency, and psychiatric comorbidities, highlighting the importance of early identification. Targeted strategies focusing on optimized treatment and lifestyle modifications are essential to prevent disease progression and mitigate its clinical burden.

Keywords:
Migraine disorders
Disease progression
Risk factors

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The impact of obesity on the clinical features of migraine: a systematic review

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Introduction
Migraine, a highly prevalent headache disorder, is strongly associated with obesity in the literature. However, its impact on clinical features remains a topic that requires further investigation.

Objective
To evaluate the impact of obesity on migraine clinical features.

Methods
This systematic review was conducted using the PICO strategy and according to the PRISMA guidelines. A search was conducted for studies published in the last 5 years in English, Portuguese, and Spanish in PubMed, Scopus, and Embase databases using the MeSH terms Obesity and Migraine Disorders combined with the Boolean operator "AND". 1,323 studies were identified and underwent double independent screening. Inclusion criteria were studies evaluating the impact of obesity on at least one of the following: attack frequency, pain severity, attack duration, or migraine chronification; observational studies and randomized clinical trials. Exclusion criteria were studies that did not specifically evaluate patients with obesity and/or migraine, resulting in 10 articles for data extraction.

Results
Class 3 obesity was related to a higher migraine headache index (p=0.01) and number of migraines per month (p = 0.007) when compared to healthy-weight controls. A relationship was found between body mass index (BMI), body fat percentage and migraine frequency (p<0.05; p<0.017); those with higher frequency had higher BMI (p=0.018). Waist circumference (WC) demonstrated an association with intensity (p = 0.028) and use of prophylactic medication (p=0.017). There was an association between higher follow-up weight, WC gains and increased headache burden (p=0.05), suggesting a cumulative or mediating role of obesity over time and supporting the link between weight gain and migraine progression. Migraineurs for more than 10 years had higher body weight (p=0.012), WC (p=0.005), and BMI (p=0.019) compared to those for 1 to 5 years, suggesting an impact on disease duration, with high body fat increasing the risk of chronic migraine by 2.8 times (p<0.003). Higher BMI was associated with medication overuse (p=0.015), especially in obese patients when compared with eutrophic or overweight individuals, presenting nearly twice the odds (p=0.009). These findings may suggest that obesity and the pro-inflammatory state caused by fat accumulation contribute to central sensitization, which is associated with an increased frequency of migraine attacks, possibly leading to medication overuse. Two studies did not find an association between obesity and migraine features, especially in groups with non-morbidly obese patients.

Conclusion
Obesity, particularly class 3, has an impact on migraine clinical features, especially regarding attack frequency, chronification and medication overuse. WC and body fat percentage also have an impact on migraine burden, including intensity and duration. Longitudinal and larger studies are needed to better understand this relation.

Keywords:
Migraine
Pathophysiology
Clinical features
Obesity

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The influence of anxiety, depression, and stress on sensory thresholds in patients with migraine

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Introduction
Migraine is a neurological disorder associated with a high prevalence of anxiety, depression, and stress. Additionally, evidence suggests the presence of central sensitization in these individuals, which contributes to the worsening of the clinical presentation of the disease. However, the relationship between emotional factors and alterations in sensory thresholds in this population is not yet well established.

Objective
To investigate the association between levels of anxiety, depression, and stress and sensory thresholds in individuals with migraine

Methods
This is a cross-sectional study including 52 individuals with migraine. Demographic and clinical data were collected, and emotional states were assessed using the Depression, Anxiety and Stress Scale (DASS-21). Sensory thresholds were evaluated using pressure pain thresholds (midpoint of the trapezius and anterior temporal muscles, bilaterally) and thermal thresholds (cold and heat pain thresholds) in the periorbital region (V1 branch, bilaterally). Spearman's correlation analysis was used to assess associations between variables.

Results
No significant associations were observed between DASS-21 domains or total score and pressure pain thresholds ($p>0.05$). In contrast, the anxiety domain showed a negative correlation with periorbital cold pain threshold (rho=-0.276; p=0.048). Furthermore, positive associations were found between anxiety (rho=0.314; p=0.023), depression (rho=0.329; p=0.017), stress (rho=0.278; p=0.046), and total DASS-21 score (rho=0.355; p=0.010) with heat pain threshold, with magnitudes ranging from weak to moderate.

Conclusion
The results suggest that emotional factors are not associated with peripheral alterations assessed by pressure pain thresholds. On the other hand, emotional factors were associated with thermal thresholds in individuals with migraine, particularly regarding heat sensitivity, reinforcing the interaction between central sensitization and emotional aspects. Clinically, these findings indicate that emotional factors may influence central pain modulation, suggesting the need for therapeutic approaches that integrate both physical and emotional aspects in the management of migraine.

Keywords:
Migraine
Anxiety
Depression
Central sensitization
Stress

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02

Cluster headaches and trigeminal autonomic cephalalgia

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From central pharmacology to peripheral modulation: multisite nerve blockade for hemicrania continua when indomethacin is contraindicated

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Introduction

Hemicrania continua (HC) is a primary headache within trigeminal autonomic cephalalgias, defined by continuous strictly unilateral pain with superimposed exacerbations and ipsilateral cranial autonomic features. Absolute response to indomethacin is the diagnostic hallmark per the International Classification of Headache Disorders, 3rd edition (ICHD-3). However, long-term indomethacin is often limited by gastrointestinal, renal, and cardiovascular toxicity. We describe a patient with HC and chronic kidney disease in whom multisite peripheral nerve blockade provided durable pain control.

Case presentation

A 42-year-old woman with stage 1 chronic kidney disease presented with a 6-month history of continuous right-sided periocular, hemifacial, and parietotemporal pain with allodynia, and exacerbations of moderate intensity lasting minutes to hours. She also had stabbing pains of 3 to 5 seconds, occurring 1 to 3 times daily in the same region. Most episodes were accompanied by ipsilateral lacrimation, conjunctival injection, and nasal congestion. Oral indomethacin in ascending doses over 30 days produced complete pain relief, confirming HC per ICHD-3 criteria, and was discontinued due to renal contraindication. Topiramate at 50 mg/day was partially effective. A nerve blockade was performed targeting the greater and lesser occipital, auriculotemporal, supraorbital, and supratrochlear nerves, and the sphenopalatine ganglion, with 2% lidocaine. The patient was pain-free for 14 days. Later recurrences responded to simple analgesics, and improvement persisted at 2-month follow-up.

Discussion

The choice of multisite peripheral nerve blockade was based on its known central mechanism and on prior reports of efficacy in HC. Local anesthetic blocks afferent nociceptive input from the targeted nerves. Functional imaging in HC has shown activation of the contralateral posterior hypothalamus and ipsilateral dorsal rostral pons, involved in descending pain modulation. Reducing peripheral input may interrupt this descending facilitation. Adding the sphenopalatine ganglion engages parasympathetic outflow, clinically relevant in HC given the autonomic features. An open-label series showed multisite blockade achieving response rates above 80% in HC, higher than isolated occipital blockade, with a safety profile more favorable than that of chronic indomethacin. Serial blockade may serve as maintenance when indomethacin remains contraindicated. Paroxysmal hemicrania, which is abolished by indomethacin, was ruled out by the continuous baseline pain. Short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing or with cranial autonomic symptoms were ruled out because they do not respond to indomethacin.

Conclusion

Multisite peripheral nerve blockade with sphenopalatine ganglion targeting should be considered as a transitional or maintenance therapy in HC patients with contraindications to indomethacin, including chronic kidney disease.

Keywords:
Trigeminal autonomic cephalalgia
Hemicrania continua
Nerve block

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TAC-tic syndromes: a case series on the complex overlap between trigeminal autonomic cephalalgias and trigeminal neuralgia

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Introduction

Trigeminal autonomic cephalalgias (TACs) and trigeminal neuralgia (TN) are classified as distinct entities by the ICHD-3, yet their co-occurrence as TAC-tic overlap syndromes is increasingly reported. When these conditions coexist, two distinct phenotypes must be recognized and independently treated, despite shared features of strict unilaterality and trigeminal territory involvement.

Case presentation

We describe five women, aged 47 to 84 years, with TAC-tic overlap syndromes: two SUNCT-tic, two cluster-tic, and one paroxysmal hemicrania-tic (PH-tic). All patients presented a TN component, characterized by brief shock-like paroxysms in the trigeminal territory, and a TAC component, characterized by longer, severe unilateral attacks with ipsilateral cranial autonomic features. In Case 1, TN in V2 preceded SUNCT by 11 years; later, left V1/V2 attacks lasting 45–90 seconds, occurring up to 10 times per hour with tearing, conjunctival injection, and rhinorrhea, developed in recurrent bouts. Partial control was achieved with carbamazepine and lamotrigine, and after neurovascular compression was identified, microvascular decompression led to complete 2-year remission. In Case 2, right periorbital/temporal attacks lasting 2–3 minutes, up to more than 15 per day, with profuse tearing and conjunctival injection, were classified within the SUNCT/SUNHA spectrum with SUNCT phenotype, although at the longer end of the ICHD-3 duration range. Nine months later, a distinct TN phenotype emerged, with 1-second V1/V2 shocks triggered by eating. A vascular loop was later identified, and microvascular decompression led to complete remission. In Case 3, infraorbital TN shocks coexisted with cluster attacks lasting 90–120 minutes, with rhinorrhea, tearing, conjunctival injection, and agitation; control was achieved with nerve blocks, carbamazepine, and verapamil. In Case 4, cluster-like supraorbital attacks lasting 40–60 minutes coexisted with tactile-triggered TN paroxysms and resolved after nerve block, carbamazepine, and verapamil, with sustained remission after withdrawal. In Case 5, TN preceded PH by 26 years; explosive attacks lasting 15–20 minutes, 4–8 per day, with tearing, periorbital edema, agitation, and suicidal ideation, were markedly reduced by indomethacin, while TN required neuromodulator adjustment.

Discussion

SUNCT-tic cases showed neurovascular compression and remission after decompression, supporting a relevant peripheral mechanism. In cluster-tic and PH-tic cases, absence of compression and differential responses to verapamil, nerve blocks, indomethacin, and neuromodulators suggest interaction between central trigeminal-autonomic dysfunction and peripheral trigeminal mechanisms.

Conclusion

TAC-tic syndromes are rare, likely underrecognized, and diagnostically complex. Dual-phenotype characterization based on ICHD-3 criteria with treatment directed at each component independently enabled satisfactory control in all five cases.

Keywords:
Trigeminal neuralgia
Trigeminal autonomic cephalalgias
SUNCT syndrome
Cluster headache
Paroxysmal hemicrania

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Image-guided pulsed radiofrequency of the sphenopalatine ganglion for refractory trigeminal-autonomic facial pain: a case report

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Introduction
Facial pain syndromes overlapping trigeminal neuralgia and trigeminal-autonomic cephalalgias (TACs) present significant therapeutic challenges. When intractable to optimized pharmacology, interventional neuromodulation targeting the sphenopalatine ganglion (SPG) emerges as a promising option. Pulsed radiofrequency (PRF) delivers high-voltage electric fields to modify synaptic signaling without thermal neurolysis, preventing permanent neurological deficits.

Case presentation
A 62-year-old male presented with a 5-year history of severe, recurrent, and highly refractory right-sided unilateral facial pain, reporting a baseline Numerical Rating Scale (NRS) score of 10/10. Although the initial presentation features overlapped with trigeminal neuralgia, the clinical presentation exhibited atypical features that deviated from the classical pattern, highlighted by prominent ipsilateral cranial autonomic symptoms (rhinorrhea, conjunctival injection, and lacrimation) and daily nocturnal crises. Structural brain magnetic resonance imaging revealed no neurovascular conflicts or relevant structural abnormalities. Prior pharmacological interventions—including maximum tolerated doses of anticonvulsants and neuromodulators, such as carbamazepine and pregabalin, alongside frequent opioid rescue medication—yielded unsatisfactory pain relief and persistent functional impairment. Given the therapeutic refractoriness and the clear involvement of the trigeminal-autonomic reflex loop, SPG neuromodulation via PRF was indicated. The procedure was performed under strict fluoroscopic guidance using a transcoronoid infrazygomatic approach. The radiofrequency cannula was meticulously advanced until its active tip was accurately positioned within the pterygopalatine fossa, targeted immediately posterior to the maxillary sinus wall and anterior to the pterygoid plates. Optimal sensory stimulation replicated the patient's typical pain distribution, confirming target accuracy prior to delivering the standard PRF cycles.

Discussion
The SPG is a critical relay in the trigeminal-autonomic reflex loop. Long-standing nocturnal attacks and localized autonomic dysregulation strongly implicate SPG hyperactivity. Fluoroscopic-guided percutaneous PRF allows a highly precise approach to the pterygopalatine fossa without injuring adjacent maxillary nerve branches. By maintaining tissue temperature below 42°C, PRF induces synaptic depression, normalizing the trigeminovascular hypersensitivity loop without destructive lesioning.

Conclusion
The procedure yielded immediate technical success. At the 3-month follow-up, the NRS score decreased from 10/10 to 3/10, and attack frequency transitioned from daily nocturnal crises to rare weekly episodes. A substantial reduction in rescue analgesics was achieved, with complete resolution of autonomic symptoms and restoration of normal sleep patterns. Image-guided PRF of the SPG represents a safe, technically feasible, and minimally invasive intervention for refractory atypical facial pain.

Keywords:
Facial pain
Sphenopalatine ganglion
Pain

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Hemicrania continua and temporomandibular disorders: overlap of chronic painful conditions and tinnitus as a reflex symptom

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Introduction

Hemicrania continua is a primary trigeminal autonomic headache described as a persistent, strictly unilateral pain associated with ipsilateral autonomic signs such as conjunctival injection, lacrimation, nasal congestion, rhinorrhoea, forehead and facial sweating, miosis, ptose, and/or eyelid oedema, and/or restlessness or agitation. Tinnitus is the conscious perception of a sound without a corresponding external acoustic stimulus, of multifactorial etiology, and primarily linked to peripheral and central auditory alterations. In turn, temporomandibular disorder (TMD) encompasses a cluster of clinical conditions involving the masticatory muscles, the temporomandibular joint (TMJ), and associated structures, mainly characterized by facial pain, limited jaw movement, and joint noises. The correct identification and meticulous differential diagnosis of orofacial pain are of paramount importance in clinical practice, since the overlap of these chronic painful conditions frequently mimics or masks primary headaches. Failure to recognize these intersections perpetuates misdiagnoses and delays proper treatment for decades, prolonging patient suffering.

Case presentation

A 47-year-old female patient, with a prior diagnosis of fibromyalgia, sought care at a TMD and Orofacial Pain clinic with multiple painful complaints. She presented with daily, bilateral, sharp pain in the jaw and during mandibular function (worse on the left side), alongside a severe (VAS 10/10) pulsatile left-sided tinnitus accompanied by aural fullness for 6 months. A detailed medical history revealed a second overlapping, never-before-diagnosed painful condition: a left-sided headache with a 23-year history, pulsatile and stabbing in nature (VAS 10/10), accompanied by ipsilateral nausea, vomiting, nasal congestion, and rhinorrhoea. Following physical examination, she was diagnosed with myofascial pain with temporomandibular and cervical reference, left TMJ capsulitis, awake bruxism, subjective tinnitus, and hemicrania continua (remitting subtype). Treatment included a multimodal approach for TMD (pain education, awake bruxism guidance, sleep hygiene, thermotherapy, mandibular exercises, and cervical stretching) and a prescription of Indomethacin (25 mg/day) for hemicrania continua. After 30 days, complete remission of the headache and significant improvement in both tinnitus and orofacial symptoms were observed.

Discussion

This clinical case reinforces that tinnitus, beyond its classical otological etiology, can manifest as a reflex symptom or comorbidity of craniofacial painful conditions and trigeminal autonomic headaches, sharing pathways of central convergence and pain modulation that go underdiagnosed in the absence of specialized multiprofessional evaluation.

Conclusion

Integrated multimodal and multidisciplinary care is crucial to identify overlapping disorders and optimize outcomes in complex craniofacial pain patients.

Keywords:
Trigeminal autonomic cefalalgias
Hemicrania
Temporomandibular joint disease
Tinnitus

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Cluster headache with side-changing attacks: a case report and diagnostic challenges

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Introduction
Cluster headache is a primary headache disorder characterized by severe unilateral pain associated with autonomic symptoms and/or motor restlessness. Its estimated prevalence ranges from 41 to 381 cases per 100,000 inhabitants. However, it remains an underdiagnosed condition, with patients experiencing an average diagnostic delay of 5.7±6.7 years. In this context, atypical presentations may make diagnosis even more challenging, highlighting the importance of reporting such cases.

Case presentation
A 63-year-old male presented with a 10-year history of headache characterized by unilateral, excruciating, and disabling pain associated with conjunctival injection, lacrimation, and nasal congestion. During attacks, the patient exhibited agitation and photophobia. Episodes lasted 15–20 minutes and occurred approximately three times daily. He experienced cluster periods lasting about two months, separated by pain-free intervals of approximately ten months. During these active cluster periods, the patient reported alternating pain sides within the same cluster period. Neurological examination revealed no significant abnormalities. MRI showed signs of global cerebral atrophy (GCA 1) and microangiopathy (Fazekas 1). The patient fulfilled diagnostic criteria for cluster headache. Significant improvement was observed after treatment with verapamil and dexamethasone during cluster periods.

Discussion
Cluster headache classically presents with unilateral pain. Most patients (84–91%) do not experience changes in pain laterality, while the remaining patients present side-shifting attacks between different cluster periods. Alternating pain laterality within the same active cluster period is considered a rare presentation in the literature. The pathophysiology supports its unilateral presentation and involves a complex interaction between the trigeminovascular system, parasympathetic pathways, and the hypothalamus, with PET and functional MRI studies demonstrating unilateral hypothalamic activation during attacks, thereby reinforcing the lateralized nature of the disorder. However, the pathophysiology underlying side-shifting attacks remains unknown. Previous reports suggest a higher association between alternating laterality and chronic forms of the disease or prior occipital nerve corticosteroid injections, characteristics that were absent in the present case. It is likely that, in clinical practice, identification of side-shifting attacks is underestimated; in a study by Youn et al., 13 out of 124 patients presented alternating laterality within the same cluster period. Patients with these atypical phenotypes are at increased risk of remaining unrecognized.

Conclusion
This case illustrates an atypical presentation of cluster headache characterized by alternating laterality within the same cluster period. Recognition of the phenotypic variability of cluster headache is essential to avoid underdiagnosis and ensure appropriate diagnosis and treatment.

Keywords:
Cluster headache
Trigeminal autonomic cephalalgias
Primary headache disorders

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Microstructural alterations in the periaqueductal gray matter and hypothalamic connectivity in patients with refractory chronic cluster headache

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Introduction

Cluster headache is one of the most severe and disabling forms of primary headache disorder. Recent studies have demonstrated a pathophysiological association with specific neural structures, particularly the hypothalamus, which is considered the central generator of the disease due to its characteristic cyclic pattern. Additionally, the periaqueductal gray matter (PAG), a key modulator of nociceptive transmission, exhibits functional abnormalities and structural alterations in affected individuals, contributing to the hyperexcitability of trigeminal and spinal nociceptive pathways. In this context, evaluating the influence of cellular and structural changes in these regions on clinical refractoriness in the chronic form of cluster headache is of paramount importance.

Objective

To analyze microstructural alterations in the periaqueductal gray matter and hypothalamic connectivity in patients diagnosed with refractory chronic cluster headache.

Methods

A systematic review was conducted using the PubMed, Google Scholar, NIH, and Cochrane databases. Searches employed combinations of the descriptors "Cluster Headache", "Periaqueductal Gray" and "Hypothalamus" in both English and Portuguese. Publications between 2010 and 2026 investigating microstructural alterations in the periaqueductal gray matter and hypothalamic connectivity through advanced neuroimaging techniques in patients with refractory chronic cluster headache were included. Studies focused on episodic cluster headache or pediatric populations were excluded.

Results

The findings suggest the presence of microstructural and functional alterations involving the hypothalamus, the PAG, and pain-modulating neural circuits. Diffusion tensor imaging studies demonstrated reduced fractional anisotropy (FA) and increased mean diffusivity (MD) within the hypothalamus, as well as bilateral increases in thalamic FA, suggesting remodeling of nuclei involved in nociceptive processing. Diffuse white matter abnormalities were identified in limbic, parahippocampal, frontal, and cerebellar regions, with anatomical connections linking these areas to the ipsilateral hypothalamus. Functional analyses revealed reduced connectivity between the central executive network and the salience network, as well as abnormal connectivity between the default mode network and executive brain regions. Studies involving the PAG also demonstrated increased connectivity with nociceptive circuits and sensorimotor regions, including the thalamus, insula, and hypothalamus, which was associated with increased attack frequency. These findings support the hypothesis that dysfunction within hypothalamic, cortical, and PAG-related networks may contribute to the chronification of cluster headache.

Conclusion

Refractoriness in chronic cluster headache appears to be directly associated with anatomical and microstructural alterations of the periaqueductal gray matter and hypothalamic connectivity.

Keywords:
Cluster headache
Hypothalamus
Periaqueductal gray

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Sleep disturbances in trigeminal autonomic cephalalgias: clinical implications and pathophysiological insights — a systematic review

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Introduction
Trigeminal autonomic cephalalgias (TACs), particularly cluster headache, are characterized by severe attacks with marked circadian patterns, frequently arising during sleep. This temporal organization reflects a close interaction between hypothalamic function, circadian regulation, and trigeminal–autonomic activation, positioning sleep and chronobiological mechanisms as central components of TAC pathophysiology.

Objective
To investigate the pathophysiological and chronobiological relevance of sleep disturbances in trigeminal autonomic cephalalgias.

Methods
Sleep-related abnormalities in trigeminal autonomic cephalalgias were evaluated through a systematic review conducted according to PRISMA 2020 guidelines. Publications indexed in PubMed/MEDLINE, SciELO, and LILACS between January 2016 and April 2026 were screened for randomized and observational studies assessing sleep through polysomnography, actigraphy, or validated questionnaires in adult patients with TACs. Studies without defined sleep outcomes, pediatric samples, or experimental models were excluded. Search terms included "trigeminal autonomic cephalalgias," "cluster headache," "sleep disturbances," "sleep architecture," and "circadian rhythm." Risk of bias was assessed qualitatively using the Newcastle-Ottawa Scale for observational studies.

Results
The included studies, predominantly involving cluster headache, demonstrated a consistent association between sleep disturbances, increased attack frequency, and greater clinical burden, with impaired sleep quality affecting more than 60% of patients across active and remission phases. From 240 identified records, 51 duplicates were removed; of the 189 records screened, fourteen studies met full inclusion criteria, comprising 1,124 patients. Polysomnographic findings included prolonged REM latency, reduced REM proportion, increased microarousals, and decreased sleep efficiency, often independent of nocturnal attacks. Circadian dysregulation was observed in approximately 70% of patients, with nocturnal clustering between 21:00 and 03:00. Neuroendocrine alterations, including reduced melatonin, altered cortisol rhythmicity, and decreased hypocretin-1 levels, suggest the presence of hypothalamic dysfunction linking circadian disruption to trigeminal–autonomic activation.

Conclusion
Sleep disturbances in trigeminal autonomic cephalalgias reflect disruption of hypothalamically regulated circadian and sleep processes, contributing to both attack generation and disease persistence. Although the available evidence is predominantly observational and methodologically heterogeneous, findings consistently support the role of circadian dysregulation in TAC pathophysiology. Prospective studies integrating standardized sleep assessment and circadian biomarkers are needed to better define causal mechanisms and evaluate sleep-targeted interventions in TACs.

Keywords:
Trigeminal autonomic cephalalgias
Cluster headache
Sleep disturbances
Circadian rhythm
Hypothalamus

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Neuromodulatory and interventional therapies in trigeminal autonomic cephalalgias: a systematic review

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Introduction
Trigeminal autonomic cephalalgias (TACs) are rare primary headache disorders characterized by severe unilateral pain and ipsilateral cranial autonomic symptoms, encompassing cluster headache, paroxysmal hemicrania, hemicrania continua, and SUNCT/SUNA.

Objective
To analyze the main therapeutic approaches used in the management of trigeminal autonomic cephalalgias, with a particular focus on neuromodulatory therapies.

Methods: A systematic literature review was conducted using the PubMed and LILACS databases. The search strategy employed was: "Trigeminal Autonomic Cephalalgias" [Title] AND "treatment", yielding an initial total of 55 articles. The research question was structured according to the PICO framework, considering: population (patients with trigeminal autonomic cephalalgias), intervention (neuromodulatory and interventional therapies), comparison (conventional pharmacological treatment or no intervention), and outcomes (reduction in attack frequency and severity, clinical improvement, and treatment tolerability). Studies published between 2021 and 2026, available in full text, free of charge, and written in English were included. After applying the eligibility criteria, five studies were selected for full-text analysis.

Results
Based on the analyzed studies, the management of trigeminal autonomic cephalalgias remains challenging. Corticosteroids, triptans, and verapamil were widely used for cluster headache, whereas indomethacin remained the standard treatment for hemicrania continua and paroxysmal hemicrania, despite limitations related to poor tolerability and gastrointestinal adverse effects. In refractory cases, interventional approaches demonstrated promising outcomes. Occipital, supraorbital, and supratrochlear nerve blocks significantly reduced attack frequency and severity, with near-complete symptom resolution reported in some patients with post-traumatic headaches presenting TAC-like features. Peripheral nerve decompression surgery also showed sustained benefits in patients intolerant to indomethacin, achieving pain reductions of up to 90% with long-term maintenance of clinical improvement. Furthermore, non-invasive vagus nerve stimulation (nVNS) demonstrated clinical benefit in approximately 65% of patients, particularly as a preventive therapy, with more than a 50% reduction in attack frequency among most responders and a low incidence of serious adverse events. These findings highlight the potential of neuromodulatory and interventional therapies as effective alternatives for refractory TACs or for patients with contraindications to conventional pharmacological treatment.

Conclusion
The treatment of trigeminal autonomic cephalalgias remains challenging, particularly in refractory cases. However, neuromodulatory therapies and peripheral interventions have shown promising results in reducing attack frequency and severity, representing effective therapeutic alternatives for patients with intolerance or inadequate response to conventional pharmacological management.

Keywords:
Neuromodulation
Vagus nerve stimulation
Trigeminal autonomic cephalalgias
Treatment outcome
Headache disorders

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Evidence of glymphatic dysfunction in cluster headache: the interface between sleep, circadian rhythms, and hypothalamic activity

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Introduction
Cluster headache exhibits marked circadian periodicity and is frequently associated with sleep disturbances, suggesting a central role of the hypothalamus and chronobiological mechanisms in its pathophysiology. In parallel, the glymphatic system plays a fundamental role in cerebral homeostasis and metabolite clearance during sleep, and its dysfunction has been associated with neuroinflammatory processes and various pain syndromes. In this context, emerging evidence suggests that glymphatic alterations may act as a potential pathophysiological link between sleep disturbances, circadian dysregulation, and hypothalamic activation in cluster headache.

Objective
Investigate the role of glymphatic system dysfunction as a potential pathophysiological link between sleep disturbances, circadian dysregulation, and hypothalamic activity in cluster headache.

Methods
This systematic review was conducted using publications retrieved from the PubMed and Google Scholar databases between 2015 and 2025. The descriptors "Cluster Headache", "Glymphatic System", "Sleep", "Circadian Rhythm", and "Hypothalamus" were combined using the Boolean operators AND and OR. Original studies published in English addressing chronobiological aspects, sleep disturbances, hypothalamic activity, and glymphatic dysfunction in cluster headache were included. Narrative reviews, editorials, and studies not directly related to the proposed topic were excluded.
Results: Diffusion tensor imaging findings demonstrated a significant reduction in the DTI-ALPS index in patients with cluster headache compared with healthy controls (1.586 vs. 1.786; p=0.044), suggesting persistent impairment of glymphatic function. The index also showed a negative correlation with age (r=-0.549; p=0.042). Clinically, up to 80% of patients identified sleep as the main trigger for headache attacks, exhibiting marked sleep fragmentation and pathological scores on the Pittsburgh Sleep Quality Index (PSQI). Since glymphatic activity depends on the integrity of deep sleep, hypothalamic-driven circadian dysregulation may promote inefficient cerebral clearance, leading to the accumulation of toxic metabolites and oxidative stress, which may amplify and sustain trigeminal nociceptive pathway activation.

Conclusion
Current evidence suggests that glymphatic system dysfunction may represent an important pathophysiological link between sleep disturbances, circadian dysregulation, and hypothalamic activity in cluster headache. Impaired cerebral clearance may contribute to neuroinflammatory processes and the perpetuation of trigeminovascular activation, emerging as a potential therapeutic target for future investigations.

Keywords:
Cluster headache
Circadian rhythm
Glymphatic system

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Effectiveness of therapeutic interventions in short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing: a systematic review

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Introduction

Short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) is a rare but extremely debilitating trigeminal autonomic cephalalgia. Its treatment includes several therapeutic options whose relative effectiveness requires further understanding.

Objective

To evaluate the effectiveness of available treatments for SUNCT.

Methods

This systematic review was conducted using the PICO strategy and according to the PRISMA guidelines. A search was conducted for studies published in the last 10 years in English, Portuguese, and Spanish in PubMed, Scopus and Embase databases using the MeSH terms SUNCT Syndrome and Treatment Outcome combined with the Boolean operator "AND". 113 studies were identified and underwent double independent screening. Inclusion criteria were studies evaluating the clinical impact and/or efficacy of treatment options in patients diagnosed with SUNCT; observational studies and randomized clinical trials. Exclusion criteria were studies that did not evaluate patients diagnosed with SUNCT or coexisting conditions that could alter the response to the treatment itself, resulting in 5 articles selected for data extraction.

Results

SUNCT patients demonstrated responsiveness especially to lamotrigine (54 to 62%), followed by oxcarbazepine (45%) and topiramate (33 to 48%) in long-term preventive treatment, suggesting a potential role of sodium channel dysregulation in SUNCT pathophysiology. In short-term prevention, intravenous infusion of lidocaine was highly efficacious as a short-term therapy (91 to 100%), but poor response was observed in chronic SUNCT patients; greater occipital nerve injections were beneficial, but to a lesser extent (24 to 50%). In treatment-refractory patients, trigeminal microvascular decompression was associated with reductions in pain severity, attack duration, Headache Impact Test scores, and interictal pain (all $p<0.05$), with 67.7% responding to the treatment, while patients with pre-operative magnetic resonance abnormalities showed higher response rates ($p=0.001$). Sphenopalatine ganglion pulsed radiofrequency presented favorable outcomes in treatment-refractory SUNCT patients in the long term, with a mean improvement of 53% in severity and/or frequency, which persisted for a mean of 6.4 months; however, 40% of them experienced a worsening of head pain for 2 to 4 weeks immediately after the procedure.

Conclusion

For long-term prevention, lamotrigine and topiramate appeared to be the most effective treatments, and the same was observed for intravenous lidocaine in the short term, but not in chronic cases. For treatment-refractory patients, trigeminal microvascular decompression appears to be a promising therapeutic option. Larger longitudinal studies are necessary for better comprehension of the most effective treatment strategies.

Keywords:
Trigeminal autonomic cephalalgias
Treatment outcome
SUNCT syndrome

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Gasserian ganglion balloon compression versus carbamazepine for the management of trigeminal neuralgia

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Introduction
Refractory trigeminal neuralgia (TN) causes severe, disabling paroxysmal pain. Although pharmacological escalation with carbamazepine (CBZ) is standard, prolonged drug retention despite treatment failure characterizes clinical inertia.This delayed surgical referral exposes patients to cumulative toxicity without long-term analgesic benefits, worsening functional and quality-of-life trajectories.

Objective
To systematically review how the timing of transition to Gasserian ganglion balloon compression (GGBC) impacts long-term functional recovery, recurrence-free survival, and medication burden.

Methods
A systematic review was conducted following PRISMA 2020 guidelines and registered in PROSPERO (CRD420251133911). Electronic searches were performed across PubMed, Embase, and the Cochrane Library for clinical trials and cohort studies published between 2015 and 2025 in English, Spanish,and French. Case reports, pediatric populations, and studies lacking quantitative functional outcomes were excluded. Initial screening identified 66 records, which were uploaded to the Rayyan QCRI platform for blinded, independent title and abstract selection by two reviewers. After removing 14 duplicates,45 studies were excluded during the blind screening phase for failing eligibility criteria Discrepancies were resolved by a third senior reviewer, resulting in 7 articles for final analysis. Risk of bias was independently assessed utilizing the Cochrane RoB 2 tool for randomized trials and the ROBINS-I tool for cohorts. Given the methodological heterogeneity,small sample sizes, and a pervasive lack of blinding (performance and detection bias) across the literature, a qualitative narrative synthesis approach was adopted.

Results
The 7 included studies represented a cumulative cohort of 642 patients (GGBC: n=312; CBZ: n=330; age range: 54–78 years). Synthesized data revealed that prolonged pharmacological persistence (>12 months of failed high-dose CBZ) strongly correlates with poorer long-term functional recovery and baseline sleep impairment. While GGBC achieved immediate pain remission in 82% to 91% of cases, patients subjected to earlier percutaneous transition demonstrated superior recurrence-free survival and enhanced functionality at 24 months. Conversely, persistent CBZ cohorts faced a 41% rate of severe systemic adverse events (dizziness, ataxia, cognitive slowing) and late therapeutic escape, contributing to avoidable, cumulative disability. Post-GGBC local complications (transient facial hypoesthesia in 62.1%; masseter weakness in 18.3%) resolved within a few months and did not track with long-term functional impairment.

Conclusion
Therapeutic inertia in refractory TN prolongs systemic toxicity exposure and delays durable analgesia. Shifting the clinical paradigm from using percutaneous intervention as a final rescue modality to executing an earlier, proactive strategic transition optimizes long-term functional outcomes, minimizes medication burden, and mitigates cumulative disability.

Keywords:
Headache
Pain
Trigeminal neuropathy

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Cluster headache and circadian dysregulation: hypothalamic mechanisms, sleep alterations and clinical implications

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Introduction
Cluster headache (CH) is one of the most disabling primary headache disorders, characterized by excruciating unilateral orbitotemporal pain associated with cranial autonomic symptoms. Unlike other headache syndromes, CH exhibits marked circadian and circannual periodicity, with attacks frequently occurring at fixed times, particularly during sleep. Evidence supports hypothalamic involvement, especially dysfunction of the suprachiasmatic nucleus, alongside altered melatonin secretion and disturbances in REM sleep, suggesting an important neurocircadian component in disease pathophysiology.
Objective: To evaluate the relationship between cluster headache and circadian rhythm, discussing underlying neurobiological mechanisms, temporal attack patterns, and clinical implications.

Methods
A systematic review with meta-analysis was conducted according to PRISMA 2020 guidelines. Searches were performed in PubMed, MEDLINE, Embase, Cochrane Library, and SciELO for studies published between 2010 and 2026. Clinical trials, observational studies, systematic reviews, and neuroimaging investigations addressing circadian aspects of CH were included. Data focused on pathophysiology, sleep alterations, hormonal findings, and clinical outcomes.

Results
Most patients demonstrated attacks occurring at predictable circadian intervals, predominantly during nighttime periods. Functional neuroimaging studies revealed activation of the inferior posterior hypothalamic gray matter during painful episodes, supporting a central role of hypothalamic dysregulation. Reduced melatonin levels, altered cortisol rhythmicity, and decreased REM sleep were recurrent findings, indicating disruption of biological clock regulation. Recognition of these chronobiological patterns may improve diagnostic accuracy and support therapeutic approaches involving chronomodulation and melatonin use.

Conclusion
Cluster headache is strongly associated with circadian dysfunction involving hypothalamic activation, neuroendocrine alterations, and sleep disturbances. Understanding brain–clock interaction may refine diagnosis and contribute to more effective therapeutic strategies and improved patient outcomes.

Keywords:
Cluster headache
Circadian rhythm
Hypothalamus
Melatonin

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Factors associated with suicidal ideation in patients with cluster headache: a systematic review

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Introduction
Cluster headache is a primary headache disorder characterized by severe unilateral pain attacks accompanied by autonomic symptoms and is considered one of the most disabling painful conditions in neurology.

Objective
To analyze the main factors associated with suicidal ideation in patients with cluster headache, focusing on clinical, psychological, and psychosocial aspects.

Methods
This systematic review was conducted using the PubMed and Virtual Health Library databases, following the PICO strategy. The population included patients with cluster headache, while the exposure factors comprised pain intensity, attack frequency, depression, anxiety, demoralization, and quality of life. The outcome evaluated was suicidal behavior. The search strategy used the descriptors: "Cluster Headache" AND ("Suicide" OR "Suicidal Ideation" OR "Suicidality"). A total of 632 studies were initially identified. After applying the inclusion criteria - studies published within the last five years, available in full text, and written in English - 29 articles were included in the analysis.

Results
The studies demonstrated a high prevalence of suicidal ideation among patients with cluster headache, particularly during active headache periods. The main associated factors included greater pain severity, longer disease duration, high attack frequency, increased headache-related disability, and worse functional impairment. Depressive symptoms, anxiety, demoralization, and anticipatory fear of attacks were strongly associated with increased suicide risk, with some studies suggesting that demoralization may be more closely related to suicidal ideation than depression itself. Poor quality of life, greater psychosocial burden, painful comorbidities, and unfavorable socioeconomic conditions were also associated with increased risk. In addition, recent evidence suggests abnormalities in brain regions involved in pain and emotional processing, such as the hypothalamus and limbic system, which may contribute to the greater psychiatric vulnerability observed in these patients.

Conclusion
The severe pain associated with cluster headache, together with its functional and psychological burden, contributes to increased psychiatric vulnerability. Furthermore, depression, anxiety, demoralization, and poor quality of life were consistently associated with higher suicide risk. Therefore, mental health assessment and suicide risk screening should be incorporated into the clinical management of these patients, allowing earlier identification of high-risk individuals and more comprehensive therapeutic interventions.

Keywords:
Cluster headache
Associated factors
Suicide

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03

Primary and secondary headaches



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Bilateral Ménière's disease and vestibular migraine: diagnostic overlap, otolith electrophysiology findings, and multimodal treatment response

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Introduction

Bilateral Ménière's Disease (BMD) and Vestibular Migraine (VM) are underdiagnosed vestibular disorders with overlapping phenotypes — episodic vertigo, auditory symptoms, and emotional triggers. VEMPs are critical for characterizing otolith dysfunction and supporting dual diagnosis. This case fulfills criteria for both BMD and VM, confirmed by bilateral otolith dysfunction on cVEMP and oVEMP, with therapeutic benefit through multimodal management.

Case presentation

A 55-year-old female caregiver presented with rotatory vertigo for over 10 years, with near-daily crises lasting minutes in recent months. She reported bilateral progressive hearing loss (hearing aid user), persistent bilateral tinnitus, aural fullness, auditory fluctuation, and vertigo worsening under emotional stress. Personal migraine history was noted. She denied comorbidities, smoking, or alcohol use. Prior medications: betahistine 48 mg/day, hydrochlorothiazide 50 mg/day (2×25 mg), duloxetine 30 mg/day. Otoscopy: normal bilaterally. Frenzel: mild left-beating nystagmus. Brandt-Daroff: objectively positive (clockwise torsional and left geotropic nystagmus). Caloric testing: left vestibular hypofunction (PD=15%). Smooth pursuit type I. cVEMP (500 Hz): bilaterally prolonged P13/N23 latencies (P13 up to 17.7 ms), IR ≤40% — bilateral saccular-cervical dysfunction. oVEMP (500 Hz): bilaterally prolonged N10 latencies (up to 13.3 ms), IR=30%, lower left amplitudes — bilateral utricular-ocular involvement. Temporal bone CT and mastoid MRI: normal. Diagnosis: BMD with VM (ICD R42). At initial visit: duloxetine replaced by venlafaxine 75 mg/day; betahistine increased to 48 mg every 8 hours (144 mg/day); hydrochlorothiazide reduced to 25 mg/day; vestibular rehabilitation, psychological support, and a headache-vertigo diary initiated. At 3-month follow-up: vertigo VAS 8 7/10; crises persisting >3×/week; DHI 70 (severe); structured abortive protocol established. At 6 months: significant improvement in migraine frequency and vertigo intensity.

Discussion

Shared pathophysiological mechanisms — endolymphatic hydrops and trigeminovascular sensitization — may underlie BMD-VM co-occurrence. Bilateral VEMP abnormalities provided otolith pathway evidence beyond caloric testing, reinforcing BMD despite normal neuroimaging. Emotional triggers and migraine history fulfilled ICHD-3 VM criteria. Venlafaxine, with established VM prophylactic efficacy, replaced duloxetine. Betahistine escalation to 144 mg/day aligns with evidence favoring higher doses in Ménière's disease; diuretic reduction minimized the hypotension. The modest VAS gain (8 7/10) and DHI of 70 at 3 months reflect dual-diagnosis complexity; the 6-month trajectory confirms cumulative multimodal benefit. Limitations include absence of electrocochleography and gadolinium-enhanced MRI.

Conclusion

BMD and VM may coexist, amplifying vestibular disability. VEMPs are essential for otolith characterization. Combined pharmacological treatment and vestibular rehabilitation yield meaningful improvement.

Keywords:
Ménière's disease
Vestibular migraine
VEMP
Dizziness
Otolith dysfunction

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Intracranial hypotension masking a complex lymphatic anomaly: a case of skull base CSF-lymphatic leak

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Introduction
Spontaneous intracranial hypotension (SIH) is a debilitating condition typically resulting from cerebrospinal fluid (CSF) leaks. While most cases are idiopathic or related to spinal discogenic microspurs, rare systemic conditions can predispose individuals to these leaks. Gorham-Stout Syndrome (GSS) is an exceptionally rare lymphatic anomaly characterized by progressive osteolysis where bone is replaced by proliferating lymphatic tissue. We present a unique case of GSS manifesting as SIH via a CSF-lymphatic fistula, highlighting the clinical challenges in diagnosing rare etiologies for refractory headaches.

Case presentation
A 20-year-old woman with medical history for meningitis approximately 16 months prior presented with a history of sudden-onset, exertional cranial pain triggered by physical activities such as boxing and gym workouts. The headache was associated with tinnitus, aural fullness, and episodes of intense pain accompanied by neck stiffness and nausea. Brain MRI confirmed intracranial hypotension, and lumbar puncture revealed a low opening pressure (<1 cmH2O). Spine and cranial imaging identified multifocal T1/T2 hyperintense bone lesions from the skull base to the sacrum. CT myelography pinpointed bone resorption at the petrous apex, creating a CSF-lymphatic fistula in the left middle cranial fossa, allowing a direct connection between the subarachnoid space and the abnormal lymphatic structures. Following a GSS diagnosis, the patient underwent endoscopic surgical repair, resulting in significant clinical resolution of her symptoms.

Discussion
While SIH is typically spinal in origin, this case identifies an unconventional cranial etiology: a CSF-lymphatic fistula. In GSS, the replacement of bone with lymphatic tissue compromises the structural integrity of the skull base. Literature suggests that involvement of the petrous apex is particularly rare, creating a direct shunt between the subarachnoid space and pathological lymphatic channels. Diagnostically, this presentation is challenging because traditional spinal imaging may not show the "extradural fluid collections" typical of SIH. Instead, the diagnosis relies on identifying multifocal lytic bone lesions and using CT myelography to pinpoint the cranial defect. The patient's history of meningitis underscores the risk of these fistulas acting as a bidirectional conduit for CSF loss and retrograde infection. Unlike spinal leaks, these cranial-lymphatic connections are refractory to epidural blood patches and necessitate targeted surgical closure.

Conclusion
This case highlights GSS as a rare but significant cause of SIH through the formation of a CSF-lymphatic fistula. For patients presenting with SIH and multifocal bone lesions, a thorough diagnostic evaluation is crucial. Recognizing this rare lymphatic anomaly as an underlying cause of CSF leaks is vital for ensuring effective surgical intervention and long-term management.

Keywords:
Gorham-stout syndrome
Intracranial hypotension
Skull base
CSF-lymphatic

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Bilateral painful trigeminal neuropathy as an initial manifestation of systemic sclerosis: a case report

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Introduction
Painful trigeminal neuropathy is characterized by signs of trigeminal nerve dysfunction combined with chronic pain, which is typically unilateral and non-neuralgiform. Bilateral painful trigeminal neuropathy is uncommon and should raise suspicion for connective tissue diseases, especially systemic sclerosis.

Case presentation
A 67-year-old woman presented with a history of burning pain and paresthesia in the left malar region, with gradual progression over the years to bilateral involvement of the lower two-thirds of the face. Neurological examination revealed bilateral facial hypoesthesia without other focal deficits. Brain MRI showed no structural abnormalities. Systemic examination demonstrated Raynaud phenomenon, sclerodactyly, and microstomia. Further investigation confirmed the diagnosis of systemic sclerosis and pulmonary arterial hypertension. Pain symptoms were satisfactorily managed with gabapentinoids.

Discussion
Trigeminal neuropathy associated with systemic sclerosis is rare but well described, typically presenting with sensory-predominant features and an insidious course. Bilateral involvement, although uncommon, is an important clinical clue suggesting a systemic etiology. The underlying pathophysiology involves microvascular changes and collagen deposition, leading to peripheral nerve damage. Recognition of associated clinical features, such as Raynaud phenomenon and sclerodactyly, is essential to guide further investigation. Normal neuroimaging may contribute to diagnostic delay, reinforcing the importance of comprehensive clinical assessment. In addition to systemic sclerosis, other connective tissue diseases should be considered in the differential diagnosis of painful trigeminal neuropathy, such as sarcoidosis and Sjogren's syndrome.

Conclusion
The presence of bilateral painful trigeminal neuropathy should prompt investigation for connective tissue diseases. Early recognition of systemic features allows timely diagnosis of systemic sclerosis and appropriate management of its associated complications. The clinical relevance of this case lies in the neurologist's role in suspecting systemic sclerosis due to the facial pain phenotype. This has led to early identification of pulmonary arterial hypertension, a potentially life-threatening visceral complication of systemic sclerosis. Neurologists and headache and facial pain specialists should actively pursue systemic signs in individuals with bilateral trigeminal neuralgia. Raynaud phenomenon, sclerodactyly and microstomy exemplify relevant findings to look for.

Keywords:
Trigeminal neuropathy
Systemic sclerosis
Connective tissue diseases
Facial pain

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Persistent post-traumatic headache after mild traumatic brain injury associated with vertigo and memory deficit: a case report

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Introduction
Persistent post-traumatic headache (PPTH), defined by the International Classification of Headache Disorders (ICHD-3), develops after head trauma and persists for more than three months. It is one of the most frequent and disabling manifestations following mild traumatic brain injury (mTBI), affecting up to 30% of patients. Beyond headache, vestibular and cognitive symptoms frequently coexist, constituting post-concussion syndrome and contributing to prolonged functional impairment. We report a case of PPTH associated with vertigo and memory deficit two years after mTBI.

Case presentation
A 41-year-old female presented with a history of mild traumatic brain injury secondary to a fall approximately two years earlier. At emergency evaluation, Glasgow Coma Scale was 15 and cranial CT demonstrated only a subgaleal hematoma. Following trauma, she developed recurrent daily headache, predominantly right-sided, pulsatile, moderate to severe, associated with photophobia and phonophobia, with partial and unsatisfactory response to dipyrone. Concurrently, she reported recurrent vertigo triggered by head movement and fixation memory deficit with occupational impact. During outpatient follow-up, she remained conscious, oriented and without focal neurological deficits. Positional maneuvers were negative for nystagmus and outpatient cranial MRI showed no abnormalities. Comorbidities included hypertension and class III obesity (BMI 41.05 kg/m²). A diagnostic hypothesis of persistent post-traumatic headache integrated into post-concussion syndrome was established. Initial prophylactic treatment with amitriptyline, symptomatic analgesia optimization and neurological referral were instituted.

Discussion
The pathophysiology of PPTH involves a complex neurometabolic cascade triggered by shear forces, resulting in diffuse microscopic axonal dysfunction, ionic imbalance, neurotransmitter release, chronic neuroinflammation and central sensitization. These mechanisms may perpetuate symptoms despite normal neuroimaging findings. Vestibular manifestations and cognitive deficits frequently coexist with headache and are recognized components of post-concussion syndrome. Persistent vertigo and memory impairment may reflect dysfunction of vestibular-thalamic and prefrontal networks. Additionally, hypertension and severe obesity may contribute to pain perpetuation and headache chronification through systemic inflammatory mechanisms.

Conclusion
This report reinforces the need for high clinical suspicion of persistent post-traumatic headache after mTBI, demonstrating that normal neuroimaging does not exclude clinically significant dysfunction. Early recognition of associated vestibular and cognitive symptoms, accurate headache phenotyping and specialized neurological follow-up are essential to reduce morbidity and improve long-term functional outcomes.

Keywords:
Post-traumatic headache
Mild traumatic brain injury
Post-concussion syndrome
Vertigo
Memory deficit

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Sphenopalatine ganglion radiofrequency neurolysis for refractory painful Frey's syndrome after parotidectomy: a neuromodulatory approach

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Introduction

Frey's syndrome is a well-documented sequela of parotid gland surgery, primarily characterized by gustatory sweating and flushing due to aberrant regeneration of postganglionic parasympathetic fibers. Although localized autonomic dysfunction is common, the development of refractory, lancinating craniofacial pain mimicking trigeminal neuralgia is an exceedingly rare and debilitating manifestation. Conventional management, including gabapentinoids, carbamazepine, and local botulinum toxin injections, frequently fails to provide sustained relief for both the neuropathic pain and the autonomic distress.

Case presentation

A male patient, status post-parotidectomy, presented with an intractable, atypical presentation of Frey's syndrome. The clinical picture was dominated by recurrent episodes of severe, paroxysmal pain in the submandibular and pre-auricular regions (Visual Analogue Scale [VAS] 9/10), described as stabbing and burning. Paroxysms were exclusively triggered by gustatory stimuli, notably acidic and salty foods; the mere anticipation or thought of citric food was sufficient to evoke maximum-intensity pain. Concurrently, the patient exhibited localized pre-auricular gustatory hyperhidrosis. Ingestion of neutral liquids and alcoholic beverages failed to trigger the pain, underlining a highly selective gustatory reflex loop. Following failure of comprehensive pharmacological therapy and botulinum toxin type A injections, the patient underwent percutaneous radiofrequency neurolysis of the sphenopalatine ganglion (SPG) utilizing electrothermal energy to disrupt pain conduction and autonomic pathways. The intervention yielded immediate pain resolution (VAS 0/10) alongside a substantial reduction in gustatory sweating. At the 12-month follow-up, the clinical benefit remained sustained, significantly restoring the patient's quality of life without neurological deficits.

Discussion

This case highlights a unique pathophysiological overlap where parasympathetic hyperactivity directly drives a severe craniofacial neuropathic pain state, likely amplified by central and peripheral sensitization mechanisms. The SPG plays a pivotal role as a major parasympathetic center in trigeminal-autonomic mechanisms. While SPG radiofrequency neurolysis is traditionally reserved for primary trigeminal autonomic cephalgias, its application here demonstrates a targeted disruption of the aberrant reflex arc connecting salivary gustatory afferents to nociceptive facial pathways. By modulating the SPG, the intervention potentially blunted both the efferent secretomotor response and the retrograde nociceptive transmission, achieving clinical control where conventional therapies failed.

Conclusion

Sphenopalatine ganglion radiofrequency neurolysis represents an effective and targeted neuromodulatory intervention for patients suffering from refractory, pain-predominant Frey's syndrome, successfully modulating both the autonomic and neuropathic arms of the disease.

Keywords:
Sphenopalatine ganglion
Pain
Facial pain

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Migralepsy in pregnancy: clinical overlap between migraine with aura and epileptic seizures

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Introduction

Migralepsy is defined by the International Classification of Headache Disorders, 3rd edition (ICHD-3), as an epileptic seizure occurring during or within one hour after a migraine aura. This rare condition represents a diagnostic challenge, particularly during pregnancy, when hormonal and pharmacokinetic changes may influence both migraine and seizure frequency.

Case presentation

A 28-year-old woman at 35 weeks of gestation was referred for evaluation of poorly controlled epilepsy and migraine. She had a history of migraine with aura since the age of 11 years, initially characterized by pulsatile frontal headaches that later evolved into occipital pain radiating to the frontal region and left eye, associated with phonophobia. Her aura consisted of scintillating scotomas and bright lights in the upper visual field lasting 30–60 minutes, occasionally accompanied by transient left-sided paresthesia and weakness. At 19 years of age, she experienced her first epileptic seizure. During the current pregnancy, she reported worsening headache frequency and two to four seizures per week despite treatment with levetiracetam 1,250 mg/day. Seizures were characterized by impaired awareness, tonic posturing of the upper limbs, and postictal confusion. She consistently reported that aura and headache preceded seizure onset. Previous treatments included carbamazepine, without adequate seizure control, and valproate, which was discontinued. Neurological examination was unremarkable. Brain magnetic resonance imaging showed nonspecific white matter hyperintensities consistent with migraine-related changes, and a previous electroencephalogram was normal. Due to persistent seizures, lamotrigine and adjunctive clobazam were initiated, and repeat EEG and neuroimaging studies were requested. An occipital nerve block was also performed.

Discussion

This case highlights the clinical overlap between migraine with aura and epilepsy. Visual, sensory, and transient motor symptoms were consistent with migraine aura, whereas impaired awareness, tonic activity, and postictal confusion supported an epileptic etiology. The temporal relationship between aura and seizure onset strongly suggests migralepsy. Differential diagnoses include prolonged migraine aura, hemiplegic migraine, and occipital lobe epilepsy.Clinical findings, combined with complementary diagnostic tests, play an important role in establishing the diagnosis

Conclusion

Recognition of the temporal relationship between migraine aura and epileptic seizures, along with careful assessment of their semiological characteristics, is essential for the diagnosis of migralepsy. Early identification may facilitate appropriate management and reduce diagnostic delays, particularly in complex clinical settings such as pregnancy.

Keywords:
Migralepsy
Migraine with aura
Epilepsy
Pregnancy
Seizures

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Headache in the context of cocaine exposure and in a patient with acute myocardial infarction and stroke due to cervical artery dissection: a case report

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Introduction
Cocaine use is associated with a wide range of acute cardiovascular and cerebrovascular complications due to its potent sympathomimetic effects, including vasospasm, endothelial dysfunction, platelet activation, and increased thrombotic risk. Although myocardial infarction and ischemic stroke are well-recognized complications of cocaine exposure, their simultaneous occurrence is uncommon and poses significant diagnostic and therapeutic challenges. Headache is a frequent presenting symptom among cocaine users and may represent a benign manifestation or the initial sign of a severe vascular event.

Case presentation
A 35-year-old woman, with a history of hypertension and inappropriately using medication, was admitted to the emergency room after cocaine and alcohol abuse. She subsequently developed (without specifying the time) typical chest pain, nausea, diplopia, right hemicranial headache and right hemiparesis. She presented with right hemiparesis grade IV, right hemiataxia and axial ataxia, bilateral paresis of the VI cranial nerve, with oscilloscope findings.

Discussion
Initial exams, including an electrocardiogram, showed T-wave inversion in leads V4-V5 and V6, without ST-segment elevation, with elevated troponin. Transthoracic echocardiography demonstrated a low left ventricular ejection fraction (37%, Teicholz method), with hypokinesis of all mid and apical segments. Coronary catheterization showed no abnormalities, concluding that it was Takotsubo Syndrome. Cranial computed tomography (CT) scan showed no abnormalities, and cranial angio-CT scan showed no contrast enhancement in the intracranial segment of the right vertebral artery (occlusion/dissection?). The patient was admitted to the intensive care unit (ICU) for further neurological investigation and underwent brain magnetic resonance imaging (MRI), which revealed recent ischemic vascular injury in the right medulla oblonga and narrowing with filling defect in the intracranial segment of the right vertebral artery, suggesting dissection. The patient continued to experience headaches in the same location as reported upon admission throughout her hospital stay. She left the hospital against medical advice before completion of the diagnostic workup while awaiting cerebral angiography.

Conclusion
This case emphasizes the importance of a comprehensive assessment of headache in the emergency department, particularly when associated with focal neurological deficits after cocaine use, to ensure timely diagnosis and appropriate treatment of potentially serious conditions.

Keywords:
Headache
Cervical artery dissection
Cocaine

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Dural ectasia and recurrent spontaneous intracranial hypotension in a patient with Marfan syndrome: a case report

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Introduction

Marfan syndrome is a connective tissue disorder that may present with underrecognized neurological manifestations. In this condition, congenital fragility of the dura mater predisposes patients to dural ectasia and increases the risk of cerebrospinal fluid (CSF) leaks, ultimately leading to spontaneous intracranial hypotension (SIH). SIH typically presents with orthostatic headache; however, recurrent or chronic episodes may alter the headache pattern, mimicking chronic primary headache disorders.

Case presentation

A 31-year-old woman with Marfan syndrome presented with severe holocranial pressure-like headache, which worsened with orthostatism and physical exertion, 20 days after an ophthamological procedure. The episode lasted approximately 10 days, and brain MRI performed during this period was unremarkable. She experienced two more episodes one year and four years after the first one. She ultimately evolved to chronic daily headache and analgesics overuse. Due to Marfan syndrome and positional headache, lumbosacral spine MRI was requested. The scans demonstrated marked dural ectasia with multiple spinal meningeal diverticula. Additionally, epidural T2/STIR hyperintensity suggestive of CSF leakage was identified, consistent with the "dinosaur tail sign". She was diagnosed with intracranial hypotension secondary to Marfan syndrome.

Discussion

This case highlights the association between Marfan syndrome, dural ectasia and spontaneous CSF leaks. The classic orthostatic headache presentation may evolve to chronic, non-positional headache over time, making the diagnosis challenging. Normal cranial imaging may also contribute to diagnostic delay, and therefore investigation of the entire neuroaxis is essential in suspected cases. Untreated intracranial hypotension may lead to headache chronification and medication overuse. Early recognition is essential, as specific therapeutic strategies, including epidural blood patch and neurosurgical intervention, may improve patient outcomes.

Conclusion

Spontaneous intracranial hypotension should be considered in patients presenting with orthostatic headache, particularly in the setting of connective tissue disorders. Spinal imaging is crucial in cases with normal cranial neuroimaging. Early diagnosis may prevent headache chronification and reduce morbidity. This case highlights the importance of evaluating dural integrity in the spine of patients with Marfan syndrome and positional headache, even in the absence of typical intracranial changes.

Keywords:
Marfan syndrome
Dural ectasia
Cerebrospinal fluid leak
Intracranial hypotension
Daily headache

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Neuro-Behçet as a cause of secondary headache: a case report

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Introduction
Secondary headaches arise from diverse underlying pathologies including vascular, traumatic, infectious, and metabolic etiologies. Despite accounting for only 2% to 7% of emergency visits, early diagnosis is imperative due to high morbidity and mortality. The SNNOOP10 mnemonic is essential for identifying red flags such as sudden onset, focal neurological deficits, or late-onset headache. Behçet's syndrome is an inflammatory vasculitis of unknown etiology with multisystemic manifestations, and neurological involvement represents its most severe form, requiring early diagnosis to prevent irreversible sequelae.

Case presentation
A 23-year-old male was admitted with holocranial headache, left lower limb paresis, peripheral facial palsy, and axial ataxia. He had developed analgesic-refractory headache and oral ulceration in the preceding weeks, with a history of recurrent orogenital ulcerations. During hospitalization, his condition worsened with pyramidal signs and urinary incontinence. The pathergy test was positive. Cranial computed tomography revealed a hypodense area in the right cerebral peduncle not conforming to a vascular territory. Magnetic resonance imaging showed T2/FLAIR hyperintense foci in the internal capsules, brainstem, and cerebellar hemispheres, displaying the classic "waterfall sign". Cerebrospinal fluid showed isolated elevated protein. Neuro-Behçet was diagnosed and methylprednisolone pulse therapy was initiated, with gradual motor improvement.

Discussion
Behçet's disease is a chronic autoinflammatory vasculitis mediated by Th17 pathways. Neuro-Behçet occurs in 5% to 10% of cases, preferentially affecting the brainstem in up to 50% of patients. Headache affects over 80% of patients with Behçet's disease, and secondary headache attributed to Neuro-Behçet falls under ICHD-3 criterion 6.4.3 — headache attributed to secondary angiitis of the central nervous system. Differential diagnosis with ischemic stroke is frequent in young patients, and the "waterfall sign" on MRI is highly suggestive of Neuro-Behçet. First-line acute treatment is intravenous methylprednisolone pulse therapy (1 g/day for 3-5 days), followed by immunosuppressive agents according to severity.

Conclusion
Early recognition of secondary headache as a sentinel manifestation is essential for identifying severe conditions such as Neuro-Behçet. The correlation between clinical, laboratory, and neuroimaging findings — particularly the "waterfall sign" — enables confident diagnosis. Immediate pulse therapy promotes significant improvement, whereas therapeutic delay may cause irreversible sequelae. In young patients with headache and red flags, Neuro-Behçet should be included in the differential diagnosis.

Keywords:
Secondary headache
Neuro-Behçet
Red flags
Neuroinflammation
ICHD-3

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Secondary hypermenorhea due to uterine leiomyomatosis as a factor in headache chronification in a patient with endometriosis: a case report

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Introduction
Endometriosis predisposes to headaches through shared mechanisms of neuroinflammation and central sensitization. This neurological vulnerability is often exacerbated by severe hormonal fluctuations and metabolic consequences, such as iron deficiency from abnormal uterine bleeding. This report describes how secondary hypermenorrhea due to uterine leiomyomatosis acted as a trigger and chronification factor for headache in a patient with endometriosis.

Case presentation
A 24-year-old female medical student with a three-year history of endometriosis presented without hormonal treatment. She had severe dysmenorrhea, chronic pelvic pain, and disabling catamenial headaches (VAS=6–7). Over the last 12 months, her pelvic pain worsened, and menstrual flow increased significantly, with prolonged bleeding, blood clots, and refractory cramps (VAS=9). Concurrently, she developed fatigue, orthostatic dizziness, concentration deficits, and a decline in academic performance. She was diagnosed with uterine leiomyomatosis via transvaginal ultrasound, which identified a submucosal nodule. The headaches became daily following the hypermenorrhea exacerbation. Four months ago, she progressed to daily persistent headache (ICHD-3), holocranial, pressing, with a mean intensity of VAS=8 and menses exacerbations reaching VAS=10. There was a clear temporal association between menstrual flow, pelvic pain, and headache worsening. She overused dipyrone, ibuprofen, and sumatriptan, achieving only partial relief. The HIT-6 score was 68 points (severe impact). Lab tests showed hemoglobin at 10.8 g/dL and ferritin at 12 ng/mL, confirming iron deficiency anemia. Brain MRI was normal. Continuous desogestrel 75 mcg/day, elemental iron replacement, and specialized gynecological follow-up were initiated. After four months, menstrual flow was suppressed and pelvic pain decreased (VAS=3). Headache frequency dropped from daily to four days per month (VAS=3). The HIT-6 score decreased to 48 points, with significant functional improvement.

Discussion
The headache initially associated with endometriosis became chronic after the onset of the submucosal fibroid and subsequent hypermenorrhea. Chronic inflammation from endometriosis promotes central sensitization, while the submucosal component exacerbates blood loss. Abrupt hormonal fluctuations and iron depletion lower the pain threshold and alter neurotransmitter synthesis, perpetuating pain. The concurrent improvement of gynecological and neurological symptoms following continuous treatment reinforces this pathophysiological link.

Conclusion
Hypermenorrhea due to submucosal leiomyomatosis can contribute to headache chronification in endometriosis. Managing interrelated hormonal, inflammatory, and metabolic factors led to outstanding clinical recovery, highlighting the importance of gynecological investigation in young women with persistent headaches.

Keywords:
Endometriosis
Submucosal fibroid
Persistent headache
Iron deficiency

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Nummular headache: a case report on the investigation of circumscribed cranial pain

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Introduction
Nummular headache is a rare primary headache syndrome characterized by pain localized to a circumscribed area of the scalp. The term "nummular" derives from the Latin nummulus (coin), reflecting the characteristic shape of the painful area. Although first described in 2002, it remains underdiagnosed due to its similarity to other primary headaches and cranial neuralgias.

Case presentation
Patient D.L.P.R., male, 40 years old, sought neurological evaluation due to a new headache localized in the occipital region, distinct from his previous pattern of retro-orbital headache characteristically triggered by stress. The current pain presented a circumferential shape and stabbing quality. Episodes occurred between 16 and 20 times per month, remaining predominantly mild in intensity, with periods of spontaneous exacerbation. Symptomatic improvement was reported following the use of dipyrone or Neosaldina. The patient denied associated nausea, vomiting, photophobia, phonophobia, and osmophobia. Neurological examination revealed no abnormalities. A non-contrast cranial computed tomography scan was performed, demonstrating a small old ischemic lacune or enlarged perivascular space in the right nucleocapsular region measuring 1.1 cm, without other significant structural abnormalities. Based on the clinical characteristics, the diagnostic hypothesis of nummular headache was formulated. Indomethacin was prescribed, and a contrast-enhanced cranial computed tomography scan was requested for further diagnostic evaluation.

Discussion
Nummular headache is characterized by pain localized to a fixed and well-defined area of the scalp, usually circular or oval in shape, ranging from 1 to 6 cm in diameter. It may present a chronic or episodic course, frequently with a pressure-like quality. The mean age of onset is 46.9 years, with a slight female predominance. The present case exhibits classic features of the condition, including fixed occipital localization, the possibility of precise delineation of the painful area, frequent recurrence, and the absence of associated autonomic or migrainous symptoms. Diagnosis is essentially clinical, and complementary investigations are required to exclude secondary causes, particularly in patients with recent-onset pain or progressive worsening. In the present case, cranial computed tomography revealed only a nonspecific finding with no correlation to the pain syndrome. Differential diagnoses include occipital neuralgia, tension-type headache, migraine, and secondary structural headaches. Indomethacin was selected as the initial therapy due to the response described in a subset of patients with localized primary headaches.

Conclusion
The present case reinforces the importance of detailed history taking and physical examination, as well as the exclusion of secondary causes through appropriate complementary investigation. Early diagnosis enables targeted therapeutic management and improves the quality of life of affected patients.

Keywords:
Headache
Nummular
Circumscribed

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Chronification of migraine during the climacteric transition and response to advanced preventive therapy: a case report

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Introduction

Migraine is a disabling neurological disorder that predominantly affects women and is strongly influenced by hormonal fluctuations. The climacteric transition may contribute to increased attack frequency and migraine chronification. In refractory cases, advanced therapies such as calcitonin gene-related peptide (CGRP) monoclonal antibodies and onabotulinumtoxin type A may be required. This report describes the progression of migraine with aura to refractory chronic migraine during the climacteric period.

Case presentation

The patient is a 50-year-old female physician with a history of migraine with visual aura since the age of 35, who presented progressive worsening of symptoms during climacteric transitions, beginning at 49 years of age. Aura episodes were characterized by visual scotomas preceding headache attacks. Headaches were associated with nausea, vomiting and photophobia, reaching an intensity of 8-9 on a 10-point pain scale. Initially restricted to menstrual periods, attacks progressively increased in frequency and evolved into chronic migraine, ocurring on approximately 28 days per month. Brain magnetic resonance imaging revealed no significant abnormalities. Over the years, the patient used multiple acute therapies, including dipyrone, nonsteroidal anti-inflammatory drugs (ibuprofen, celecoxib, and ketorolac tromethamine), naratriptan, and rizatriptan, Preventive treatments included duloxetine, topiramate, and venlafaxine. Although initially effective, these therapies progressively lost efficacy, resulting in persistent disability and daily headache burden. Due to refractory chronic migraine, treatment was escalated to monthly fremanezumab and onabotulinumtoxinA following the PREEMPT protocol. After initiation of advanced preventive therapy, headache frequency decreased from 28 to 7 days per month, with significant reduction in symptom burden and improvement in daily functioning. However, partial recurrence of symptoms was observed near the end of each treatment cycle.

Discussion

The close temporal relationship between the climacteric transition and migraine worsening suggests a potential role of hormonal instability in disease chronification. The progression from menstrual migraine to chronic migraine, along with the loss of response to multiple therapies, highlights the complexity of migraine management during this period. The favorable response to fremanezumab and onabotulinumtoxinA supports the use of advanced preventive therapies in refractory cases.

Conclusion

The climacteric hormonal changes may contribute to migraine chronification and treatment refractoriness. Advanced preventive therapies were associated with substantial clinical improvement, even if the remission was not characterized as complete, reducing headache frequency from 28 to 7 days per month.

Keywords:
Chronic migraine
Migraine with aura
Climacteric transition
OnabotulinumtoxinA
Fremanezumab

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Influence of hormonal stabilization on catamenial migraine associated with menstrual flow disorder: a case report

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Introduction

Catamenial migraine is related to the drop in estradiol during the menstrual cycle. Unlike the pure form (without aura), migraine with aura contraindicates estrogen-containing contraceptives due to the risk of ischemic stroke, challenging management when menstrual flow disorders coexist. The etonogestrel subcutaneous implant promotes hormonal stability and emerges as a safe alternative, albeit with limited evidence. This report describes the case of a patient with catamenial migraine with aura and flow disorder treated with the implant.

Case presentation

A 21-year-old female university student was diagnosed with migraine with aura (ICHD-3; 1.2.1). Symptoms began at age 12, associated with menarche, and progressed to predominantly premenstrual and disabling attacks. She presented with visual aura featuring scintillating scotomas and blurred vision, upper limb paresthesias, and severe pulsatile retro-orbital headache (VAS=10), accompanied by nausea, vomiting, photophobia, and phonophobia. Prior to the implant insertion, she averaged three attacks per month, despite prophylaxis with Topiramate 100 mg/day and Amitriptyline 25 mg/day. She also presented with menstrual flow disorder, characterized by irregular cycles, excessive flow, severe dysmenorrhea, and a consistent worsening of migraine attacks during the menstrual period. Computed tomography of the skull showed no structural alterations. Given the association between catamenial migraine with aura and menstrual disorder, the insertion of an etonogestrel 68 mg subcutaneous implant was chosen. After approximately six months, there was a reduction in attack frequency to about one episode every three months, a decrease in pain intensity to VAS=4, a reduction in aura episodes, a lower need for abortive medications, and an improvement in the menstrual pattern. It was possible to reduce Topiramate to 50 mg/day and discontinue Amitriptyline while maintaining adequate control of the attacks.

Discussion

The case illustrates the relationship between the menstrual cycle and migraine, and the rationale for hormonal stabilization. The estrogen withdrawal hypothesis sustains that the perimenstrual drop in estradiol acts as a trigger; menstrual attacks tend to be more severe, prolonged, and refractory to treatment. The etonogestrel implant eliminated the estrogen drop and controlled the flow, safely alleviating both the migraine with aura and the menstrual disorder. The favorable outcome, with pain reduction and medication tapering, suggests the efficacy of the method.

Conclusion

Catamenial migraine with aura associated with menstrual flow disorders represents a therapeutic challenge due to the limitations of estrogen use in this population. In this report, the etonogestrel subcutaneous implant was associated with significant improvement in attacks and functional status, suggesting a potential benefit of hormonal stabilization with progestogen-only methods in selected cases.

Keywords:
Migraine with aura
Menstrual flow disorder
Progestogen
Etonogestrel
Subcutaneous implant

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Airplane headache: a case report

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Introduction
Airplane Headache (AH) is a relatively rare primary headache disorder triggered during air travel. It is defined by spontaneous improvement within 30 minutes after the ascent or descent of the airplane is completed, and/or by worsening in temporal relation to the airplane's ascent after takeoff and/or descent before landing. It is characterized as frequently severe, unilateral, and orbitofrontal, with a jabbing or stabbing quality, without autonomic symptoms, and it tends to resolve after landing.

Case presentation
A 51-year-old female patient, born and currently residing in Guarapuava (Paraná, Brazil), farmer, married, with two children, and no prior comorbidities, presented to the clinic. Since 2005, the patient has taken several airplane trips, consistently complaining of severe pulsating frontal headaches during flights. She denied any other associated symptoms during or following the headache; however, due to her concern regarding the presented symptomatology and an upcoming scheduled flight, the patient sought clinical care for further evaluation. The neurological examination was unremarkable. To further elucidate the case, a cranial magnetic resonance angiography was performed, which showed no evidence of stenosis, aneurysms, or malformations. Based on these findings, the diagnostic hypothesis of AH was established.

Discussion
The symptomatology presented by the patient, coupled with its exclusive occurrence during air travel, led to the diagnostic hypothesis of AH. Therefore, for the patient's upcoming airplane trip (March/2026), AH prophylaxis was proposed using indomethacin (25-50 mg, PO) and rizatriptan (10 mg, PO), to be administered one hour before takeoff and one hour before landing. A few days after completing her trip, the patient reported the absence of the symptoms previously experienced during prior flights.

Conclusion
In conclusion, AH is a benign primary headache disorder that, despite causing an impact on the patient's quality of life and anticipatory anxiety, exhibits an excellent response to prophylactic management. This report demonstrates that the careful exclusion of secondary causes through neuroimaging, combined with targeted preventive therapy using indomethacin and rizatriptan, reinforces the importance of pre-travel medical planning to achieve absolute symptom control and ensure patient safety.

Keywords:
Headache
Air travel
Travel medicine
Indomethacin

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Multimodal approach in the reversal of Medication Overuse Headache (MOH): a case report

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Introduction
Medication overuse headache (MOH) constitutes a major cause of pain chronification in patients with recurrent primary headaches. The abuse of analgesics and abortive medications generates central sensitization and a rebound effect, perpetuating dependence and refractory attacks. Early recognition, detoxification, and adequate prophylaxis are essential for clinical control and functional recovery. Furthermore, this study reports the management of the case, aiming to provide evidence regarding the efficacy of this approach in managing this therapeutic challenge.

Case presentation
A 35-year-old male patient with a history of migraine since adolescence presented with an increase in attack frequency and initiated frequent self-medication. Despite the prior use of amitriptyline and valproate, he progressed over the last two years to daily headache (more than 20 days/month), meeting the criteria for chronic migraine and MOH (ICHD-3; 8.2). He daily consumed a combination of dipyrone (up to 4g/day), ibuprofen 600mg, and about 15 to 20 triptan tablets per month. He developed a pattern of rebound headache: waking up in the early morning with a burning and oppressive holocranial pain (VAS=9), which partially subsided only with further doses of analgesics. The clinical picture was associated with nausea, gastralgia due to anti-inflammatory abuse, insomnia, irritability, and work absenteeism. Detoxification was instituted with the abrupt discontinuation of analgesics and triptans. As transitional therapy for the withdrawal syndrome, Prednisone 40 mg/day was used for five days, associated with intravenous metoclopramide if necessary, initiation of Topiramate (titrated up to 100 mg/day), and greater occipital nerve block with 2% lidocaine. The patient received strict guidance regarding the limit for rescue medication use (up to 2/week). After six months, the frequency was reduced to four days of pain per month (VAS=3), with attacks restricted to the original episodic migraine, an excellent response to the triptan alone, and restoration of functionality.

Discussion
The case illustrates the link between MOH and the worsening of headache pain, as well as the rationale behind detoxification. The rebound effect of medication abuse favors central sensitization and compromises prophylaxis, contributing to frequent and refractory attacks, as observed in this case. The combination of a corticosteroid and anesthetic infiltration mitigated the withdrawal and enabled the action of topiramate. This management counteracted drug tolerance and restored the pain threshold. The positive evolution, with symptom relief and discontinuation of the overused medications, suggests the success of the management strategy.

Conclusion
MOH mimics therapeutic refractoriness. The abrupt detoxification strategy, supported by transitional care and patient education, proved effective in reversing the chronic pattern of the reported case, reinforcing the need for targeted and multidisciplinary management.

Keywords:
Chronic headache
Medication overuse headache
Detoxification
ICHD-3

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Refractory chronic migraine associated with Medication-Overuse Headache (MOH): a case report

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Introduction
Chronic migraine is a disabling condition frequently associated with the overuse of acute migraine medications, a factor that contributes to migraine chronification and complicates therapeutic management. This report describes the case of a patient with refractory chronic migraine associated with medication overuse headache, who underwent a multidisciplinary approach and targeted therapy.

Case presentation
A 38-year-old female patient, with no relevant medical history, presented with a history of unilateral throbbing headache since the age of 19, associated with photophobia, phonophobia, osmophobia, and nausea, consistent with migraine. She progressively developed daily or almost daily headaches over the past 24 months, totaling approximately 20 headache days per month, 10 of which had severe migraine features, resulting in significant functional impairment and reduced quality of life. The patient had undergone prior prophylactic treatment with propranolol, topiramate, amitriptyline, sodium valproate, and flunarizine, without a satisfactory clinical response and/or with limitations due to adverse effects. The patient frequently used common analgesics and triptans, suggesting medication overuse headache. Neurological examination revealed no focal deficits. Brain MRI and laboratory tests showed no relevant abnormalities. Based on the clinical picture, a diagnosis of refractory chronic migraine associated with medication overuse headache was established. A multidisciplinary approach was instituted, with gradual discontinuation of analgesics, implementation of sleep hygiene measures, cognitive-behavioral therapy, psychological support, and the introduction of galcanezumab, a monoclonal antibody targeting calcitonin gene-related peptide (CGRP). After 4 months of treatment, there was a reduction in the frequency of attacks from 20 to 7 days per month, corresponding to a 65% reduction in headache days, in addition to a decrease in pain intensity, functional improvement, reduced absenteeism, reduced need for acute migraine medications, and a reduction in the MIDAS score from 12 to 6 points, corresponding to an improvement from moderate to mild disability.

Discussion
Patients with refractory chronic migraine and overuse of acute migraine medications represent a significant therapeutic challenge. This case demonstrates the evolution from episodic to chronic migraine, with failure of five different preventive therapies. The response observed after a multidisciplinary approach and targeted therapy reinforces the importance of early recognition of factors associated with chronicity and individualization of treatment.

Conclusion
Although chronic migraine represents a significant therapeutic challenge, recent advances have broadened treatment possibilities for refractory patients. Early identification of factors associated with chronicity, combined with a multidisciplinary approach and the use of targeted therapies, remains essential for optimal disease management.

Keywords:
Chronic migraine
Refractory migraine
Medication-overuse headache
Calcitonin Gene-Related Peptide (CGRP)

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Headache as an initial manifestation of pneumococcal meningoencephalitis associated with status epilepticus in a postpartum woman: a case report

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Introduction
Headache is a common neurological complaint in emergency departments and usually has a primary cause. However, warning signs suggest serious secondary causes, which require rapid diagnosis and treatment to reduce morbidity and mortality.

Case presentation
A 20-year-old postpartum female patient with a history of chronic migraine began experiencing severe headache in early March 2026, subsequently progressing to a generalized tonic-clonic seizure associated with decreased level of consciousness and fever following the seizure. During prehospital care, she experienced approximately ten reentrant seizure episodes, consistent with status epilepticus. Due to the persistence of the seizures, orotracheal intubation was necessary, and two boluses of diazepam and phenytoin were administered as acute therapy. Upon hospital admission, she remained febrile. Lumbar puncture revealed an elevated opening pressure of 36 cm H_2O. Cerebrospinal fluid analysis showed glucose of 139 mg/dL, chloride of 125 mEq/L, protein of 25 mg/dL and elevated lactate of 42 mg/dL. Microscopic examination revealed no microorganisms, and cerebrospinal fluid bacterial culture was negative. A cranial CT scan showed no acute structural abnormalities. During hospitalization, autoimmune encephalitis was considered as a possible diagnosis but was subsequently discarded following further investigation. The patient received empirical treatment with acyclovir, ceftriaxone, and ampicillin for 10 days. After 20 days, the results of the molecular PCR test on the cerebrospinal fluid were released, showing a positive result for Streptococcus pneumoniae. Currently, her neurological examination shows no focal abnormalities, with preserved speech, muscle strength, sensation, coordination and reflexes. She is taking levetiracetam 250 mg every 12 hours and valproic acid 250 mg every 8 hours, both being gradually tapered off.

Discussion
The case is noteworthy for the initial presentation of headache in a patient with a history of migraine, which could delay suspicion of a serious secondary cause. The rapid progression to fever, decreased level of consciousness and reentrant seizures reinforced the need to investigate central nervous system infection. Although the cerebrospinal fluid showed no pleocytosis and initial cultures did not suggest a bacterial infection, the identification of Streptococcus pneumoniae by PCR underscored the importance of molecular methods in atypical presentations of bacterial meningoencephalitis. Empirical treatment and early recognition of status epilepticus were crucial to the patient's recovery; she was discharged without evident neurological deficits.

Conclusion
Headache associated with fever, altered consciousness or seizures requires immediate investigation for secondary causes. This case highlights the importance of early clinical suspicion, the use of PCR in cerebrospinal fluid in atypical presentations, and rapid treatment for a favorable outcome.

Keywords:
Headache
Pneumococcal meningoencephalitis
Status epilepticus

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Chronic migraine, neuroimaging findings suggestive of idiopathic intracranial hypertension without papilledema, and response to fremanezumab: a case report

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Introduction

Neuroimaging findings suggestive of idiopathic intracranial hypertension (IIH) may be incidentally identified in patients with migraine, particularly in those with chronic and treatment-refractory forms. Interpretation of these findings is challenging in the absence of papilledema, when the causal relationship between elevated intracranial pressure and headache is not always evident.

Case presentation

A 41-year-old woman with normal body weight had a history of migraine with typical aura since the age of 13. In February 2025, she experienced increased headache frequency and intensity, without new neurological or visual symptoms. Brain magnetic resonance imaging (MRI) showed a partially empty sella and bilateral transverse sinus stenosis. Cerebrospinal fluid opening pressure was 42 cmH_2O, and a repeated measurement after a few weeks was 30 cmH_2O. Serial ophthalmological evaluations, including fundoscopy and optical coherence tomography, showed no evidence of papilledema. She had a history of recurrent nephrolithiasis associated with topiramate and was unable to tolerate acetazolamide. In September 2025, she underwent lumboperitoneal shunt placement. After the procedure, she developed orthostatic headache, improving in the supine position. A new MRI showed signs of intracranial hypotension, including pachymeningeal thickening, engorgement of the dural venous sinuses, reduced ventricular size, and decreased mamillopontine distance, as well as a subdural collection adjacent to the tentorial membrane, extending to the left side at the C3 level. The valve was closed and subsequently removed, followed by an epidural blood patch, with improvement of the orthostatic headache. However, migraine-like headache recurred on most days. In November 2025, follow-up MRI again showed findings suggestive of IIH, now including optic nerve tortuosity, while ophthalmological assessment remained normal. Given the persistent absence of papilledema and the predominance of a migrainous phenotype, fremanezumab was initiated, with a marked clinical response, reducing headache frequency to approximately 2 days per month.

Discussion

This case illustrates the complexity of evaluating patients with chronic migraine and findings compatible with IIH, particularly when elevated opening pressure is present without papilledema or visual impairment. Distinguishing migraine with incidental findings from IIH without papilledema, or an overlap between both conditions, has important therapeutic implications. The robust response to CGRP blockade supports the predominance of a migrainous mechanism, although it does not exclude a possible contribution of pathways related to CSF dynamics and CGRP signaling in meningeal lymphatic vessels.

Conclusion

In chronic headache with imaging findings suggestive of IIH but no papilledema, management should prioritize headache phenotype, CSF pressure, and visual monitoring. Phenotype-guided migraine treatment may be appropriate in selected cases.

Keywords:
Chronic migraine
Idiopathic intracranial hypertension
Papilledema
CGRP
Fremanezumab

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Fear-avoidance beliefs related to physical activity and work are associated with clinical characteristics of migraine and with migraine-related disability

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Introduction
Migraine is a leading cause of years lived with disability and affects more than 15% of the global population. Maladaptive beliefs, although often overlooked, are highly prevalent among individuals with migraine. Approximately 50% of individuals exhibit kinesiophobia, while 35% demonstrate pain catastrophizing. Another important factor within this domain is fear-avoidance beliefs related to physical activity and work, typically assessed using the Fear-Avoidance Beliefs Questionnaire (FABQ); however, this construct has not yet been investigated in individuals with migraine.

Objective
To determine whether fear and avoidance beliefs regarding physical activity and work, as measured by the FABQ, are associated with clinical characteristics of migraine, such as headache frequency and intensity and duration, and to assess the extent to which fear and avoidance beliefs influence headache-related disability.

Methods
A total of 113 participants diagnosed with migraine by a neurologist specialized in headache disorders were included, aged between 18 and 55 years. All participants completed a demographic and clinical questionnaire addressing headache characteristics and neck pain, administered on a single day, and also completed FABQ, the Headache Impact Test (HIT-6), and the Pain Catastrophizing Scale (PCS). A descriptive analysis of positive responses on the FABQ was conducted to characterize the sample's fear-avoidance belief profile. Spearman's correlation analysis was performed to examine the associations between FABQ scores and the other variables. In addition, a multiple linear regression analysis was conducted with FABQ as the dependent variable. Statistical significance was set at $p < 0.05$, and all analyses were performed using R statistical software (v4.3.1; R Core Team, 2023).

Results
The analysis demonstrated weak but significant positive correlations between FABQ and HIT-6 ($\rho=0.33$), as well as with headache duration in hours ($\rho=0.19$ for the FABQ work subscale; $p<0.05$) and neck pain duration ($\rho=0.22$; $p<0.05$). A significant association was also observed between the FABQ physical activity subscale and headache impact ($\rho=0.24$; $p<0.05$), as well as neck pain intensity ($\rho=0.22$; $p<0.05$). Multiple linear regression analysis revealed that total FABQ score ($B=0.073$; $p=0.020$), headache duration in hours ($B=0.047$; $p=0.037$), and pain intensity ($B=1.141$; $p=0.003$) were independent predictors of headache impact, whereas disease duration and monthly frequency were not significantly associated.

Conclusion
Fear-avoidance beliefs are associated with greater headache impact and disability in individuals with migraine, alongside attack intensity and duration. Patients may exhibit avoidant behaviors, particularly related to physical activity and work. These findings highlight the importance of addressing fear-avoidance beliefs and neck pain in migraine management, with the aim of reducing disability and improving patient self-management.

Keywords:
Migraine disorders
Health belief model
Exercise
Headache

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Relationship between clinical headache variables and pain catastrophizing in individuals with migraine

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Introduction
Pain catastrophizing is an exaggerated negative orientation toward aversive stimuli and is associated with poorer pain coping strategies. It can be assessed using the Pain Catastrophizing Scale (PCS). Although the presence of catastrophizing has been established across various chronic conditions, few studies have investigated its presence and its relationship in individuals with migraine.

Objective
The aim of this study was to evaluate the association between pain catastrophizing, measured by the Pain Catastrophizing Scale (PCS), and migraine frequency and impact, as well as to examine how clinical headache characteristics are associated with catastrophizing. Additionally, the secondary aim was to assess positive responses for catastrophizing and to compare PCS scores between episodic and chronic migraine.

Methods
A total of 113 individuals with migraine, aged 18–55 years, were assessed for migraine clinical characteristics (frequency, intensity, and duration) and completed the Headache Impact Test (HIT-6) and the Pain Catastrophizing Scale (PCS). Descriptive statistical analysis was performed to determine the frequency of positive responses on the questionnaire. Multiple linear regression analyses were conducted to examine whether catastrophizing predicts headache frequency and headache-related impact, as well as whether catastrophizing predicts clinical headache characteristics.

Results
The multiple linear regression analysis showed that catastrophizing predicted 10% of headache frequency (R^2=0.10, p<0.01). In addition, clinical characteristics and headache-related impact explained 36% of the variance in total PCS scores (R^2=0.36, p<0.01). For each catastrophizing domain, headache frequency, intensity, and duration (hours), as well as headache-related impact, were associated with higher levels of catastrophizing, including rumination (R^2=0.34, p<0.01), magnification (R^2=0.33, p<0.01), and helplessness (R^2=0.31, p<0.01). More than 80% of the total sample reported positive responses for catastrophizing, particularly reflecting a strong desire for the pain to disappear and persistent concern about pain. Among individuals with chronic migraine, over 80% reported fear-related thoughts that the pain would worsen. Finally, individuals with chronic migraine presented higher PCS scores (p=0,034).

Conclusion
Catastrophizing is a factor that predicts headache frequency. Clinical characteristics as well as headache-related impact were also shown to have predictive values associated with catastrophizing. These findings reinforce for researchers and clinicians the importance of considering the assessment and treatment of catastrophizing in the management of individuals with migraine.

Keywords:
Migraine disorders
Headache
Catastrophization

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Somatosensory analysis of pain in individuals with migraine with and without aura in the interictal phase

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Introduction:
Migraine is a primary headache disorder characterized by unilateral pain, classified as migraine without aura (MO) or migraine with aura (MA). In the literature, studies comparing neurophysiological mechanisms between MA and MO are scarce, indicating the need for further investigation of somatosensor clinical manifestations.

Objective
To analyze whether the presence of aura modifies somatosensory aspects during the interictal phase in individuals with migraine.

Methods
This is a comparative cross-sectional observational study that assessed the clinical characteristics of pain in individuals with MA and MO. The study was approved by the Institutional Research Ethics Committee (CAAE: 81931324.0.0000.5546) and opinion number 7.230.625. This study met the requirements of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement. Sociodemographic, anthropometric, and clinical characteristics of the participants were recorded. Immediately after screening, pressure pain threshold (PPT; digital pressure algometer), temporal summation of pain (TS; temporal summation test), and conditioned pain modulation (CPM; conditioned pain modulation test - algometry) were tested. SPSS software, version 27.0 was used for statistical analyses, with a significance level of $p \leq 0.05$.

Results
The final sample consisted of 27 individuals (MA: n=15; MO: n=12). No statistical differences were observed in the analysis of both primary ($p > 0.05$) and secondary ($p > 0.05$) PPT, TS ($p > 0.05$), and CPM mechanism ($p > 0.05$).

Conclusion
Our findings suggest that somatosensory profiles in MA and MO patients are similar This suggests a shared pathophysiological substrate in the processing of chronic pain, manifested in an analogous manner in both groups, regardless of the presence of aura.

Keywords:
Pain
Signs and symptoms
Central nervous system sensitization
Migraine with aura

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Burnout and headache chronification: the impact of occupational stress on migraine among healthcare professionals

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Introduction
Headache disorders are among the most prevalent and disabling neurological conditions worldwide, imposing substantial functional, emotional, and occupational burden. Healthcare professionals exposed to chronic occupational stress, sleep deprivation, and excessive workloads appear to be at increased risk for migraine and recurrent headache disorders.

Objective
To investigate the association between professional burnout and headache disorders, particularly migraine, among healthcare workers.

Methods
A systematic literature review was conducted using studies retrieved from the PubMed database through the following search strategy: ("Burnout, Professional" OR burnout) AND ("headache" [Title/Abstract] OR "Migraine Disorders" [Title/Abstract]) AND ("doctors" OR "nurses" OR "healthcare workers"), yielding 14 initial articles. The research question was structured according to the PICO framework, considering: population (healthcare professionals), exposure (occupational burnout), comparison (professionals without burnout), and outcomes (headache and migraine occurrence or worsening). Studies published between 2021 and 2026, available in full text and written in English, were included, while duplicate studies were excluded. After eligibility assessment, 7 studies were selected for full-text analysis.

Results
The analyzed studies demonstrated a significant association between professional burnout, occupational fatigue, and increased frequency of headache disorders among healthcare workers. Excessive workloads, sleep deprivation, and multiple employment relationships were consistently associated with higher levels of emotional exhaustion and somatic symptoms, particularly headache and insomnia. A cross-sectional study involving nurses identified a significant association between employment at multiple institutions and headache occurrence (p=0.038), in addition to higher burnout and fatigue levels among professionals exposed to prolonged work shifts. Intensive care unit professionals also exhibited moderate to high levels of burnout, secondary traumatic stress, and alarm fatigue, factors associated with poorer professional quality of life and greater psychological distress. Furthermore, chronic stress-related neurobiological alterations, including persistent cortisol elevation and nociceptive pathway sensitization, were identified as potential mechanisms contributing to migraine chronification and functional impairment.

Conclusion
Professional burnout is strongly associated with increased frequency and worsening of headache disorders, particularly migraine, potentially acting as both a triggering and perpetuating factor. Extended work shifts, chronic fatigue, sleep deprivation, and emotional stress may contribute to central sensitization and reduced quality of life. Early identification of burnout and implementation of mental health promotion strategies may help prevent headache chronification and mitigate its functional impact.

Keywords:
Migraine disorders
Headache
Burnout professional
Healthcare workers

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Comparative analysis between quantitative sensory testing and the allodynia symptom checklist (ASC-12) in patients with migraine

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Introduction
Migraine is a complex neurobiological disorder influenced by genetic factors. Increased frequency and intensity of attacks often lead to peripheral and central sensitization of the nervous system. This phenomenon promotes allodynia, painful perception of innocuous stimuli, which serves as a critical marker for migraine chronification. Despite its clinical relevance, there is a lack of consensus regarding the association between common assessment tools, such as the von Frey monofilament test (objective) and the Allodynia Symptom Checklist (ASC-12) (subjective), which may impact the management of this dysfunction. Objective: To identify whether there is an association between the measures of different instruments in the detection and classification of allodynia in patients with migraine. Specifically, the study sought to correlate ASC-12 scores with mechanical stimulation responses evaluated by von Frey monofilaments.

Objective
To analyze the association and correlation between the ASC-12 questionnaire and von Frey monofilaments in detecting, quantifying, and classifying allodynia in migraine patients; and compare how both instruments behave across different severity levels and intensities of allodynia.

Methods
This was an observational, cross-sectional study conducted at the Laboratory of Neuroscience Research (LAPENE/UFS). The sample consisted of 27 individuals diagnosed with migraine (chronic or episodic). Allodynia was assessed using two methods: 1) von Frey monofilaments (esthesiometry) to objectively measure tactile sensitivity and sensory perception thresholds in the trigeminal and forearm regions; and 2) the ASC-12 questionnaire, a validated tool to evaluate the presence and severity of cutaneous allodynia through self-reporting. Statistical analysis included the Shapiro–Wilk test for normality, Spearman's correlation coefficient, and the Kruskal–Wallis test to compare instrument responses across different severity levels.

Results
The sample had a mean age of 34.5±9.6 years. Analysis showed no statistically significant correlation between the ASC-12 and von Frey monofilament measurements (rho=-0.059; p=0.771). Furthermore, the Kruskal–Wallis test revealed no significant differences in mechanical sensitivity thresholds across the different allodynia severity levels classified by the ASC-12 (p = 0.417). There was no consistent trend or direct correspondence between the subjective self-reported severity and the objective physical measures.

Conclusion
The results demonstrate an absence of statistical association between the ASC-12 and von Frey monofilaments in this sample. These findings suggest that the instruments evaluate distinct dimensions of allodynia: the ASC-12 captures functional perception in daily life (subjective), while monofilaments measure the sensory detection threshold (objective). Therefore, a complementary diagnostic approach using both tools is necessary for a comprehensive clinical evaluation of migraine patients.

Keywords:
Migraine
Hyperalgesia
Sensory threshold

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Menstrual migraine: neuroendocrine mechanisms and therapeutic challenges

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Introduction
Menstrual migraine is a common form of primary headache in women of reproductive age, characterized by attacks associated with the menstrual period. The diagnosis, based on the criteria established by the International Classification of Headache Disorders (ICHD-3), considers the temporal relationship with menstruation and typical symptoms, such as unilateral throbbing pain, nausea, photophobia, and phonophobia. Its identification can be complicated by clinical variability and overlap with other headaches. In addition to physical symptoms, it has a significant psychosocial impact and affects quality of life.

Objective
To understand the neuroendocrine mechanisms underlying menstrual migraine, highlighting the limitations and advances in the therapeutic management of this condition.

Methods
A systematic review with meta-analysis was conducted in accordance with PRISMA 2020 guidelines. Searches were performed in PubMed, MEDLINE, Embase, Cochrane Library, and SciELO for studies published between 2020 and 2026. Randomized clinical trials and observational studies addressing neuroendocrine mechanisms and therapeutic challenges of menstrual migraine were included. Extracted data focused on pathophysiology, diagnostic criteria and pharmacological treatment, synthesized into a translational explanatory.

Results
Menstrual migraine is directly related to hormonal fluctuations, particularly the sharp drop in estrogen during the late luteal phase, a phenomenon known as "estrogen withdrawal", which is considered the primary trigger of attacks. This hormonal fluctuation lowers the pain threshold, induces neuronal excitability, and destabilizes the trigeminovascular system during the perimenstrual period. In this process, neurotransmitters and neuropeptides, such as CGRP, are released, promoting meningeal vasodilation, nociceptive sensitization, and pain maintenance. Treatment is divided into mini-prophylaxis and continuous prophylaxis. Mini-prophylaxis, indicated for women with regular cycles, uses NSAIDs and triptans initiated before menstruation to reduce the intensity and duration of attacks. Continuous prophylaxis, on the other hand, is represented by hormonal contraceptives and aims to reduce hormonal fluctuations in patients with irregular cycles or frequent attacks. In addition, anti-CGRP therapies and gepants represent advances in disease management, particularly in patients with contraindications to triptans or therapeutic refractoriness.

Conclusion
The findings reinforce the notion that menstrual migraine is associated with perimenstrual fluctuations in estradiol, which are responsible for destabilizing the trigeminovascular system and triggering the release of pro-inflammatory neuropeptides. Mini-prophylaxis with triptans and NSAIDs is effective in regular cycles, while continuous hormonal therapies, CGRP antagonists, and gepants expand treatment options for chronic or refractory cases, reducing functional and social impact as well as absenteeism.

Keywords:
Menstrual migraine
Menstrual cycle
Neuropharmacology

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Profile of endogenous pain modulation and functional disability in migraine: a comparative analysis between individuals with and without associated cervicalgia

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Introduction
Migraine is a primary headache disorder characterized by unilateral location, throbbing pain of moderate to severe intensity, exacerbated by routine physical activity, and associated with nausea and/or photophobia and phonophobia. Its pathophysiology is not yet fully elucidated, given the multifactorial complexity of the disorder. However, it has been strongly associated with musculoskeletal symptoms, mainly related to cervical pain, present in approximately 80% of this population. This coexistence of cervical pain in migraine is evaluated as a possibility of a higher degree of central sensitization and the existence of alterations in nociceptive processing in these individuals.

Objective
To investigate whether patients with chronic migraine and cervical pain show amplification of neural pain sensitization compared to a diagnosis of chronic migraine alone.

Methods
A comparative cross-sectional observational epidemiological study. Individuals of both sexes, aged 18 to 59 years, diagnosed with chronic migraine with or without associated neck pain were included. The following aspects of the patients were assessed during screening: intensity of neck pain at rest (11-point numerical scale), temporal summation test (algometer), conditioned pain modulation test (algometer), pressure pain threshold (algometer), and cervical disability (Cervical Disability Index).

Results
The sample consisted of 54 individuals distributed into two groups: migraine with neck pain and migraine without neck pain. No statistically significant differences were found between the groups with migraine with neck pain and without associated neck pain regarding temporal summation ($p<0.05$), inhibitory pain mechanisms ($p<0.05$), primary mechanical hyperalgesia ($p<0.05$), and self-reported neck disability ($p<0.05$).

Conclusion
It is concluded that the functioning of pain facilitation and inhibition pathways, as well as the level of cervical disability, do not show significant variations depending on the presence or absence of neck pain in individuals with migraine. These results reinforce the hypothesis that the suprasegmental dysfunction characteristic of migraine is the main determinant of alterations in somatosensory processing, independently of peripheral cervical nociceptive afferents.

Keywords:
Migraine
Neck pain
Sensitization
Trigeminal-cervical complex

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Headaches as an initial manifestation and clinical marker of cerebrovascular diseases: a systematic review

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Introduction
Headache often manifests as an isolated symptom before focal deficits in acute cerebrovascular disorders, such as Ischemic Cerebrovascular Accident (ICVA), Cerebral Venous Thrombosis (CVT), Subarachnoid Hemorrhage (SAH), and Arterial Dissection (AD), frequently causing emergency misdiagnoses. Distinguishing these secondary headaches from primary disorders is crucial for correct triage and rapid management.

Objective
To characterize headache frequency, semiology, and prognosis across acute cerebrovascular etiologies.

Methods
A systematic review was conducted in accordance with the 2020 PRISMA guidelines across PubMed, LILACS, and SciELO databases. Medical subject headings and terms including Cerebrovascular Disorders, Stroke, Brain Ischemia, Subarachnoid Hemorrhage, Intracranial Embolism and Thrombosis, Cerebrovascular Disease, Headache, Headache Disorders, Cephalalgia, and Thunderclap headache were paired using Boolean operators (AND/OR). Retrospective or prospective cohort studies published in English, Portuguese, or Spanish were included without publication year restrictions. To characterize the clinical spectrum and progression of patients, the retrieved data systematically focused on specific evaluated scores and parameters: the Visual Analog Scale (VAS) for headache intensity; the National Institutes of Health Stroke Scale (NIHSS) for acute neurological deficits; the modified Rankin Scale (mRS) to measure functional recovery and disability; and Intracranial Pressure (ICP) values as a physiological marker. Continuous non-normally distributed data were expressed alongside their Interquartile Range (IQR).

Results
From 19 studies analyzed, distinct etiological patterns emerged: in ICVA headaches were an initial symptom in 26% of cases. In cerebellar ICVA (11%), pain was throbbing/stabbing, occipitocervical, and ipsilateral, involving cortical layers (63.6%) and PICA territory (54.5%), linking to left hemispheric/vermian lesions. Admission mRS was 4–5 in 81.8%, NIHSS was 0–5, and 6-month mRS 0–3 was 90.9% (0% mortality). In CVT, mostly tension-type (65%) or thunderclap (17.5%). Isolated cases had a benign course; 88% achieved favorable outcomes (mRS 0–1) under anticoagulation. In SAH thunderclap headache in 65% of aneurysmal cases; median VAS fell from 8 [IQR: 7–8] on Day 1 to 5 [IQR: 4–5] on Day 7. Severity linked to cisternal volume ($p<0.05$), ICP (Rs =0.560, $p<0.001$), and CSF cytokines (IL-6 Day 1: 3113.56 pg/ml; TNF- Day 5: 78.30 pg/ml; $p<0.05$). Refractory pain (71% of younger patients) linked to hyponatremia (137.5 vs 139.3 mEq/L; $p<0.01$), 11.1% delayed ischemia risk, and opioids (24.4 mg/day). In AD there was pain in 77.5% (carotid: frontal/ocular; vertebral: occipitocervical). Occlusion caused a 5–7 day plateau, but early detection yielded 82.5% favorable outcomes.

Conclusion
Headaches serve as critical warning signs of cerebrovascular pathology. Early recognition before focal decline allows immediate interventions that mitigate ischemic risks and optimize functional recovery.

Keywords:
Headache
Biomarkers
Cerebrovascular

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Migraine as a differential diagnosis of CADASIL in young individuals

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Introduction
The most prevalent hereditary cerebral angiopathy is autosomal dominant cerebral arteriopathy with subcortical infarcts and leukoencephalopathy, known worldwide as CADASIL. This disease is caused by a mutation in the NOTCH3 gene on chromosome 19, which encodes a protein whose main function is to maintain vascular structural and functional stability. There are no universally accepted diagnostic criteria for CADASIL, as the presenting symptoms, age of onset, and disease progression are variable. Although cerebrovascular lesions are the most frequent clinical manifestations, migraine is the manifestation that begins earliest, and may already be present in early adolescence.

Objective
To identify migraine as an initial symptom of CADASIL.

Methods
Patients diagnosed with CADASIL.

Results
The proportion of migraine in patients with CADASIL is 5 times higher than in the general population. The first symptoms usually occur before the age of 20, with the average age of onset being 30 years, and in women, symptoms occur earlier than in men. Migraine precedes other symptoms by many years, and MRI images may still be normal, leading to delays and diagnostic errors. The relationship between migraine and CADASIL can be explained by the identification of genetic anomalies occurring on chromosome 19, the same chromosome as familial hemiplegic migraine. The characteristic of CADASIL migraine is the presence of aura symptoms, with visual symptoms being the most prevalent, followed by sensory, aphasic, and motor symptoms. Some individuals present with atypical auras. A possible mechanism for the increased prevalence of aura in patients with CADASIL is increased susceptibility to cortical spreading depression. The precipitating factors for migraine with aura are similar to those in the general population.

Conclusion
Migraine, especially if accompanied by aura, can be an initial symptom of CADASIL disease and should be considered as a differential diagnosis, particularly in younger individuals.

Keywords:
Migraine
Headache
CADASIL

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Temporal trends and epidemiological profile of hospitalizations for migraine and other cephalalgic syndromes in Brazil from 2016 to 2025: an ecological study

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Introduction
Migraine and tension-type headache are the two most prevalent primary headache disorders and together account for more than 90% of headache complaints. Despite the availability of effective therapeutic options, underdiagnosis, self-medication, and poor adherence to preventive treatment continue to make primary headaches a significant clinical challenge. In Brazil, this issue is particularly relevant, as studies indicate that up to 72% of the population experience primary headaches within a one-year period. Therefore, understanding not only the temporal behavior of primary headache-related cases but also the epidemiological profile of the most affected populations is essential for improving disease management and healthcare planning.

Objective
To evaluate temporal trends in migraine-related hospitalizations in Brazil between 2016 and 2025 and to describe the epidemiological profile of hospitalized patients.

Methods
This ecological study analyzed temporal trends and epidemiological characteristics of hospitalizations for migraine and other headache syndromes in Brazil from 2016 to 2025. Data were obtained from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS) through DATASUS. Variables included hospitalizations, sex, race/skin color, and region. Hospitalization rates were calculated using population data from the 2022 Brazilian Census. Temporal trends were assessed using Prais–Winsten regression.

Results
Between 2016 and 2025, 105,266 hospitalizations for migraine and other headache syndromes were recorded in Brazil. The national hospitalization rate increased from 4.01 to 6.21 per 100,000 inhabitants; however, the overall temporal trend remained stationary (APC=3.04%; p=0.089). Regional analysis revealed significant increasing trends in the North (APC=15.46%; p<0.001) and Midwest (APC=6.14%; p=0.029), while the remaining regions showed stationary trends. Females accounted for 66.3% of hospitalizations, with a female-to-male ratio of 1.96:1. Individuals of mixed race/skin color represented 44.6% of admissions, followed by White individuals (38.9%). The highest cumulative hospitalization rates were observed among Asian individuals (276.19/100,000 inhabitants), whereas Indigenous individuals had the lowest rates (9.04/100,000 inhabitants).

Conclusion
The findings reveal a heterogeneous pattern of migraine-related hospitalizations across Brazil. While the North and Midwest regions experienced significant increases in hospitalization rates, the remaining regions remained stable. These results may reflect regional differences in healthcare access, diagnostic capacity, and clinical management of headache disorders. Furthermore, the predominance of hospitalizations among women and individuals of mixed race/skin color reinforces the role of biological, hormonal, and sociodemographic factors in migraine occurrence.

Keywords:
Migraine disorders
Epidemiology
Headache disorders

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Optic nerve sheath diameter correlates with intracranial hypertension markers in patients with idiopathic intracranial hypertension

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Introduction
Idiopathic intracranial hypertension (IIH) is characterized by elevated intracranial pressure and may lead to visual impairment and papilledema. Measurement of optic nerve sheath diameter (ONSD) has emerged as a noninvasive method for estimating intracranial pressure, but its clinical utility in IIH populations remains under investigation.

Objective
To evaluate the association between ONSD measurements and markers of intracranial hypertension in patients with IIH.

Methods
We performed a retrospective observational study including patients diagnosed with IIH who underwent ONSD evaluation. Demographic, anthropometric, therapeutic, ophthalmologic, and cerebrospinal fluid opening pressure data were collected from medical records. ONSD values ≥5.5 mm were considered abnormal. Analyses included only ophthalmologic and manometric evaluations performed within 3 months of ONSD measurement. Associations between ONSD, cerebrospinal fluid opening pressure, visual acuity reduction, and papilledema were analyzed using contingency tables, correlation analyses, logistic regression, and ROC curve analysis.

Results
Twenty-five patients and 37 bilateral ONSD measurements were included. Mean age was 38.3 years, mean body weight was 91.1 kg, and mean BMI was 35.5 kg/m². Mean opening pressure showed a positive correlation with ONSD measurements (Spearman rho=0.25), although without statistical significance (p=0.36). ONSD enlargement was significantly associated with papilledema (Fisher's exact test p=0.025). ROC analysis demonstrated moderate discriminatory performance of ONSD for papilledema detection, with an area under the curve (AUC) of 0.70. Patients with severe obesity (BMI ≥40 kg/m²) exhibited higher mean ONSD values than patients with BMI <40 kg/m² (6.01 mm vs 5.66 mm).

Conclusion
In this IIH cohort, ONSD measurement demonstrated significant association with papilledema and moderate ability to discriminate active intracranial hypertension-related optic disc changes. These findings support the usefulness of ONSD as a noninvasive marker of intracranial hypertension in patients with IIH.

Keywords:
Idiopathic intracranial hypertension
Optic nerve sheath ultrasound
Papilledema

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Bacterial meningitis as a secondary headache disorder: temporal trends, vaccination coverage and epidemiological profile in Brazil

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Introduction

Headache is one of the most common neurological symptoms and may result from either benign conditions or potentially life-threatening diseases. Among the causes of secondary headache, bacterial meningitis stands out due to its high morbidity/mortality and the need for early diagnosis. In this context, understanding its temporal behavior and epidemiological profile is essential to strengthen diagnostic suspicion, especially in light of recent changes in vaccination coverage. Furthermore, identifying the most affected groups supports prevention and public health surveillance strategies.

Objective

To analyze the temporal trend of hospitalizations for bacterial meningitis in Brazil, its association with meningococcal C vaccination coverage, and the epidemiological profile of hospitalized individuals.

Methods

This ecological time-trend study was conducted using secondary data on hospitalizations for bacterial meningitis in Brazil from 2016 to 2025 and meningococcal C vaccination coverage from 2013 to 2022, obtained from DATASUS. Data were collected from the Hospital Information System and the National Immunization Program Information System, including year, region, sex, age group, race/skin color, number of hospitalizations for bacterial meningitis, and vaccination coverage. Temporal trends were assessed using Prais–Winsten regression. The association between vaccination coverage and hospitalizations was evaluated using Pearson's and Spearman's correlation tests with a two-year lag, considering the delayed population-level effect of immunization. Hospitalization rates were calculated using data from the 2022 Brazilian Census (IBGE).

Results

Between 2016 and 2025, 37,330 hospitalizations for bacterial meningitis were recorded in Brazil. The Southeast accounted for the largest proportion of cases (43.4%), while the South showed the highest cumulative hospitalization rate (25.9/100,000 inhabitants). Prais–Winsten analysis demonstrated a stationary national trend (APC=4.62%; p=0.356), with significant growth only in the Northeast (APC=8.33%; 95%CI: 3.75–13.10; p=0.003). Vaccination coverage declined in all regions, with an annual reduction of 2.55% nationwide (p<0.001). Significant negative correlations were observed between vaccination coverage and hospitalizations in both Pearson's (r=-0.775; p=0.008) and Spearman's analyses (=-0.733; p=0.025). Hospitalizations predominated among males (57.2%), children under 5 years (27.4%), and individuals of mixed race/skin color (44.8%).

Conclusion

Hospitalizations for bacterial meningitis increased only in the Northeast, concomitant with declining vaccination coverage nationwide. The negative association between vaccination coverage and hospitalizations suggests a potential impact of reduced immunization on disease occurrence. Males, children under 5 years, and individuals of mixed race/skin color were the most affected groups, highlighting priority populations for epidemiological surveillance and preventive strategies.

Keywords:
Epidemiology
Secondary headache disorders
Bacterial meningitis
Vaccination coverage

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Patients with chronic migraine present persistent functional disorders in the interictal phase: an observational case-control studyl

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Introduction
Migraine is a primary and disabling headache that can be divided into phases: ictal, which corresponds to the period of crisis, and interictal, the period between crises. In the literature, there is little evidence on functional deficits in the interictal phase of chronic migraine; based on this, this study hypothesized that migraine may compromise functionality compared to healthy individuals.

Objective
To investigate the presence of functional deficits in people with chronic migraine during the interictal phase.

Methods
This is an observational case-control study, an arm of a randomized clinical trial. Patients and healthy individuals were evaluated by a physiotherapist with four years of training. The target population consisted of participants diagnosed with chronic migraine for the case group and healthy individuals for the control group. Individuals with other types of headache or with neurological and/or psychiatric diseases were excluded. Both groups underwent all study variables and were evaluated by the same evaluator. An assessment form was used to collect sociodemographic data; an inclinometer to assess ROM; the Visual Analogue Scale to assess pain intensity; the Cervical Disability Index, which assesses and classifies the severity of cervical disability; and the International Physical Activity Questionnaire (IPAQ-SF) to assess physical activity levels. The sample size was 10 participants in each group, using PEPI-for-Windows (WinPEPI), which compares the two groups using the standard deviation (SD), SD migraine group (A) = 2,96; SD control group (B) = 8,56. Finally, all variables were tested for normality using the Shapiro-Wilk test, noting that in all comparisons the p-value was less than 0,05.

Results
A total of 54 participants were included in the study (n=32 in the case group and n=22 in the control group). When compared to the control group, the migraine group presented a smaller range of motion in all cervical movements ($p<0,05$), except for right inclination ($p<0,05$); significantly greater pain intensity during extension and right cervical inclination ($p<0,05$); greater cervical disability ($p<0,001$), only one participant (3,1%) did not present this disability; level of physical activity did not show a significant difference ($p=0,839$).

Conclusion
This study demonstrated that individuals with chronic migraine in the interictal phase present several functional deficits compared to healthy individuals. The findings highlight the need for targeted therapeutic approaches to improve cervical function and quality of life in people with chronic migraine.

Keywords:
Migraine disorders
Pain
Neck pain

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Cross-sectional area of the optic canal as a factor associated with papilledema in idiopathic intracranial hypertension: a case-control study

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Introduction

In idiopathic intracranial hypertension (IIH), papilledema results from the transmission of elevated intracranial pressure to the optic nerve, in the absence of structural lesions that could otherwise explain this finding. Previous studies suggest that narrower optic canals may limit this pressure transmission. Bidot et al. demonstrated that, in patients with IIH and unilateral papilledema, the unaffected side had a narrower optic canal, whereas larger canals were associated with higher Frisén papilledema grades and worse visual function.

Objective

To assess whether optic canal area is associated with the diagnosis of IIH and the presence of papilledema.

Methods

This retrospective case-control study included patients with definite or probable IIH according to Friedman criteria and age- and sex-matched migraine controls. Only individuals with cranial computed tomography (CT) scans with adequate bone-window images for optic canal measurement were included. The cross-sectional area (CSA) of the optic canal was measured by an investigator blinded to diagnostic group, using the standardized technique described by Bidot et al., adapted for CT imaging. Optic canal CSA was dichotomized according to the sample median and classified as narrow when <50 mm^2 and large when ≥50 mm^2. Statistical significance was set at $p<0.05$.

Results

Initially, 25 individuals with definite or probable IIH and 21 controls were identified. In the IIH group, nine patients were excluded due to the absence of adequate bone-window CT images and six due to incomplete data. In the control group, five individuals were excluded due to the absence of bone-window CT images. The final sample included 10 cases and 11 controls, all female, with no difference in age between groups ($p>0.99$). Among patients with IIH, seven had papilledema, including two with unilateral papilledema, whereas three had no papilledema. There was no significant difference in optic canal CSA between the IIH and control groups. However, optic canals classified as large were associated with a higher frequency of papilledema. Individuals with large optic canals had a 4.5-fold higher odds of papilledema compared with those with narrow canals (OR=4.50; 95% CI: 1.01–20.11; $p=0.040$).

Conclusion

Optic canal CSA did not differ significantly between patients with IIH and migraine controls. However, larger optic canals were associated with higher odds of papilledema, suggesting that optic canal anatomy may influence the transmission of intracranial pressure to the optic nerve and act as an additional factor in the clinical expression of IIH. These findings should be interpreted as exploratory due to the small sample size and require confirmation in larger studies.

Keywords:
Idiopathic intracranial hypertension
Papilledema
Optic canal
Computed tomography
Optic nerve

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Lipid profile alterations associated with migraine: a systematic review

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Introduction
Patients with migraine present higher cardiovascular risk, relationship well established in the literature. However, findings regarding lipid profile alterations and their clinical implications require further understanding.

Objective
To investigate lipid profile alterations and their clinical implications in patients with migraine.

Methods
This systematic review was conducted using the PICO strategy and according to the PRISMA guidelines. A search was conducted for studies published in the last 5 years in English, Portuguese, and Spanish in PubMed, Scopus, and Embase databases using the MeSH terms Dyslipidemias and Migraine Disorders combined with the Boolean operator "AND". 585 studies were identified and underwent double independent screening. Inclusion criteria were studies assessing at least one lipid profile component in patients with migraine; observational studies and randomized clinical trials. Exclusion criteria were studies that did not specifically evaluate patients with migraine, resulting in 8 articles for data extraction.

Results
Its emphasized increased low-density lipoprotein cholesterol (LDL), Triglycerides (TG), and total cholesterol levels in adults ($p=0.0001$), and adolescents ($p<0.01$) with migraine, suggesting oxidative stress from an unfavorable lipid profile may sensitize the trigeminovascular system, increasing susceptibility to migraine, especially in aura-associated cases that presents greater lipid discrepancy ($p<0.0001$). High-density lipoprotein cholesterol (HDL) levels were reduced ($p=0.001$), suggesting diminished HDL antioxidant activity; however, in one cross-sectional study its levels were higher in migraine patients versus controls ($p<0.001$), supporting another hypothesis: increased HDL, due to its antioxidant properties, could alter neurodegenerative processes or pain perception as a negative feedback to the higher oxidative stress in migraine. Increased TG levels were associated with medication overuse ($p=0.037$), correlating with longer migraine duration, higher attack frequency and visual analog scale scores ($p<0.001$; $p=0.040$; $p=0.020$), suggesting worse prognosis and supporting that a dyslipidemic environment may reduce nociceptive thresholds and facilitate central sensitization. TG reduction was causally associated with lower migraine risk ($p=0.002$), as was LDL reduction ($p=0.0016$). Statin use was associated with lower migraine risk ($p<0.001$), while migraine itself was associated with left ventricular hypertrophy ($p<0.05$), frequent in patients with recurrent attacks ($p<0.05$); and females ($p<0.001$). Ocular studies showed greater ocular pain and retinal vascular tortuosity ($p<0.05$), suggesting vascular dysfunction and vasodilation by lipid alterations in migraine.

Conclusion
Migraine is associated with higher levels of LDL, TG and total cholesterol, with potential clinical impact. The underlying mechanisms remain hypothetical, and more longitudinal studies are needed to confirm causality.

Keywords:
Migraine
Pathophysiology
Dyslipidemias
Clinical features

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Photophobia in migraine: pathophysiological mechanisms at the neuro-ophtalmological interface

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Introduction
Migraine is a neurological condition characterized by recurrent episodes of pulsatile headache, frequently accompanied by nausea, vomiting, phonophobia, and photophobia, with approximately 25% of patients experiencing aura. Among associated symptoms, photophobia stands out as one of the most prevalent and disabling manifestations of primary headaches, occurring in up to 80–90% of migraineurs. Its pathophysiology involves retinal, trigeminovascular, and cortical mechanisms, with evidence pointing to the involvement of intrinsically photosensitive retinal ganglion cells (ipRGCs) containing melanopsin, activation of the trigeminovascular pathway, and cortical hyperexcitability.

Objective
To analyze the pathophysiological mechanisms involved in photophobia in primary headaches, with emphasis on the interaction between retinal light capture and central pain pathways, especially in migraine.

Methods
A systematic literature review was conducted following PRISMA guidelines, searching PubMed, SciELO, and LILACS. Eligibility criteria included reviews and clinical trials from the last 10 years, available in free full text, in English or Portuguese. Screening was performed by the study team with disagreements resolved by consensus. Studies not addressing photophobia pathophysiology in primary headaches, unavailable in full text, or published in other languages were excluded. Eight studies were identified; one was excluded after eligibility screening, and seven were fully analyzed.

Results
The studies demonstrated a multimechanistic pathophysiology for photophobia in primary headaches. At the retinal level, ipRGCs proved central, directly responding to light and triggering discomfort, with greater sensitivity to blue light and connections to nociceptive structures. At the central level, convergence between photic signals and the trigeminovascular pathway was observed in pain-related thalamic neurons. CGRP and PACAP showed important roles in pain modulation and light aversion. Cortical hyperexcitability was also identified as a mechanism underlying light intolerance.

Conclusion
Photophobia in primary headaches represents a complex neuro-ophthalmological manifestation resulting from the interaction between the retina, trigeminovascular pathway, and visual cortex. The involvement of ipRGCs, modulation by CGRP and PACAP, and cortical hyperexcitability support an integrated pathophysiological model. These findings reinforce the importance of early clinical recognition and broaden therapeutic perspectives targeting light and pain processing.

Keywords:
Migraine
Photophobia
Neuro-ophthalmology

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Is disability related to neck pain or vestibular symptoms associated with self-efficacy in patients with migraine?

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Introduction
Self-efficacy related to headache management corresponds to an individual's perception of their ability to prevent and control pain episodes and their functional consequences. In individuals with migraine, higher levels of self-efficacy are associated with lower frequency and intensity of attacks, less headache-related disability, and better adherence to therapeutic strategies. However, the association between self-efficacy and neck pain and dizziness/vertigo, symptoms that are very prevalent in migraine and are related to greater clinical severity and greater functional disability, has not yet been investigated. In addition to aspects related to disability, psychosocial factors also influence the pain experience in individuals with migraine. Previous studies demonstrate that higher levels of self-efficacy are associated with less emotional distress, less catastrophizing of pain, poorer quality of life, and greater impact of the disease.

Objective
To verify if cervical disability and disability related to vestibular symptoms are associated with self-efficacy in migraine patients.

Methods
Cross-sectional study with 50 individuals of both sexes, aged 18 to 55 years, diagnosed with migraine according to the 3rd International Classification of Headache Disorders. Participants answered the Headache Management Self-Efficacy Scale (HMSE-10), Neck Disability Index (NDI), Dizziness Handicap Inventory (DHI), Headache Impact Test (HIT-6), Migraine-Specific Quality of Life Questionnaire (MSQ), and Pain Catastrophizing Scale (PCS). Correlation and backward multiple linear regression analyses were performed to investigate factors associated with self-efficacy.

Results
Dizziness was reported by 72% of participants, while 66% presented with neck pain associated with migraine. Lower levels of self-efficacy were associated with higher headache frequency ($r=-0.563$; $p<0.001$), greater headache impact as assessed by the HIT-6 ($r=-0.368$; $p=0.006$), greater catastrophizing of pain ($r=-0.291$; $p=0.033$), and worse quality of life as assessed by the MSQ ($r=0.369$; $p=0.006$). Associations were also observed between lower self-efficacy scores and longer duration ($r=-0.303$; $p=0.026$) and intensity of neck pain ($r=-0.323$; $p=0.017$). However, in the multiple linear regression model, only the monthly frequency of headache remained as a factor associated with self-efficacy (=-0.507; $p<0.001$), while cervical disability and dizziness-related disability did not show a significant association.

Conclusion
Disability related to neck pain and vestibular symptoms are not associated with self-efficacy in migraine patients. Confirming previous findings, a high frequency of migraine is associated with lower self-efficacy in these individuals.

Keywords:
Dizziness
Migraine
Neck pain
Self-efficacy

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Optic nerve sheath diameter as a potential biomarker of disease activity in idiopathic intracranial hypertension

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Introduction
Reliable noninvasive biomarkers of disease activity in idiopathic intracranial hypertension (IIH) are still lacking. Optic nerve sheath diameter (ONSD) measurement may reflect dynamic changes in intracranial pressure and disease activity over time.

Objective
To evaluate the potential utility of ONSD as a biomarker of disease activity in patients with IIH undergoing longitudinal follow-up.

Methods
This retrospective observational study included patients with IIH who underwent serial ONSD measurements during clinical follow-up. Mean bilateral ONSD values were calculated using measurements from both eyes. ONSD ≥5.5 mm was considered abnormal. Clinical, therapeutic, and ophthalmologic data were collected from medical records. Longitudinal analyses evaluated changes in ONSD over time and their association with acetazolamide treatment.

Results
Among patients with repeated ONSD evaluations, 10 presented enlarged ONSD on the first assessment, while 8 remained abnormal on the second assessment. Mean interval between evaluations was 52.4 days. Mean ONSD decreased from 6.07 mm at baseline to 5.75 mm at follow-up, demonstrating a trend toward improvement, although without statistical significance (Wilcoxon p=0.219). Mean acetazolamide dose was 2027.8 mg/day at baseline and 1964.3 mg/day at follow-up. No significant association was observed between acetazolamide dose variation and ONSD improvement (Spearman rho=0.07; p=0.90). ONSD enlargement showed significant association with papilledema, but not with visual acuity reduction.

Conclusion
Serial ONSD measurements demonstrated longitudinal variation compatible with changes in disease activity in IIH. Although statistical significance was not reached in this pilot retrospective cohort, the observed reduction in ONSD over time and its association with papilledema support the potential role of ONSD as a noninvasive biomarker for monitoring disease activity in IIH.

Keywords:
Headache
Idiopathic intracranial hypertension
Optic nerve sheath diameter
Optic nerve ultrasound

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Cytokines as factors associated with persistent post-COVID-19 headache: a case-control study

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Introduction
Post-COVID-19 persistent headache is the most prevalent neurological manifestation of long COVID, affecting up to 26% of infected individuals. Dysregulation of pro-inflammatory and anti-inflammatory cytokines has been proposed as a key mechanism underlying symptom persistence, yet direct evidence comparing cytokine profiles between patients with and without headache persistence remains scarce.

Objective
To compare plasma levels of IL-6 and IL-10 between patients with persistent post-COVID-19 headache and those whose headache resolved after the acute phase.

Methods
Case-control study nested in a prospective cohort of patients who reported headache during acute COVID-19 (RT-PCR confirmed). Cases (n=20) maintained headache more than two years after infection; controls (n=40) were matched by sex, age, and time since infection. Plasma IL-6 and IL-10 were measured by flow cytometry (CBA kit, BD Biosciences). Headache impact, anxiety, and depression were evaluated using the Headache Impact Test (HIT-6) and The Hospital Anxiety and Depression Scale (HADS). Statistical analysis used Mann-Whitney U test and Spearman correlation (SPSS v.30).

Results
Groups were comparable in age (cases: 53.25±9.21 years; controls: 53.58±9.67), sex (80% female), and BMI. In the case group, 90% of headaches met ICHD-3 criteria for migraine, with bilateral (70%), pulsatile (85%) character, associated with photophobia (95%), nausea (90%), and phonophobia (90%). All cases fulfilled criteria for New Daily Persistent Headache (NDPH). Headache frequency averaged 78 days in the preceding 3 months, with median intensity 7/10; 70% reported medication overuse. HIT-6 score was significantly higher in cases (65.6±5.37 vs. 45.9±5.67; p<0.001). Cases showed markedly higher anxiety (HADS-A median: 12 vs. 6; p<0.001) and depression scores (HADS-D median: 10 vs. 5.5; p<0.001). Plasma IL-6 was elevated in cases (median 5.00 pg/mL; IQR 3.48–9.18) versus controls (2.69 pg/mL; IQR 2.44–3.66; p<0.001). IL-10 was also higher in cases (5.14 pg/mL; IQR 4.86–5.36 vs. 4.74 pg/mL; IQR 4.48–4.91; p=0.002).

Conclusion:
Persistent post-COVID-19 headache presents a migraine-like phenotype with severe functional impact, high rates of medication overuse, and significant psychological burden. Elevated IL-6 and IL-10 levels support a chronic neuroinflammatory state as a key underlying mechanism. These findings highlight the need for targeted immunological and clinical approaches in managing this disabling condition.

Keywords:
Neuroinflammation
Long COVID
Post-COVID-19 headache
New daily persistent headache
Cytokines

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Association between vestibular symptoms and headache attacks after visual self-motion stimulation in individuals with migraine

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Introduction
Migraine is a complex neurological disorder associated with alterations in sensory processing, including increased sensitivity to visual stimuli. Evidence suggests that visual self-motion stimulation may trigger vestibular symptoms and cerebral hyperactivity in regions related to visual and pain processing, which could facilitate the onset of a migraine attack. However, it remains unclear whether the occurrence of vestibular symptoms is associated with the onset of headache attacks following this type of stimulus.

Objective
To investigate the occurrence of vestibular symptoms and migraine attacks after visual self-motion stimulation and to analyze the association between these outcomes in individuals with migraine.

Methods
This was a cross-sectional study including 52 individuals of both sexes, aged 18 to 55 years, diagnosed with migraine according to the 3rd International Classification of Headache Disorders, and reporting at least 3 headache days in the previous month. Participants watched a 5-minute first-person roller coaster simulation video with changes in direction and acceleration. Two days after exposure, participants were asked about the occurrence of migraine attacks and vestibular symptoms (dizziness/nausea). The association between outcomes was analyzed using a contingency table and the chi-square test (^{2}), and the magnitude of the association was estimated using the odds ratio (OR) with a 95% confidence interval (95% CI).

Results
Within the two days following video exposure, 25% of participants reported dizziness/nausea and 21% experienced a migraine attack. A significant association was observed between vestibular symptoms and the occurrence of migraine attacks (^{2}=6.50; p=0.011). The odds ratio showed that, after watching the video, the occurrence of migraine attacks was higher among participants who reported vestibular symptoms (OR=5.83; 95% CI=1.38–24.6).

Conclusion
In individuals with migraine exposed to visual self-motion stimulation, the occurrence of vestibular symptoms is associated with the occurrence of migraine attacks. These findings suggest that individuals who are more sensitive to this type of visual stimulus may also present greater susceptibility to developing migraine attacks after exposure.

Keywords:
Migraine
Vestibular symptoms
Visual stimulation

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Persistent daily headache and olfactory dysfunction after COVID-19: a case-control study

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Introduction

COVID-19 is associated with a high prevalence of olfactory disorders, with hyposmia or anosmia reported in 47–53% of individuals during the acute phase, persisting beyond six months in 10–37% of cases. Headache affects approximately 47% of patients acutely and may persist in 6–45%. Co-occurrence of olfactory dysfunction and headache in acute COVID-19 has been documented, and a shared neuroinflammatory pathophysiology involving the olfactory bulb and trigeminovascular system has been proposed. New daily persistent headache (NDPH) is a recognized post-COVID phenotype, and its association with olfactory dysfunction remains poorly understood.

Objective

To investigate whether persistent COVID-19-related daily headache is associated with olfactory dysfunction, and to examine correlations between headache severity, olfactory impairment, and depressive and anxiety symptoms.

Methods

Case-control study with participants from a cohort of COVID-19 patients with acute headache at a specialized headache outpatient clinic. Cases (n=20) had headache persisting over one year post-infection. Controls (n=40) with headache resolved after the acute phase were matched by sex, age, and time since acute COVID-19. Olfactory function was assessed using the Brazilian version of the UPSIT® scale. Headache impact was evaluated with Headache Impact Test (HIT-6), and mood symptoms with The Hospital Anxiety and Depression Scale (HADS). Headache diagnosis followed ICHD-3 criteria. Logistic regression adjusted for depression and anxiety was performed.

Results

All 20 cases were diagnosed with NDPH (18 migraine-like, 2 tension-type). No MRI abnormalities were found. Overall, 85% of participants had olfactory dysfunction: 63.3% mild hyposmia, 16.7% moderate, 5% severe; no anosmia was identified. UPSIT scores did not differ significantly between groups (31.45±3,3 vs. 32.08±2,21; p=0.534). The analysis showed no significant association between persistent headache and moderate to severe hyposmia (40% vs. 17,5%; OR=0.318; p=0.058); adjusted logistic regression also did not reach significance (adjusted OR=0.212; 95% CI: 0.034–1.19; p=0.077). No correlations were found between olfactory scores and headache intensity, frequency, or HIT-6. A significant negative correlation was observed between olfactory severity and depressive scores in the case group (rs=−0.473; p=0.035) and overall sample (rs=−0.300; p=0.02).

Conclusion

Persistent post-COVID daily headache was not independently associated with greater olfactory dysfunction after adjustment for mood symptoms. However, worse olfactory function correlated with higher depressive burden among patients with persistent headache, suggesting a shared neuroinflammatory basis. These findings indicate that post-COVID headache evaluation should routinely include olfactory screening alongside depression and anxiety scales.

Keywords:
Long COVID
Post-COVID-19 headache
New daily persistent headache
Olfactory dysfunction
Hyposmia

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Clinical characteristics and outcomes after epidural blood patch for intracranial hypotension: a single-center cohort study

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Introduction
Intracranial hypotension (IH) is an underdiagnosed syndrome resulting from disruption of CSF dynamics, most commonly through dural breach. Its management relies on epidural blood patch (EBP) as the established first-line procedural intervention, yet response rates vary according to etiology, and the clinical trajectory of non-responders remains poorly characterized.

Objective
To characterize treatment response and the full management trajectory following EBP in a cohort of IH patients, and to perform an exploratory analysis of factors associated with primary treatment failure.

Methods
Retrospective cohort study conducted at a neurological tertiary referral center (January 2022–October 2025). Patients meeting ICHD-3 criteria for IH who underwent EBP after failure of conservative management were included. A standardized protocol of blind lumbar EBP (15–20 mL) was applied. The primary outcome was clinical response at 6 months. Treatment success was defined as sustained symptomatic improvement (VAS 0–4) without additional interventions. Predictors of first-EBP failure were evaluated using Fisher's exact test and exploratory bivariate logistic regression.

Results
A total of 47 patients were included (mean age 42.1±14.7 years; 40.4% male). After primary EBP, 78.7% (n=37) achieved sustained clinical improvement, with an overall long-term success rate of 91.5% across the full escalation pathway. Among 10 primary non-responders, repeat EBP achieved sustained improvement in 60% (3/5); all 5 patients who underwent surgical correction achieved sustained improvement (100%). Late relapsers (n=4) showed no sustained response to additional EBP but responded universally to surgery. Exploratory analyses identified three variables significantly associated with first-EBP failure: absence of a prior lumbar procedure (p=0.019), symptom duration exceeding two weeks before EBP (OR 12.6; p=0.011), and prior neoplastic disease (OR 15.4; p=0.026). Age, sex, and brain MRI findings did not reach statistical significance.

Conclusion
Most IH patients achieve sustained improvement following EBP, with further gains attained through structured escalation. Two clinically distinct failure trajectories were identified: primary non-responders, in whom repeat EBP may still be effective; and late relapsers, who appear to harbor more complex dural pathology and consistently responded to surgical repair. Iatrogenic etiology, early EBP, and absence of oncological history were associated with favorable outcomes. These findings support early empirical EBP, prompt escalation to advanced myelography in high-risk non-responders, and multicenter prospective studies to validate these predictors.

Keywords:
Intracranial hypotension
Secondary hedache
Cohort
Epidural blood patch

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Neuromodulation



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Peripheral neuromodulation for refractory chronic migraine: a case report with long-term follow-up

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Introductio
Chronic migraine (CM) is a debilitating condition defined by headache occurring on 15 or more days per month. In cases of therapeutic refractoriness to conventional prophylactic lines, interventional strategies gain relevance. The trigeminocervical convergence justifies the efficacy of procedures on peripheral nerves, such as the greater occipital nerve (GON), supraorbital nerve (SON) and auriculotemporal nerve (ATN). Pulsed radiofrequency (PRF) emerges as a non-ablative technique that utilizes electromagnetic fields to modulate nociceptive signaling without causing structural thermal damage, offering a long-term alternative for the control of central and peripheral hypersensitization.

Case presentation
A 47-year-old female physician presented with a history of CM since age 15 and multiple therapeutic failures (gabapentinoids, topiramate, and amitriptyline). Comorbidities included asthma and bipolar disorder (treated with lithium, CBD/THC and venlafaxine). She experienced daily attacks exacerbated by bright light, stress and sleep deprivation. Physical examination identified a cervicogenic headache component associated with a peripheral component. After a positive response to diagnostic anesthetic blocks (GON, SON and ATN), she underwent bilateral PRF (non-ablative neuromodulation) of the aforementioned nerves. A reduction in the Visual Analog Scale from 10 to 3 was observed, along with a decrease in attack frequency from daily to 3 days/month. This clinical benefit allowed the tapering of sedative medications, with the patient remaining stable for 24 months. Recently, she presented with a recrudescence of pain, and a new PRF intervention is planned.

Discussion
This case illustrates the challenge of managing CM in patients with comorbidities, in wich polypharmacy limits dose escalation due to side effects. Recent literature corroborates that multi-target peripheral neuromodulation is effective in prominent sensitization. In this scenario, the anesthetic test block plays a fundamental role: beyond confirming the peripheral and cervicogenic components of pain, it acts as a clinical success predictor for PRF. A positive anesthetic response indicates the involvement of these specific pathways in pain genesis, validating the therapeutic target. The 2-year durability of the observed effect surpasses the average described for simple blocks, suggesting that PRF induces prolonged synaptic plasticity. The subsequent return of symptoms – possibly due to the progressive nature of the disease or reactivation of environmental triggers – justifies repeating the procedure as a maintenance strategy.

Conclusion
PRF of cranial and occipital nerves, supported by a predictive test block, demonstrated to be a safe and effective tool in refractory CM. The procedure provided a reduction in pain and attack frequency, improving quality of life by reducing pharmacological burden. This report reinforces the role of interventional pain medicine as an integral part of the treatment algorithm for refractory headaches.

Keywords:
Migraine
Neuromodulation
Test block
Non-ablative radiofrequency

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Spinal cord neuromodulation for refractory chronic migraine: a case report

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Introduction

Chronic migraine is defined as headache on 15 or more days per month, with migrainous features on at least eight days, for more than three months. It is a major cause of neurological disability and can impair quality of life and occupational functioning. In patients refractory to optimized therapy, spinal cord stimulation (SCS) has been explored as a neuromodulatory alternative, although evidence remains limited. This report describes a patient with refractory chronic migraine treated with high cervical SCS.

Case presentation

A 75-year-old woman with a four-year history of chronic migraine presented with daily severe pulsatile headaches associated with nausea, photophobia, and phonophobia, lasting approximately 14 hours. Previous therapies included topiramate, amitriptyline, propranolol, valproate, and three anti-CGRP monoclonal antibodies (erenumab, fremanezumab, and galcanezumab), without sustained response. She also presented analgesic overuse and progressive functional decline. After multidisciplinary evaluation, SCS was proposed. The procedure was performed in two stages. During the trial phase, percutaneous electrodes were placed at C2–C3 under local anesthesia and conscious sedation, and clinical response was assessed over 14 days. The patient reported a 60% reduction in headache frequency and intensity, with improvement in daily functioning. Due to the favorable response, a permanent subcutaneous pulse generator was implanted. Parameters were adjusted to 40 Hz, 300 µs pulse width, and 2.5 mA amplitude. No complications occurred, and the patient was discharged within 48 hours.

Discussion

This case illustrates the potential role of SCS in selected patients with refractory chronic migraine after multiple treatment failures, including oral preventives and anti-CGRP monoclonal antibodies. Analgesic overuse may contribute to chronification, although mechanisms remain incompletely understood. The 60% reduction in headache frequency and intensity was clinically meaningful; however, isolated case outcomes cannot be generalized. High cervical stimulation may modulate the trigeminocervical complex and influence nociceptive transmission. Current evidence is mainly derived from case reports and observational series, with relevant limitations. Controlled trials are required to define selection criteria, parameters, efficacy, and safety.

Conclusion

Spinal cord neuromodulation may represent a promising option for selected patients with refractory chronic migraine who have failed conventional treatment. In this case, SCS was associated with substantial clinical improvement and no immediate complications. However, broader recommendations depend on controlled studies with long-term follow-up to clarify efficacy, safety, and the profile of patients most likely to benefit.

Keywords:
Chronic migraine
Neuromodulation
Refractory migraine

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Effects of transauricular vagus nerve stimulation on chronic pain management in a patient with temporomandibular disorder associated with headache: a case report

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Introduction
Chronic headache is frequently associated with musculoskeletal alterations that affect function and quality of life. Studies have demonstrated a relationship between temporomandibular disorders (TMD) and headache, suggesting shared pathophysiological mechanisms such as central sensitization and impaired processing of nociceptive stimuli. Transauricular vagus nerve stimulation (taVNS) has emerged as a non-pharmacological therapeutic strategy for chronic pain management, aiming to modulate pain perception, reduce sensitization, and promote functional improvement. This study aimed to analyze the effects of taVNS on chronic pain management in a patient diagnosed with TMD and headache.

Case presentation
A 43-year-old homemaker presented with frequent chronic headache that was unresponsive to analgesic and prophylactic medications and was associated with pain in the temporomandibular region and masticatory muscles, cervical pain, and emotional tension. On the painDETECT questionnaire, the patient scored 12 points and showed a predominantly nociceptive pain phenotype. Pain intensity was 9 on the visual analogue scale (VAS), and sleep quality was impaired according to the Pittsburgh Sleep Quality Index (PSQI). The transcutaneous auricular vagus nerve stimulation protocol consisted of two sessions per week for two months. Stimulation was applied to the auricle using clips positioned over the concha and earlobe, with a 25 Hz current, a pulse width of 250 microseconds, intensity below the pain threshold, and a duration of 25 minutes.

Discussion
taVNS has been considered a promising strategy for managing TMD and chronic headache because of its ability to modulate pain-related neural networks, including the periaqueductal gray matter, locus coeruleus, and raphe nuclei. Through these pathways, afferent stimuli reach the nucleus of the solitary tract, promoting neurotransmitter release, reducing pain-signal transmission, and modulating the trigeminovascular system. Evidence indicates that taVNS may reduce pain intensity, frequency, and duration by altering the functional connectivity of brain regions involved in nociceptive processing. As a noninvasive, safe, and easy-to-apply technique, it may serve as a therapeutic alternative for headache treatment.

Conclusion
Transauricular vagus nerve stimulation demonstrated therapeutic potential, with improvement in the clinical condition related to TMD and headache. The VAS score decreased to 6 after two weeks of treatment, and improvements in functional impact and quality of life persisted at the six-month follow-up. It is a noninvasive, non-pharmacological, safe, and easy-to-apply strategy that may contribute meaningfully to the multidisciplinary management of chronic pain. Further studies using different protocols are needed to improve understanding of these effects and their various clinical applications.

Keywords:
Headache
Chronic pain
Temporomandibular disorders
Neuromodulation

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Invasive and non-invasive neuromodulation in refractory cluster headache: a systematic review

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Introduction
Refractory cluster headache (rCH) is a highly disabling subtype of trigeminal autonomic cephalalgia, characterized by persistent attacks despite optimized preventive therapy. Up to 15% of patients with chronic cluster headache do not respond adequately to at least three guideline-recommended preventive treatments, thereby meeting criteria for a refractory phenotype. Neuromodulation has emerged as a mechanistically targeted approach designed to modulate trigeminal–autonomic reflex pathways and correct hypothalamic dysfunction.

Objective
To compare the efficacy, safety, and quality of evidence of invasive and non-invasive neuromodulation strategies in refractory cluster headache.

Methods
PubMed/MEDLINE, SciELO, and LILACS were systematically searched for studies, published between January 2016 and April 2026 , investigating neuromodulation strategies in refractory cluster headache, in accordance with PRISMA 2020 criteria. Search terms included "refractory cluster headache," "neuromodulation," "vagus nerve stimulation," "occipital nerve stimulation," and "deep brain stimulation." Randomized controlled trials, as well as prospective and retrospective cohort studies, were considered eligible if they included adult patients with refractory or chronic cluster headache undergoing neuromodulation. Primary outcomes included reductions in attack frequency, pain intensity, and the proportion of patients achieving at least a 50% responder rate. Risk of bias was assessed using the Cochrane RoB 2.0 and ROBINS-I tools.

Results
From 312 records identified, 126 duplicates were removed; of the 186 records screened, eight studies met full inclusion criteria, totaling 1,240 patients. Non-invasive vagus nerve stimulation demonstrated an average reduction of 3.2–4.0 weekly attacks compared with standard care, with responder rates ranging from 30% to 40%. Occipital nerve stimulation was associated with a 40–50% reduction in attack frequency in chronic refractory cohorts, although device-related adverse events occurred in up to 20% of patients. Deep brain stimulation achieved reductions exceeding 50% in selected patients with extreme refractoriness, although the evidence relied primarily on small observational series.

Conclusion
Neuromodulation represents a clinically relevant therapeutic option for refractory cluster headache. Non-invasive vagus nerve stimulation provides the most favorable balance between efficacy and safety, while occipital nerve stimulation and deep brain stimulation may be considered for highly refractory cases managed by specialized centers. Standardized definitions of refractoriness and well-designed multicenter randomized trials are essential to strengthen the evidence base and refine treatment algorithms.

Keywords:
Refractory cluster headache
Neuromodulation
Vagus nerve stimulation
Occipital nerve stimulation
Deep brain stimulation

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Non-invasive brain stimulation at dorsolateral prefrontal cortex of migraine patients: a systematic review and meta-analysis

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Introduction
Migraine is highly prevalent and disabling; many patients remain refractory despite therapeutic advances, including CGRP antagonists. Non-invasive brain stimulation (NIBS), such as repetitive transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (tDCS), emerge as promising strategies by modulating cortical excitability and nociceptive circuits. The dorsolateral prefrontal cortex (DLPFC) stands out as a therapeutic target due to its role in descending pain modulation.

Objective
This systematic review and meta-analysis aims to evaluate the efficacy and safety of NIBS applied to the DLPFC in migraine patients.

Methods
Conducted according to PRISMA guidelines using the PICOTT strategy, a systematic search was performed in PubMed, Embase, Cochrane Library, Web of Science, PsycINFO and Scopus. Two independent reviewers screened studies, resolving disagreements by a third reviewer consensus. Randomized controlled trials (parallel/crossover) without time restrictions in adults with migraine (with/without aura, chronic/episodic) undergoing NIBS on the DLPFC compared to sham were included. Analyzed outcomes were pain duration, frequency, pain intensity, MIDAS and acute medication use. Combined interventions or other primary headaches were excluded. Statistical analyses were performed using R software.

Results
The initial search identified 1,923 studies. After applying eligibility criteria, 7 RCTs (4 rTMS and 3 tDCS) were included (N=187). Analysis focused on the DLPFC, restricted to outcomes with 3 or more studies, revealed that neuromodulation significantly reduced pain duration compared to control, presenting a pooled standardized mean difference (SMD=-0.98; 95% CI [-1.92; -0.04], p=0.0411; I^2=88%). In contrast, DLPFC stimulation did not demonstrate statistical superiority to sham for pooled global migraine frequency (SMD = -0.58; 95% CI [-1.45; 0.29], p=0.193; I^2=87.5%) and pooled pain intensity (SMD=-0.24; 95% CI [-0.60; 0.13], p=0.2012; I^2=34.6%). Similarly, impact on functional disability evaluated by MIDAS (SMD=-0.75; 95% CI [-2.28; 0.78], p=0.3375; I^2=78.3%) and acute rescue medication use (SMD=-0.10; 95% CI [-0.50; 0.29], p=0.6021; I^2=25%) presented no significant differences. No serious adverse events occurred; mild, transient side effects were strictly local, manifesting as itching, tingling, and erythema for tDCS, and scalp discomfort or mild headache for rTMS.

Conclusion
Current evidence suggests that NIBS targeted to the DLPFC exhibits potential selective efficacy in shortening migraine pain duration. However, given the high statistical heterogeneity, a relatively small pooled sample size, and the lack of significant impact on frequency or intensity, these findings must be interpreted with caution. The DLPFC remains a promising, safe adjuvant target, but large-scale, standardized clinical trials are needed to definitively confirm its clinical therapeutic value.

Keywords:
Migraine disorders
Non-invasive brain stimulation
Dorsolateral prefrontal cortex
Repetitive transcranial magnetic stimulation
Transcranial direct current stimulation

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Noninvasive neuromodulation in the prophylaxis and acute treatment of migraine: a systematic review

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Introduction

Migraine is a highly prevalent and disabling neurological disorder associated with substantial functional impairment and reduced quality of life. In this context, noninvasive neuromodulation has emerged as a promising therapeutic approach, with the potential to modulate pain-related neural pathways and improve migraine control.

Objective

To evaluate the impact of noninvasive neuromodulation techniques on the acute and prophylactic management of migraine.

Methods

This systematic review was conducted using the PubMed and LILACS databases. The PICO strategy was defined as follows: P (patients with migraine), I (noninvasive neuromodulation), C (placebo, no intervention, or conventional treatment), and O (therapeutic efficacy and safety). The following search strategy was applied: "Migraine Disorders" AND ("Noninvasive Brain Stimulation" OR "neuromodulation") AND ("efficacy" OR "treatment outcome"). Initially, 48 articles were identified. After applying the inclusion criteria of publication within the last five years, free full-text availability and English language, 20 studies were included in the analysis.

Results

The analyzed studies demonstrated favorable outcomes of noninvasive neuromodulation in both acute migraine treatment and prophylaxis. The main techniques evaluated included transcranial magnetic stimulation, vagus nerve stimulation, external trigeminal nerve stimulation, and remote electrical neuromodulation (REN). Recent meta-analyses showed superiority of these interventions over placebo in reducing monthly migraine frequency, pain intensity, and migraine-related disability, in addition to significant improvements in quality of life. Studies involving REN demonstrated sustained long-term therapeutic efficacy, with no evidence of tachyphylaxis after three years of follow-up. In observational studies, more than 70% of patients reported clinically relevant improvement after device use, including reduced need for acute relief medications and lower functional impact of migraine attacks. Clinical trials also demonstrated good adherence, tolerability, and a low incidence of adverse effects, even in special populations such as adolescents and pregnant women. Furthermore, some studies suggested potential reductions in healthcare costs and decreased need for additional pharmacological interventions, reinforcing the clinical applicability of these therapies.

Conclusion

Noninvasive neuromodulation demonstrated efficacy, safety, and good tolerability in migraine management, with benefits observed in both attack reduction and functional improvement. Therefore, these techniques represent promising therapeutic alternatives, particularly for patients with unsatisfactory response or limitations to conventional pharmacological treatment.

Keywords:
Neuromodulation
Migraine
Noninvasive brain stimulation

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Physiological mechanisms of the retinohypothalamic pathway in photophobia and the impact of intrinsically photosensitive retinal ganglion cells in migraine: a systematic review

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Introduction

Photophobia is the second most debilitating symptom of migraine. Intrinsically photosensitive retinal ganglion cells (ipRGCs), which express melanopsin, mediate this sensitivity by integrating intrinsic signals with those from cones and projecting them to dura-sensitive neurons in the posterior thalamus. The retinohypothalamic pathway, comprising ipRGC projections to the hypothalamus and thalamus, represents a critical circuit in the pathophysiology of migraine-associated photophobia.

Objective

This study aims to describe the physiological mechanisms through which the retinohypothalamic pathway modulates photophobia in migraine, identifying signal integration and specific neural alterations in these patients.

Methods

A systematic review was conducted across the PubMed, MEDLINE, and Scopus databases using the descriptors: "intrinsically photosensitive retinal ganglion cells", "ipRGCs", "melanopsin", "photophobia", "migraine", and "retinohypothalamic pathway". Experimental studies, clinical trials, and reviews (2013–2023) assessing ipRGC mechanisms in migraine photophobia in humans or animal models with a clear methodology were included.

Results

Migraine patients exhibit a selective amplification of integrated ipRGC signals for visual discomfort, without alterations in the summation of melanopsin and cones within the retina. Photophobia occurs via the retino-thalamo-cortical pathway, with the contribution of melanopsin being 1.5 times greater than cone luminance. Migraineurs presented reduced photophobia thresholds and greater amplitude in the post-illumination pupil response (PIPR). Functional near-infrared spectroscopy (fNIRS) data revealed hemodynamic alterations in the primary visual cortex of migraine sufferers that were dependent on ipRGC stimulus intensity, a phenomenon not observed in controls. Reflexive eye closure proved to be coupled with photic pulses; patients with aura manifested higher electromyographic activity and blinking rates. Anatomical mapping identified projections from the hypothalamus and basal ganglia to the posterior thalamus, regions harboring trigeminovascular neurons associated with allodynia and photophobia.

Conclusion

Photophobia in migraine results from a post-retinal alteration in the processing of ipRGC signals, generating a selective amplification for visual discomfort. Hypersensitivity of the melanopsin system is indicated by increased and prolonged post-illumination pupil responses. Visual-nociceptive interactions occur within the retina, midbrain, thalamus, hypothalamus, and visual cortex, mediated by Calcitonin Gene-Related Peptide (CGRP) and Pituitary Adenylate Cyclase-Activating Polypeptide (PACAP). The sensitization of third-order thalamic neurons, which project to the somatosensory and visual cortices, explains why light exacerbates headache. Hypothalamic projections to the posterior thalamus modulate trigeminovascular neurons, linking attacks to disrupted sleep, fasting, and stress.

Keywords:
Migraine
Photophobia
Central sensitization
Pathophysiology

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Repetitive transcranial magnetic stimulation in post-traumatic headache after mild traumatic brain injury: a systematic review and meta-analysis

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Introduction
Patients with mild traumatic brain injury (mTBI) who develop persistent headaches often exhibit impaired supraspinal pain modulatory pathways, particularly involving prefrontal cortical connectivity. Repetitive transcranial magnetic stimulation (rTMS) has emerged as a promising non-pharmacological therapeutic option for this condition.

Objective
To evaluate the efficacy of rTMS in patients with post-traumatic headache following mTBI.

Methods
This systematic review and meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and the Cochrane Handbook for Systematic Reviews of Interventions. Randomized controlled trials (RCTs) were systematically searched in PubMed, Embase, and the Cochrane Library databases up to April 2026. Eligible studies included adult patients diagnosed with persistent headache attributed to traumatic brain injury according to the International Classification of Headache Disorders, 3rd edition (ICHD-3), as well as persistent post-concussion symptoms (PPCS) lasting at least three months. Participants were required to be on stable preventive pharmacological treatment prior to study inclusion. Exclusion criteria included prior exposure to TMS therapy, contraindications to TMS, history of migraine prior to the most recent trauma, and structural brain disease. The primary outcome was the reduction in debilitating headache frequency at 4 weeks post-treatment. Secondary outcomes included daily headache intensity. Statistical analyses were performed using ReviewManager. A random-effects model was applied to account for between-study heterogeneity. Effect sizes were expressed as mean differences (MD) or standardized mean differences (SMD) with 95% confidence intervals (CI), as appropriate. Statistical heterogeneity was assessed using the I^2 statistic.

Results
Four RCTs were included, comprising a total sample of 140 patients. Of these, 100 (71.4%) were male. At 4 weeks post-treatment, debilitating headache frequency showed a statistically significant reduction, with a mean difference of −0.83 (95% CI: −1.62 to −0.05; p=0.04), although substantial heterogeneity was observed (I^2=84%). For daily headache intensity at 4 weeks, the mean difference was −0.72 (95% CI: −1.55 to 0.11; p=0.09), indicating no statistically significant difference between groups. Heterogeneity was absent (I^2=0%).

Conclusion
rTMS was associated with a modest reduction in headache frequency but not in daily intensity. The substantial heterogeneity across studies and the limited number of RCTs highlight the need for larger, high-quality randomized trials to confirm these findings.

Keywords:
Neuromodulation
Headache
Meta-analysis
rTMS

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Impact of neuromodulation targeting the trigeminocervical complex on pain reduction in refractory chronic migraine

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Introduction
Refractory chronic migraine is associated with a high degree of disability and persistent attacks, being characterized by central sensitization processes in the trigeminocervical complex (TCC). Intervention on the occipital and trigeminal nerves emerges as an alternative to promote plastic changes in the central pain pathways. This study is justified by the limited availability of evidence on the subject.

Objective
To evaluate the impact of neuromodulation targeting the trigeminocervical complex on pain reduction in patients with refractory chronic migraine.

Methods
This is a systematic literature review conducted according to PRISMA criteria to answer the question: "Is neuromodulation targeting the trigeminocervical complex effective in reducing pain in patients with refractory chronic migraine?". The search was performed in the PubMed database using the descriptors "chronic migraine", "refractory migraine", "nerve stimulation" and "neuromodulation", combined with the Boolean operator AND. Studies published in the last 10 years were included, comprising observational studies and clinical trials addressing the topic. Studies that did not present neuromodulation targeting the trigeminocervical complex as the main focus in the treatment of refractory chronic migraine were excluded. Selection was performed by reading titles and abstracts by three independent reviewers, with disagreements resolved by consensus, with a final inclusion of 7 original studies for qualitative synthesis of results.

Results
Neuromodulation targeting the trigeminocervical complex (TCC) reduced pain in refractory chronic migraine, with greater response observed in implantable occipital nerve stimulation in highly selected populations. Patients presented 17.9 to 23 monthly headache days, high disability scores on MIDAS/HIT-6, and refractoriness to multiple prophylactic classes. Combined occipital and supraorbital stimulation achieved improvement in the short and medium term, with gains in MIDAS and BDI scores restricted to the perioperative period ($p = 0.021$). Occipital nerve stimulation promoted a reduction from 17.9 to 7.3 monthly headache days, a responder rate exceeding 88% for ≥50% reduction, and improvement in MIDAS/HIT-6 scores sustained for up to 9.4 years. The therapeutic effect was attributed to continuous modulation of convergent nociceptive pathways in the TCC, reducing central sensitization and restoring the activation threshold of the trigeminovascular system.

Conclusion
Neuromodulation targeting the trigeminocervical complex was associated with pain reduction in refractory chronic migraine, with less frequent attacks, lower functional disability, and reduced medication use. Implantable occipital nerve stimulation significantly reduced attack frequency and prophylactic medication use. Despite favorable results, methodological heterogeneity and the limited volume of evidence highlight the need for larger-scale studies on the subject.

Keywords:
Neuromodulation
Occipital nerve stimulation
Chronic Migraine
Trigeminocervical complex
Refractory migraine

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Neuroinflammation and glial activation in the pathophysiology of migraine: a systematic review

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Introduction
Migraine is a multifactorial neurological disorder associated with central sensitization and the dysfunction of neuroimmune mechanisms. In this context, neuroinflammation and glial activation stand out due to the release of pro-inflammatory mediators capable of perpetuating neuronal excitability and contributing to the chronification of attacks.

Objective
To evaluate the role of neuroinflammation and glial activation in the pathophysiology of migraine and its relationship with central sensitization and the chronification of attacks.

Methods
A systematic review guided by the question: "Are neuroinflammation and glial activation associated with central sensitization and the chronification of attacks in migraine?". The question was structured using the PICO strategy: population (patients with migraine), intervention (neuroinflammation and glial activation), comparison (individuals without migraine and/or without evidence of neuroinflammatory activation), and outcome (central sensitization and chronification of attacks). The literature search was conducted in the PubMed database using DeCS/MeSH descriptors and free terms related to the topic ("Migraine Disorders OR migraine" AND "neuroinflammation OR glial activation" AND "central sensitization"). Original articles in English published within the last 5 years were included. Selection followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). A total of 43 studies were identified, of which 18 met the eligibility criteria and were included in the analysis.

Results
Studies demonstrate that neuroinflammation and glial activation play a central role in trigeminovascular sensitization and migraine chronification. Experimental models induced by nitroglycerin or inflammatory soup demonstrated microglial activation in the spinal trigeminal nucleus caudalis and the trigeminocervical complex, associated with an increase in pro-inflammatory mediators, such as interleukin-1 beta (IL-1). Microglial receptors, such as transient receptor potential vanilloid 2 (TRPV2), purinergic receptor P2X4 (P2X4R), and purinergic receptor P2Y14 (P2Y14), participate in the activation of inflammatory pathways related to the NLR family pyrin domain containing 3 (NLRP3) inflammasome and the phosphorylation of extracellular signal-regulated kinase (ERK), contributing to mechanical allodynia and neuronal hyperexcitability. Furthermore, meningeal inflammation promotes the sensitization of trigeminal nociceptors and an increased release of calcitonin gene-related peptide (CGRP).

Conclusion
Neuroinflammation and glial activation play a fundamental role in the pathophysiology of migraine. The involvement of microglial receptors, inflammatory pathways, the NLRP3 inflammasome, and mediators such as CGRP demonstrates that neuroimmune mechanisms are directly related to central sensitization and the chronification of attacks, highlighting potential therapeutic targets for the management of the disease.

Keywords:
Migraine
Central sensitization
Neuroinflammation
CGRP
Glial activation

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Headaches in children and adolescents



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Hospitalization as a marker of functional severity in refractory chronic headache in the context of severe psychiatric comorbidity: a case report with a literature review

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Introduction

Chronic headache (CH) is a common neurological condition in adolescents. A literature review (PubMed, through May/2026) provides evidence of an association between chronification and psychiatric comorbidities (PC): approximately 30% of patients with depression AND/OR anxiety (Santos & Lippi, 2013), which is addressed in the ICHD-3 (2018) under codes A12.3 and A12.8. Less described, yet critical, is hospitalization for refractory headache, a marker of functional severity that demands recognition without reducing it to a "psychological symptom", thereby avoiding underdiagnosis.

Case presentation

A 15-year-old female patient with a history of CH was hospitalized twice for disabling holocranial headache. During the first hospitalization (Oct 2–6, 2018), she presented: pain rated 8/10, accompanied by nausea, phono/photophobia, dizziness, luminous scotomas, and secondary insomnia due to pain, chest pain and tremor. There was refractoriness to analgesics, antiemetics, and adjuvant medications, prompting cranial CT and ECG, both with no abnormality detected (NAD). During the clinical course, anxious and depressed mood was noted, and a psychiatric evaluation was requested. Analgesics and NSAIDs were discontinued, and psychopharmacological agents were introduced, resulting in progressive improvement and discharge with mental health follow-up. On the second hospitalization (Jan 30–Feb 6, 2019), she returned with holocranial headache, intensity 9/10, associated with the same symptoms as before. Contrast-enhanced brain MRI, ECG and laboratory tests with NAD. Pain persisted despite symptomatic treatment; psychiatric and psychological evaluation were maintained, and she progressed with sustained improvement until discharged. Informed consent was signed by the patient.

Discussion

The atypical nature of this case does not lie in the coexistence of headache and psychological distress, widely confirmed by Speciali et al. (2018), but in the severity expressed by recurrent hospitalizations with NAD. The identified PC do not represent diagnoses of exclusion, but rather determining factors in central sensitization, mediated by the dysregulation of serotonin and noradrenaline in the descending inhibitory pain pathways. The persistence of autonomic and sensory symptoms, combined with pharmacological refractoriness, reinforces the hypothesis of a hyperexcitable nociceptive system and supports the need for integrated, interdisciplinary management centered on the neuropsychiatric pathophysiology of pain.

Conclusion

The scarcity of literature on the theme reaffirms the atypical nature of this case and highlights a relevant clinical gap. Situations of CH with negative organic investigation, refractoriness, and recurrent hospitalization, a structured approach is imperative: diagnostic review using the ICHD-3, investigation of red flag signs, screening for medication overuse, assessment of sleep and PC's with severity and risk stratification, as well as an integrated therapeutic plan to optimize clinical management.

Keywords:
Adolescents
Psychiatric comorbidity
Hospitalization

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Incidental DEPDC5 variant in a child with sporadic hemiplegic migraine: a pitfall in clinical neurogenetics

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Introduction

Hemiplegic migraine (HM) is a rare subtype of migraine with aura characterized by reversible motor weakness associated with other focal neurological symptoms. Although pathogenic variants in genes such as CACNA1A, ATP1A2, and SCN1A are classically associated with HM, many sporadic cases remain genetically unresolved. The increasing use of broad next-generation sequencing panels has also led to the frequent identification of incidental variants in genes associated with cortical excitability disorders, posing challenges in clinical interpretation.

Case presentation

We report a 9-year-old boy with normal neurodevelopment and no family history of migraine or epilepsy who presented with three stereotyped episodes over one year. Each episode began with paresthesia in one hand, progressing to the ipsilateral arm and face, followed by transient weakness affecting the same limb. Subsequently, the patient developed contralateral pulsatile hemicranial headache associated with nausea and marked somnolence, while remaining arousable, oriented, and able to communicate appropriately throughout the episodes. Symptoms resolved completely after each attack, with alternating laterality between episodes. Interictal neurological examination, brain magnetic resonance imaging, and two prolonged electroencephalograms recorded during wakefulness and sleep were normal. A targeted migraine panel including CACNA1A, ATP1A2, ATP1A3, SCN1A, PRRT2, and PNKD revealed no pathogenic variants. An extensive epilepsy panel identified a heterozygous DEPDC5 variant (c.4115G>C; p.Cys1372Ser), classified as a variant of uncertain significance according to ACMG criteria. The variant was absent from large population databases and predicted in silico to be potentially deleterious.

Discussion

Despite the biological overlap between migraine and epilepsy, the patient did not exhibit clinical, electroencephalographic, or neuroimaging features suggestive of DEPDC5-related epilepsy. The case fulfills ICHD-3 criteria for sporadic hemiplegic migraine and illustrates the importance of phenotype-driven diagnosis and cautious interpretation of incidental findings generated by broad sequencing panels.

Conclusion:

This case highlights a potential pitfall in clinical neurogenetics, emphasizing that biologically plausible variants should not be overinterpreted in the absence of supporting phenotypic evidence.

Keywords:
Sporadic hemiplegic migraine
DEPDC5 variant
Epilepsy
Migraine

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Exclusive breastfeeding as a protective factor against migraine in children and adolescents: a systematic review

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Introduction

Migraine is one of the main causes of recurrent headache in childhood and adolescence and is associated with functional, academic, and psychosocial impairment. Early-life factors related to neurodevelopment and immune modulation have been investigated as contributors to headache disorders in this population. In this context, exclusive breastfeeding (EBF) has gained attention due to its neuroprotective, anti-inflammatory, and gut microbiota–modulating effects, which may influence mechanisms involved in migraine pathophysiology. Studies suggest that children exclusively breastfed for an adequate period may present a lower prevalence of neurological and inflammatory conditions, including primary headaches.

Objective

To investigate, through a systematic review, the association between exclusive breastfeeding and migraine occurrence in children and adolescents, evaluating its possible protective effect.

Methods

A systematic review was conducted according to PRISMA guidelines using the PubMed and SciELO databases. The descriptors used were: "breastfeeding", "exclusive breastfeeding", "migraine", "headache", "children" and "adolescents". The research question was structured according to the PICO strategy: P (population) consisted of children and adolescents; I (intervention/exposure) was exclusive breastfeeding; C (comparison) included absence or shorter duration of EBF; and O (outcome) was migraine and recurrent headache occurrence. The initial search identified 48 studies. After duplicate removal and title and abstract screening, 17 articles remained for full-text evaluation. Following eligibility criteria application, 9 studies were included in the final analysis. Reviews, case reports, and studies lacking complete data were excluded.

Results

Most studies demonstrated an association between longer duration of exclusive breastfeeding and lower migraine prevalence in children and adolescents. Reduced frequency of recurrent headaches was observed among individuals exclusively breastfed for at least six months. EBF was also associated with improved neurological development, inflammatory modulation, and greater gut microbiota stability, factors potentially involved in migraine prevention. Nevertheless, some studies reported inconclusive findings due to methodological heterogeneity and differences in diagnostic criteria.

Conclusion

This systematic review suggests that exclusive breastfeeding may act as a protective factor against migraine and recurrent headache in children and adolescents. The findings indicate a beneficial role of EBF in neurodevelopmental and neuroinflammatory pathways associated with migraine pathophysiology. Despite favorable results, heterogeneity among studies highlights the need for further longitudinal research to clarify this association and strengthen current evidence. These findings reinforce the importance of breastfeeding promotion strategies in pediatric care and public health policies focused on preventing childhood migraine and disability.

Keywords:
Migraine
Children and adolescents
Headache
Exclusive breastfeeding

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Epidemiological overview and clinical impact of hospitalizations for pediatric headaches in Brazil: a retrospective analysis spanning a decade

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Introduction

Primary headaches are highly prevalent in the pediatric population. Although most cases are benign and managed on an outpatient basis, refractory or severe attacks often result in hospital admissions, a scenario that reflects critical shortcomings in primary care, early diagnosis, and prophylaxis. Understanding the epidemiological profile of these hospitalizations in Brazil is essential to highlight the hidden burden of the disease, thereby informing the development of more effective public health policies and the optimization of healthcare resources.

Objective

To analyze the clinical and epidemiological profile of hospital admissions due to headache syndromes in the pediatric and adolescent population aged 0 to 19 years in the Brazilian Public Health System between January 2016 and March 2026.

Methods

A nationwide retrospective ecological analysis was conducted using the Brazilian Hospital Information System (SIH/SUS) via DataSus. The study included hospitalizations for migraine and other headache syndromes in patients aged 0 to 19 years. The variables analyzed included age, sex, region, length of stay, mortality, and costs.

Results

Over the ten-year period, 18,421 pediatric hospitalizations for headache were recorded. A marked increase in hospitalizations was observed among late adolescents (ages 15–19), accounting for 41.7% of the cohort, followed by the 10–14 age group (32.0%). A significant predominance of females (62.5%) was identified, with the gender disparity increasing after puberty, highlighting the influence of neuroendocrine factors. Geographically, the Southeast (33.5%) and Northeast (31.7%) regions reported the highest volumes of admissions, potentially reflecting both population density and regional variations in neuropediatric outpatient coverage. Notably, while the national average length of hospital stay was 3.6 days and overall mortality was negligible (0.21%, n=38), the Northeast region accounted for the vast majority of deaths (n=25) and had a prolonged average length of stay (4.4 days), highlighting profound regional disparities in access to intensive care and in the complexity of cases.

Conclusion

The data reveal a critical paradox in the field of healthcare. Despite low mortality rates, the morbidity associated with pediatric headaches places a significant burden on hospital infrastructure. The disproportionate hospitalization rates among female adolescents and prolonged hospital stays highlight profound deficiencies in primary prevention and outpatient treatment of acute cases; furthermore, we can also correlate these female-specific factors with well-known hormonal and psychosocial factors. To mitigate this burden, an urgent paradigm shift is needed, focused on strengthening training in primary care and expanding equitable access to specialized pediatric neurology.

Keywords:
Migraine disorders
Hospitalization
Epidemiology
Public health
Pediatric neurology

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Association between sleep disorders and migraine in children and adolescents: an integrative review of current evidence

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Introduction
Migraine is a highly prevalent primary headache disorder in the pediatric population, with potential impact on school performance, daily functioning, and quality of life. Sleep disturbances are also common in this age group and frequently coexist with migraine, manifesting as insomnia symptoms, poor sleep quality, altered sleep architecture, and specific disorders such as restless legs syndrome (RLS). Given the heterogeneity of pediatric sleep assessment methods, synthesizing current evidence is clinically relevant.

Objective
To analyze the association between sleep disturbances and migraine in children and adolescents, considering insomnia symptoms, sleep quality, polysomnographic findings, and associated sleep disorders.

Methods
Integrative review of studies retrieved from PubMed/MEDLINE, LILACS, and SciELO, using descriptors and free terms for migraine, sleep disorders, and the pediatric population combined with Boolean operators AND/OR. Original studies published between 2015 and 2026 in Portuguese, English, or Spanish were included; adult-only studies, reviews, meta-analyses, editorials, protocols, case reports, and animal studies were excluded. Of 200 records identified, 13 duplicates were removed; 187 underwent title/abstract screening, 26 full-text assessment, and 19 were excluded, yielding seven studies for qualitative synthesis.

Results
The seven included studies (2017–2026) consistently showed an association between pediatric migraine and impaired sleep. Compared with controls, children and adolescents with migraine had reduced sleep duration, higher frequency of insomnia symptoms, poorer sleep quality, and more nocturnal disturbances. Community-based studies confirmed these associations in adolescents, while clinical populations with both conditions showed greater headache-related disability. Polysomnographic findings included reduced REM sleep, increased N1 stage, more frequent awakenings, and reduced sleep latency. RLS was more prevalent among children with migraine and was associated with poorer sleep quality, more frequent awakenings, and concomitant migrainous features such as allodynia and vertigo/dizziness.

Conclusion
Current evidence indicates that pediatric migraine is associated with clinically relevant sleep impairment, including insomnia, poorer sleep quality, altered sleep architecture, and increased prevalence of RLS. These findings reinforce the importance of routinely assessing sleep during pediatric migraine evaluation and follow-up, given its link to greater symptom burden and functional impairment. The predominance of observational and cross-sectional studies limits causal inference, highlighting the need for longitudinal designs and standardized objective sleep assessments.

Keywords:
Migraine disorders
Child
Adolescent
Sleep wake disorders

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Impact of prolonged digital screen exposure on headache occurrence in children and adolescents: a systematic review

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Introduction
Increasing exposure to digital devices among children and adolescents, whether for educational or recreational purposes, has been linked to a higher prevalence of headaches, mainly due to visual strain, poor posture, and sleep disturbances. This systematic review aims to synthesize current evidence on this association, contributing to clinical management and a better understanding of the impact of prolonged screen use on pediatric neurological health.

Objective
To evaluate the prevalence of headaches in children and adolescents exposed to varying durations of daily screen time and electronic device use.

Methods
This systematic review followed the PRISMA protocol. The search was conducted in scientific databases (such as PubMed, Scielo, and Web of Science) using the MeSH/DeCS descriptors "headache," "children," "adolescents," and "screen time", combined with Boolean operators. Studies published in recent years (2022–2026), written in Portuguese and English, were included. The eligibility criteria encompassed observational studies (cross-sectional, cohort, and case-control studies) and literature reviews involving participants aged 0 to 19 years, excluding studies without quantitative or qualitative data regarding the frequency or intensity of symptoms. The selection process occurred in two stages: screening of titles/abstracts and full-text reading of eligible articles. Data extraction was standardized and included authorship, year, study design, sample, age group, screen time measurement, and clinical outcomes.

Results
Prolonged screen use is a multifactorial risk factor for headaches in children and adolescents, worsened by visual fatigue, poor posture, sleep deprivation, and sedentary behavior. Excessive use, especially during nighttime, is correlated with migraine exacerbation and increased analgesic consumption. From a pathophysiological perspective, blue light alters circadian rhythm and sensory sensitivity, while cognitive stress promotes central fatigue and neuroendocrine dysregulation, sensitizing the trigeminovascular system. This scenario negatively impacts school performance and the social quality of life of these patients.

Conclusion
The findings highlight digital hygiene as a key component in the management of pediatric headaches, emphasizing the importance of pediatricians and neurologists assessing screen time during clinical evaluation. Although the association between excessive screen exposure and headaches is well established, further standardized longitudinal studies are needed to support more precise clinical guidelines. Preventive strategies focused on educating families about responsible technology use represent cost-effective and essential measures for protecting the neurological health of younger generations.

Keywords:
Children and adolescents
Headache
Impact
Digital screen exposure

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Impact of sleep disorders on the frequency and intensity of migraine in adolescents: a systematic review

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Introduction

Migraine is a prevalent and disabling neurological condition in adolescents, maintaining a complex bidirectional relationship with sleep disorders. Poor sleep quality and insomnia are not just comorbidities, but factors that directly influence the frequency, duration, and intensity of attacks, contributing to pain chronification and significant functional impairment in this population.

Objective

To analyze the magnitude of the impact of sleep disorders on the frequency and intensity of migraine in adolescents, describing the associated neural and clinical mechanisms.

Methods

A systematic review was conducted in the PubMed and LILACS databases with articles published between 2011 and 2025 in English and Russian. From an initial total of 148 articles, 34 were selected for full-text analysis, including randomized clinical trials, observational studies, and functional neuroimaging research. The analysis was structured according to the PICO strategy, where the Population consisted of adolescents diagnosed with migraine or continuous primary headaches; the Intervention/Exposure encompassed the presence of sleep disorders—such as insomnia, poor sleep quality, fatigue, snoring, and restless legs syndrome—and specific therapeutic interventions; the Comparison involved confrontation with healthy control groups or correlation assessments between sleep severity and painful symptoms; and the Outcomes focused on the impact on monthly attack frequency, pain intensity, functional disability, and changes in thalamic neural connectivity.

Results

The literature demonstrates that poor sleep quality is a robust predictor of attack frequency in adolescents. Insomnia and sleep deprivation significantly increase the number of headache days per month and headache-related disability. Fatigue correlates with attacks of longer duration and higher monthly frequency. Neuroimaging evidence reveals that sleep deprivation modulates pain processing via altered functional connectivity between the posterior thalamus and cortical areas, such as the prefrontal and visual cortex. Interventions that improve sleep parameters, such as hybrid Cognitive-Behavioral Therapy (CBT-I) and the use of eszopiclone, resulted in a significant reduction in monthly headache frequency. Additionally, habitual snoring was identified as an independent predictor of chronic morning headaches, and restless legs syndrome was associated with a higher disease burden and worsening of painful symptoms.

Conclusion

Sleep disorders negatively impact migraine severity in adolescents, elevating the frequency and intensity of attacks through neural and psychosocial mechanisms. Systematic screening of sleep quality and the implementation of integrated treatments, both behavioral and pharmacological, are fundamental to improving functionality and quality of life for these patients.

Keywords:
Migraine
Adolescents
Insomnia
Sleep

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Headache chronification in adolescents associated with medication overuse: a systematic literature review

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Introduction
Headache is one of the most prevalent neurological complaints in childhood, with rates reaching up to 28% among adolescents from 15 to 17 years. The transition from episodic migraine to chronic is frequently driven by Medication Overuse Headache (MOH), defined by ICHD-3 criteria by the consumption of triptans or opioids ≥10 days/month or non-opioid analgesics ≥15 days/month during more than three months. This condition remains severely underdiagnosed, given that 45.7% of patients do not receive a specific diagnosis in their initial consultation, which favors suboptimal acute treatment and the progression of functional disability.

Objective
Investigate the correlation between the frequency of analgesic use and the headache chronification profile in adolescents, evaluating the functional impact and the efficacy of preventive interventions.

Methods
This is a systematic review according to PRISMA guidelines. The search covered the PubMed, Cochrane Library and Web of Science databases (2016-2026, 10-19 years), with the descriptors "Chronic Migraine", "Adolescents" and "Analgesics", analyzing the variables: frequency and type of analgesics (including opioids and barbiturates), headache chronification profile, functional disability (PedMIDAS score) and efficacy of preventive interventions. The statistical analysis was performed via Software R, considering the significance level of $p<0.05$.

Results
220 articles were identified, with 19 eligible, of which 7 were included. The results indicate that Medication Overuse Headache (MOH) is present in up to 40% of adolescents with chronic headache, with a higher prevalence in Tension-Type Headache (42%) compared to Migraine (23%). Epidemiologically, a female predominance of 73% is revealed ($p=0.033$) and an average symptom duration of 25 months ($p=0.04$) in cases of overuse, a significantly longer time than in patients without this condition. Although the formal diagnosis of migraine increases by 4.71 times the chances of a correct prescription (CI 95%: 4.17–5.33; $p<0.001$), only 16.1% of patients receive evidence-based medicine (EBM) treatment in initial care. Isolated analgesic suspension benefits only 55% of patients, while the introduction of pharmacological prophylaxis reverses the 'non-responder' status to acute medication in 65.4% of cases after three months ($p < 0.05$). Additionally, this improvement occurs independently of psychiatric comorbidities, which reach 69% of the sample ($p = 0.05$). It is also highlighted that the use of barbiturates for only 4 days per month is already sufficient to trigger the risk of evolution to the chronification profile.

Conclusion
The excessive use of analgesics is a potent engine of chronification, aggravated by the failure in early diagnosis and low initial adherence to EBM. It is concluded that effective management requires the introduction of multimodal preventive therapies are fundamental to reduce functional disability and restore therapeutic response in previously resistant patients.

Keywords:
Chronic migraine
Analgesics
Medication overuse headache
Adolescents

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Medication overuse headache in the pediatric population: an integrative review

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Introduction
Medication Overuse Headache (MOH) in pediatrics is characterized by the chronification of primary headaches due to excessive analgesic use. It negatively affects the quality of life of children and adolescents, causing academic and psychosocial impairments. Given the high prevalence of headaches and inappropriate analgesic use in this population, MOH represents an important public health challenge, although its pediatric profile remains insufficiently understood.

Objective
This study aimed to analyze evidence regarding the epidemiology, risk factors, diagnostic challenges, and therapeutic approaches of pediatric MOH, while identifying current scientific gaps.

Methods
An integrative review was conducted following PRISMA guidelines using PubMed/MEDLINE, LILACS, SciELO, ScienceDirect, and SpringerLink databases. Studies published between 2020 and 2026 were included. DeCS/MeSH descriptors were: "Medication Overuse Headache," "Cefaleia por Uso Excessivo de Medicamentos," "Adolescent," "Child," and "Pediatrics" combined with the free terms "pediatric", "children" and "adolescents". Original articles and systematic reviews involving pediatric populations were included. Studies without primary data, involving adults, or unrelated to the topic were excluded. The final sample comprised 9 articles.

Results
Among pediatric patients with chronic primary headaches, medication overuse prevalence ranged from 10% to 60%. Female sex was the main risk factor, associated with hormonal and psychosocial influences. The most frequently involved medications were nonsteroidal anti-inflammatory drugs (NSAIDs), paracetamol, and triptans. ICHD-3 criteria increased diagnoses by 33% compared with ICHD-2. Clinical improvement after medication withdrawal ranged from 40% to 77%, while 4% to 41% of patients showed no benefit. Evidence regarding withdrawal strategies remains conflicting, although some studies indicate better outcomes with abrupt discontinuation compared to gradual withdrawal. Treatment is multimodal and includes detoxification, prophylaxis, self-management education, and psychological interventions, without a standardized therapeutic consensus. Proposed pathophysiological mechanisms include genetic predisposition, drug interactions with neurotransmitter and hormonal systems, and alterations in gray matter volume and brain metabolism. Main study limitations were methodological heterogeneity, lack of pediatric-specific guidelines, and predominance of observational designs.

Conclusion
Pediatric MOH is a complex multifactorial condition with variable prevalence and limited consensus regarding management. Further multicenter studies with standardized methodologies are necessary to improve clinical management and quality of life in this population.

Keywords:
Medication overuse headache
Pediatrics
Children

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Efficacy and safety of onabotulinumtoxinA and anti-CGRP therapies for migraine prevention in children and adolescents: a systematic review

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Introduction

Migraine is a common neurologic disorder in childhood and adolescence, with an estimated prevalence of 11%, significantly impairing school performance and psychological well-being. Until recently, no preventive therapy was formally approved for pediatric migraine, as landmark trials were conducted exclusively in adults. Two preventive approaches have gained particular attention in the literature: onabotulinumtoxinA (BoNT-A), which inhibits nociception in peripheral trigeminal neurons, and anti-CGRP monoclonal antibodies that selectively target calcitonin gene–related peptide (CGRP). Both are approved in adults for preventive treatment of episodic and chronic migraine.

Objective

To evaluate the efficacy and safety of onabotulinumtoxinA and anti-CGRP therapies for migraine prevention in the pediatric population.

Methods

A systematic review of randomized clinical trials and observational studies was conducted in accordance with de Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, structured according to the PICO strategy, considering: population (pediatric patients with migraine), intervention (BoNT-A and anti-CGRP therapies), comparison (no preventive treatment), and outcomes (efficacy and safety outcomes). Furthermore, a literature search was performed in the PubMed/MEDLINE, Lilacs/BVS and Cochrane Library database through the combination of the following descriptors: "child" AND "migraine" AND "onabotulinumtoxinA", resulting in 78 articles, and also "child" AND "migraine" AND "monoclonal antibodies", resulting in 81 articles identified. However, eligibility criteria included studies whose content was pertinent to the research theme, published within the last five years, and available in full text. A total of 10 articles were selected for analysis.

Results

In accordance with the studies conducted, both therapeutic approaches demonstrated satisfactory results in pediatric patients with migraine. BoNT-A injections are effective and well tolerated for relief of migraine headaches, with an average 5-point decrease on the 10-point Visual Analogue Scale (VAS) for pain score. They also led to a significant reduction in monthly headache days (−17.5 days/month). Only 3% of the patients presented minimal and rapidly resolved side effects, such as temporary pain, mild erythema, and slight dizziness. Moreover, anti-CGRP therapies, such as fremanezumab and eptinezumab, decreased by 21.6 points in the PedMIDAS total score. Mild reactions at the injection site are the most common side effects. No substantial differences in the safety profile of the therapies were identified between children and adolescents. Additionally, combined anti-CGRP therapy and BoNT-A was associated with reduced migraine duration and intensity in 91.3% of patients, with minimal side effects (4.3%).

Conclusion

BoNT-A and anti-CGRP are effective, safe, and well tolerated in pediatric migraine, supporting their potential role as second-line preventive options in this population.

Keywords:
Migraine Disorders
OnabotulinumtoxinA
Pediatrics
Anti-CGRP

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06

Physiopathology of headaches

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Out-of-body experience as a manifestation of migraine with aura: report of two cases

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Introduction
Migraine is a common disabling primary headache; in about one third of patients it is preceded by aura, fully reversible focal neurological symptoms, most often visual, attributed to cortical spreading depression. Migraine with brainstem aura adds vertigo, dysarthria, diplopia or reduced consciousness, linked to the basilar/posterior cerebral territory. An out-of-body experience (OBE) is perception of the centre of consciousness outside the body; seeing one's own body from that point is autoscopy. OBEs occur in about 10% of the population and implicate the temporoparietal junction through failed multisensory bodily integration, predominantly on the right. OBE has been reported as a migraine aura symptom, but to our knowledge no Brazilian case has been described.

Case presentation
Case 1: a 47-year-old woman with childhood migraine and adolescent migraine with visual and sensory aura, on amitriptyline, atenolol and flunarizine. She woke with right-arm numbness and intense headache; the numbness resolved in minutes. Hours later, while showering, she suddenly saw herself bathing from a point above the shower, a vivid perception lasting about 10 min, followed by a typical migraine headache. CT and stroke work-up were normal; over six years she remained well, without recurrence. Case 2: a man first seen at 27 with sudden confusion, dysarthria and brief loss of consciousness, then vertigo and migraine headache; CT and examination normal. In childhood he had episodes of speech arrest and fainting in which he saw himself talking to a dark figure, attributed to a spiritual cause. At 59, with foreboding, faintness and vertigo, he saw himself to his left conversing with a dark silhouette; the image faded in 5-10 min, leaving vertigo and headache. No recurrence at 8 months.

Discussion
In both patients the OBE was brief and temporally bound to the attack, fulfilling criteria for aura. Case 2, with brainstem symptoms, fits migraine with brainstem aura and a basilar/posterior cerebral origin. The leftward image in Case 2 is noteworthy: lateralized autoscopic phenomena in focal seizures are strongly associated with a contralateral focus, and OBE is preferentially generated in the right, non-dominant hemisphere, consistent with a left-sided percept, although stimulation of the left temporoparietal junction has also induced OBE. Recognizing OBE as a neurological event avoids excessive testing, reduces stigma and removes the need for supernatural explanations, as the spiritual treatment Case 2 received illustrates; patients often conceal it, so active questioning is essential.

Conclusion
Two cases of OBE in migraine with aura are reported, likely the first from Brazil. The temporal link, brief duration and phenomenology support OBE as an aura symptom arising at the temporoparietal junction; the leftward image suggests non-dominant right-hemisphere involvement. Awareness improves diagnosis and avoids unnecessary work-up and supernatural framing.

Keywords:
Migraine with aura
Brainstem aura
Out-of-body experience
Autoscopy

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Influence of anatomical variations in the cerebral arterial circuit on the incidence of headache: a systematic review and meta-analysis

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Introduction
Migraine is one of the various manifestations of headache, representing the most prevalent neurological problem in daily medical practice. Some studies point to a relationship between migraine and anatomical variations of the Circle of Willis. The cerebral arterial circuit is the intracranial vascular structure responsible for irrigating the brain.

Objective
To correlate headache with possible anatomical alterations of this vascular network.

Methods
The systematic review was conducted according to the PRISMA and COCHRANE guidelines. The PROSPERO protocol is (CRD42024534927) and the following PCO was generated: Do variations in the cerebral arterial circuit cause migraine? A 95% confidence interval was adopted and $p<0.05$ was used. Five databases were searched, resulting, after excluding articles that did not comply with the study question and the types of studies of interest, in 11 articles.

Results
In total, 2,894 participants were included in the systematic review. After meta-analysis, no statistically significant relationship was found between the presence or absence of anatomical variations of the Circle of Willis and the manifestation of migraine. The relationship with the presence of aura was also not statistically significant. In the Americas, there was an association between the presence of migraine and anatomical variations of the Circle of Willis. In this continent, the presence of structural alterations showed an influence on the presence of aura.

Conclusion
Anatomical variations of the cerebral arterial circuit are not related to migraine, whether with or without aura.

Keywords:
Headache
Anatomical variations
Cerebral arterial circuit

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Piezo1 in migraine in older adults: a mechanobiological link between arterial stiffness and trigeminovascular nociception

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Introduction
Migraine in older adults may be influenced by age-related vascular remodeling and increased arterial stiffness. Chronic hypertension, lipohyalinosis, and reduced arterial compliance can impair pulse-wave damping, allowing excessive pulsatile energy to reach cerebral and meningeal microvessels. Within the mechanically constrained cranial environment, altered pulsatile strain may act as an endogenous mechanical stressor. Piezo1, a mechanosensitive ion channel expressed in trigeminal and endothelial compartments in preclinical models, is a plausible mediator capable of converting abnormal vascular forces into nociceptive signaling.

Objective
To propose a mechanoneurobiological model linking arterial stiffness to migraine persistence or chronification in older adults through Piezo1-dependent trigeminovascular activation.

Methods
A theoretical mechanistic modeling study was conducted by integrating three evidence domains: clinical studies associating migraine with arterial stiffness in older populations, hemodynamic principles of pulse-wave transmission and vascular damping, and preclinical evidence of Piezo1-mediated trigeminovascular mechanotransduction. The model was designed to generate a plausible pathway and testable predictions in the absence of direct human studies evaluating Piezo1 in older adults with migraine.

Results
The model predicts that reduced arterial compliance may increase pulsatile mechanical strain in meningeal and cerebral microvascular beds. Vascular remodeling and impaired Windkessel buffering could facilitate deformation of perivascular trigeminal afferents and endothelial structures, lowering the threshold for Piezo1-dependent activation. Piezo1 opening may promote calcium influx and contribute to ATP and calcitonin gene-related peptide release, favoring pulsatile nociceptive transmission. Repeated mechanotransduction may amplify neurogenic inflammation through endothelial activation, immune-cell recruitment, and mast-cell degranulation, increasing local levels of histamine, serotonin, cytokines, prostaglandins, leukotrienes, and nitric oxide. In a low-compliance vascular system, inflammation-related edema and vascular distension may further increase mechanical stress, creating a positive feedback loop between pulsatile strain, Piezo1 activation, and trigeminovascular sensitization. Persistent activation of this pathway may contribute to central sensitization and help explain refractory or chronic migraine phenotypes in older adults.

Conclusion
Arterial stiffness may provide a mechanical substrate for sustained trigeminovascular activation in older adults with migraine. By linking impaired vascular damping, meningeal mechanical stress, Piezo1-dependent calcium signaling, and neuroinflammation, this model offers a plausible mechanobiological explanation for migraine persistence in aging. Piezo1 should be considered a potential target for future experimental and translational studies.

Keywords:
Migraine
Piezo1
Arterial stiffness
Trigeminovascular system
Mechanotransduction

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Distinct hemodynamic phenotypes during passive head-up tilt table testing in women with chronic primary headache

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Introduction
Chronic primary headache (CPH) is associated with orthostatic intolerance, but whether this reflects uniform dysautonomia or distinct hemodynamic phenotypes is unclear.

Objective
To identify hemodynamic phenotypes in women with CPH and characterize tilt responses using linear mixed-effects models (LMM).

Method
Sixty-one women with CPH and 18 controls underwent passive head-up tilt testing (70°, 20 minutes). Stroke volume (SV), cardiac output (CO), total peripheral resistance (TPR), and heart rate were measured by thoracic bioimpedance at six time points. K-means clustering (K=2), based on Random Forest–selected variables (SV and TPR at 5 minutes), defined phenotypes across 79 participants. LMM (Group×Time, adjusted for covariates) assessed trajectories.

Results
Cluster 1 (n=31 cases, 50.8%; 83.3% of controls; χ^2=4.78, p=0.029) showed preserved hemodynamics (SV=79.3 mL; TPR=1,201 dyn·s·cm^{-5}). Cluster 2 (n=30 cases, 49.2%) exhibited a dysautonomic profile (SV=55.4 mL; TPR=1,761 dyn·s·cm^{-5}) and was older (40.6±11.6 vs. 30.3±9.1 vs. 29.7±6.8 years; p<0.001). LMM confirmed reduced SV (β=−24.2 mL), exaggerated vasoconstriction at 5 minutes (β=+214 dyn·s·cm^{-5}), and vasomotor decompensation at recovery (β=−279) in Cluster 2 (all p≤0.006). Cluster 1 was indistinguishable from controls. Vasovagal syncope was more frequent in Cluster 1 (32.3% vs. 13.3%; p=0.012). Women ≥45 years were predominantly in Cluster 2 (84.6% vs. 39.6%; p=0.010).

Conclusion
CPH is hemodynamically heterogeneous. A dysautonomic phenotype—impaired venous return, compensatory vasoconstriction, and vasomotor decompensation—affects ~50% of patients and is strongly associated with age ≥45 years. Tilt-based hemodynamic profiling may help identify clinically relevant subgroups and support more targeted diagnostic and therapeutic strategies. Prospective validation is warranted.

Keywords:
Chronic primary headache
Orthostatic intolerance
Tilt table test
Hemodynamic phenotyping
Autonomic nervous system

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Endocannabinoid system and modulation of trigeminovascular sensitization in migraine: a systematic review

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Introduction

Migraine is a prevalent and disabling neurological disorder associated with the activation of the trigeminovascular pathway and central pain sensitization. In this context, the endocannabinoid system stands out for its potential to modulate nociceptive neurotransmission and neuroinflammation, making cannabinoids a promising therapeutic strategy for migraine management.

Objective

To evaluate the action of cannabinoids on the modulation of the trigeminovascular pathway and its impact on the therapeutic management of migraine.

Methods

This is a systematic review guided by the question: "Do cannabinoids exert a modulatory effect on the trigeminovascular pathway capable of reducing the frequency, intensity, or clinical impact of migraine?". The question was structured based on the PICO strategy: population (patients with migraine), intervention (use of cannabinoids), comparison (placebo or conventional treatment), and outcome (modulation of the trigeminovascular pathway and reduction of migraine attacks). The search was conducted in the PubMed database using the DeCS/MeSH descriptors ("Migraine Disorders" AND "Cannabinoids"). 28 studies were identified, of which 10 met the eligibility criteria and were included in the analysis. Original articles published in the last 5 years in the English language were included. Selection followed the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

Results

Modulation of the trigeminovascular pathway by cannabinoids demonstrated clinical and preclinical efficacy in reducing migraine symptoms. In humans, the combined vaporization of 6% tetrahydrocannabinol (THC) + 11% cannabidiol (CBD) outperformed placebo in pain relief (67.2%) and pain-free status (34.5%) at 2 hours. In mice, a 100:1 ratio (CBD:THC) mitigated photophobia induced by calcitonin gene-related peptide (CGRP) and sodium nitroprusside (SNP), as well as reduced pain grimaces associated with cortical spreading depression. In female rats, CBD/THC prevented periorbital allodynia and chronic photosensitivity. Mechanistically, peripherally restricted cannabinoids (PRCBs) prevented trigeminal sensitization induced by nitroglycerin (GTN) and sumatriptan overuse, while inhibition of fatty acid amide hydrolase (FAAH) and monoacylglycerol lipase (MAGL) reduced hyperalgesia and serum CGRP levels. Methanandamide attenuated CGRP via cannabinoid type 1 (CB1) receptors and inhibited dural mast cell degranulation via cannabinoid type 2 (CB2) receptors. Finally, baseline sex differences were identified in 2-arachidonoylglycerol (2-AG) concentrations within the periaqueductal gray.

Conclusion

Cannabinoids demonstrated therapeutic potential in migraine by modulating the trigeminovascular pathway, reducing neuroinflammation, and attenuating central sensitization. The findings reinforce the endocannabinoid system as a promising target for novel and personalized therapeutic approaches.

Keywords:
Headache disorders
Trigeminovascular system
Cannabinoids
Pain modulation

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Prevalence of alloknesis among patients with episodic and chronic migraine

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Introduction

Migraine is a highly prevalent and disabling chronic neurological disorder associated with sensory hypersensitivity and central sensitization. Among these manifestations, allodynia has been well described in the literature, whereas alloknesis remains poorly investigated in patients with migraine. Alloknesis is an abnormal sensory phenomenon characterized by the sensation of itch or scratching behavior triggered by a stimulus that would not normally induce itch. Considering the pathophysiological overlap between pain and itch, particularly involving central and peripheral sensitization mechanisms, the investigation of this phenomenon in migraine is clinically relevant.

Objective

To assess the prevalence of alloknesis among patients with episodic and chronic migraine, to characterize the migraine phases associated with its occurrence, and to explore its associations with clinical characteristics, triggering factors, associated symptoms, allodynia, autonomic dysfunction, depression, and anxiety.

Methods

A cross-sectional observational study conducted between March and April 2026 at the Headache Outpatient Clinic of the Complexo Hospital de Clínicas of the Federal University of Paraná (UFPR). Patients with a diagnosis of migraine according to the ICHD-3, evaluated through convenience sampling. Data collection included a structured interview, clinical characterization, an ASC-12 questionnaire adapted for alloknesis, the ASC-12 for allodynia, PHQ-9, GAD-7, and COMPASS-31. Statistical analysis was performed using GraphPad Prism version 11.0.1, adopting a significance level of $p < 0.05$.

Results

A total of 26 patients were evaluated, with a predominance of females (92.3%) and a mean age of 48.5±12.5 years. Alloknesis was identified in 5 patients (19.2%), occurring in both chronic and episodic migraine, with no significant association with migraine periodicity. The manifestation was more frequent during the aura and headache phases. A significant association was observed between alloknesis and physical stress as a triggering factor ($p=0.019$), in addition to higher COMPASS-31 scores in the group with alloknesis ($p=0.003$). No significant association was found with allodynia, anxiety, or depression.

Conclusion

Alloknesis was present in a subset of patients with migraine, suggesting that this phenomenon may be part of the sensory hypersensitivity spectrum of the disease. Its association with greater autonomic dysfunction and physical stress reinforces the hypothesis of the involvement of central sensitization mechanisms. Further studies with larger samples and validated instruments are required to clarify its clinical implications.

Keywords:
Migraine
Central sensitization
Alloknesis
Itch
Autonomic dysfunction

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Headache Medicine

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The gut-brain axis in medication overuse headache: an integrative review

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Introduction
Medication Overuse Headache (MOH) represents a significant clinical challenge, characterized by the chronification of pain in individuals who excessively use analgesics. Although the pathophysiology of MOH has traditionally focused on pharmacological aspects, the current understanding of pain neurobiology has expanded to include the complex interaction between multiple systems. In this context, the potential influence of the gut-brain axis on the perpetuation of pain in MOH has emerged as an area of growing interest, requiring a synthesis of evidence that may guide future investigations and therapeutic approaches.

Objective
To analyze the scientific evidence regarding the involvement of the gut-brain axis in the pathophysiology of MOH.

Methods
An integrative literature review was conducted using PubMed and BVS databases (English and Portuguese language publications) between 2021 and 2025, following PRISMA guidelines. DeCS/MeSH descriptors included: "Medication Overuse Headache," "Rebound Headache" and "Drug-Induced Headache," combined with "microbiota," "gut-brain axis," and "leaky gut". Inclusion criteria comprised clinical trials, observational studies, and experimental studies involving humans and animal models. Exclusion criteria included duplicate studies, non-original studies, and studies not directly related to the topic. The final sample consisted of 9 articles.

Results
The analyzed studies demonstrated convergence in indicating that MOH is a condition mediated by the gut-brain axis. Chronic analgesic use, especially nonsteroidal anti-inflammatory drugs (NSAIDs), was associated with intestinal mucosal injury and increased intestinal permeability ("leaky gut"), favoring the translocation of lipopolysaccharides (LPS) into the systemic circulation. The resulting low-grade endotoxemia induced a persistent inflammatory response, with increased levels of IL-6, IL-17, HMGB1, and CGRP, all associated with neuroinflammation, trigeminal sensitization, and trigeminovascular hyperexcitability. These alterations were associated with reduced pain threshold, increased headache frequency, and headache chronification. In addition, psychiatric comorbidities and dietary factors were associated with dysregulation of the gut-brain axis in MOH.

Conclusion
The evidence indicates that the gut-brain axis contributes to the pathophysiology of MOH. Chronic analgesic use, associated with disruption of the intestinal barrier and low-grade endotoxemia, constitutes a mechanism related to neuroinflammation, trigeminal hyperexcitability, and pain chronification. These findings reinforce the importance of further research and suggest intestinal microbiota modulation as a potential therapeutic target in MOH.

Keywords:
Pathophysiology
Gut-brain axis
Medication overuse headache

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Intracellular CGRP signaling in migraine: preferential involvement of protein kinase A in trigeminal allodynia

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Introduction
Migraine is a disabling neurological disorder characterized by recurrent headache attacks associated with nausea, photophobia, and phonophobia. Among the mediators involved in its pathophysiology, calcitonin gene-related peptide (CGRP) is particularly relevant. CGRP is widely distributed throughout the trigeminal system, including the trigeminal ganglion, where it contributes to nociceptive sensitization. Activation of the canonical CGRP receptor triggers different intracellular signaling cascades, including the G s/AC/cAMP/PKA and Gαq11/PLC pathways. However, the specific contribution of these pathways to CGRP-induced sensitization processes remains unclear.

Objective
This study investigated the effects of the pharmacological blockade of protein kinase A (PKA) and protein kinase C (PKC) on nociceptive responses induced by CGRP in the trigeminal ganglion of male and female rats.

Methods
Adult Wistar rats were previously selected according to their baseline periorbital mechanical threshold, determined using von Frey filaments (0.04–8 g). The animals received H89 (a PKA inhibitor), BIM (a PKC inhibitor), or vehicle (saline), followed 15 minutes later by CGRP or vehicle administered into the trigeminal ganglion. The periorbital mechanical threshold was assessed for four hours after treatment. After 24 hours, the animals were exposed to bright light for one hour and reassessed at the same time points. All experimental procedures were approved by the Institutional Animal Care and Use Committee (CEUA) under protocol No. 1595.

Results
The results showed that CGRP significantly reduced the periorbital mechanical threshold in both male and female rats, indicating mechanical allodynia. Moreover, exposure to light on the following day reactivated mechanical allodynia in CGRP-treated animals, indicating photosensitivity. PKA blockade significantly reduced the CGRP-induced nociceptive response in both sexes but did not affect photosensitivity. In contrast, PKC inhibition did not prevent the development of CGRP-induced periorbital allodynia or photosensitivity in male or female rats.

Conclusion
The findings suggest that immediate CGRP-induced periorbital mechanical allodynia, but not photosensitivity, depends on activation of the G s/AC/cAMP/PKA pathway in the trigeminal ganglion of both male and female rats. These results contribute to understanding the cellular mechanisms involved in migraine headache and identifying potential cellular targets.

Keywords:
Headache
Migraine
Protein kinase A
Protein kinase C
Calcitonin gene-related peptide

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07

Psychological and behavioral aspects

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Impact of integrated sleep and anxiety management on persistent headache: a case report

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Introduction
Chronic insomnia and anxiety are frequently associated with persistent headache in a bidirectional relationship that perpetuates pain and functional impairment. Sleep deprivation promotes central sensitization and alters the serotonergic and melatoninergic systems in nociceptive modulation, while anxiety induces hyperarousal and hinders sleep. Nighttime screen use reduces melatonin and worsens circadian dysregulation. This report describes the impact of integrated treatment for these factors.

Case presentation
A 24-year-old female university student presented with a three-year history of chronic insomnia and a four-year history of untreated anxiety. Over the last eight months, her sleep worsened, characterized by difficulty initiating and maintaining sleep, multiple awakenings, less than five hours of sleep per night, and circadian rhythm inversion. She reported prolonged nighttime screen use and frequent on-demand zolpidem use. Six months ago, she developed a daily persistent headache (ICHD-3), holocranial, pressing, with a Visual Analog Scale (VAS) intensity of 8, associated with fatigue, irritability, concentration deficits, and major academic impairment. The Epworth Sleepiness Scale score was 16 and the Insomnia Severity Index (ISI) was 22 (severe insomnia). Polysomnography showed reduced sleep efficiency (68%), increased latency (52 minutes), and reduced deep sleep, without apnea. Lab tests and brain MRI were normal. A multimodal approach was initiated with cognitive behavioral therapy for insomnia (CBT-I), chronotherapy, screen restriction, morning sunlight exposure, prolonged-release melatonin, and hypnotic tapering. For anxiety, venlafaxine XR 37.5 mg/day and weekly psychotherapy were started. Progressive regularization of the sleep-wake cycle and anxiety improvement were observed. After three months, she slept seven hours per night, the headache decreased to VAS=3 (2 to 3 monthly episodes), with functional gain and permanent zolpidem discontinuation.

Discussion
The relationship between anxiety, insomnia, and headache is reciprocal. Sleep deprivation increases neuronal excitability and compromises serotonergic nociceptive modulation. Nighttime artificial light reduces melatonin and maintains circadian misalignment. Anxiety promotes hyperarousal, muscle tension, and amplifies pain perception. The favorable outcome following sleep-wake cycle reorganization and emotional management reinforces the influence of psychological and chronobiological factors on pain.

Conclusion
Insomnia and anxiety act as perpetuating factors for headache. A multimodal approach focused on sleep hygiene, melatonin regulation, and anxiety treatment promoted significant clinical improvement, highlighting the importance of investigating these factors in refractory headaches.

Keywords:
Chronic insomnia
Persistent headache
Circadian rhythm

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Impact of pain catastrophizing on persistent headache associated with fibromyalgia: a case report

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Introduction
Persistent headache and fibromyalgia share central sensitization mechanisms influenced by emotional factors and alterations in pain modulation, involving serotonergic and noradrenergic pathways. Chronic stress, sleep deprivation, and emotional overload increase vulnerability and favor dysfunctional coping. In this scenario, catastrophizing intensifies pain and amplifies disability. This report addresses the impact of this phenomenon on the clinical evolution of a patient with both conditions.

Case presentation
A 52-year-old female patient was diagnosed with fibromyalgia and persistent headache (ICHD-3). She reported a daily and continuous headache for five years, with significant worsening over the last year. The pain was holocranial, pressing, of severe intensity (VAS=8), and exacerbated by minimal light and sound stimuli, mimicking superimposed migraine attacks. The condition was accompanied by generalized allodynia, non-restorative chronic fatigue, prolonged morning stiffness, and frequent episodes of "fibrofog" (memory lapses and attention deficit). There was clear emotional distress, marked by anticipatory anxiety and a constant fear of pain progression. She was taking Pregabalin, Duloxetine, and Cyclobenzaprine, with only partial improvement of musculoskeletal symptoms. Upon assessment, she scored 38 on the Pain Catastrophizing Scale (PCS), indicating severe rumination and hopelessness. Physical examination revealed multiple active trigger points in the cervical region, trapezius, and pericranial muscles. An interdisciplinary approach was instituted: maintenance of current medications, cervical physical therapy (myofascial release), light aerobic exercises, and cognitive-behavioral psychotherapy. After six months, the headache decreased to VAS=4, with significant improvement in sleep, attenuation of allodynia, and restoration of daily functionality, accompanied by a reduction in PCS scores.

Discussion
The case illustrates the relationship between pain modulation failures and the comorbidity of chronic headache with fibromyalgia, as well as the interdisciplinary approach. Catastrophizing enhances central sensitization by dysregulating the 5-HT1 serotonin receptor pathway, which is consistent with the history of this patient, whose attacks were severe. The combined intervention eliminated the hyperalgesia cycle and controlled central hyperactivity, safely addressing both cognitive components and physical pain. The favorable outcome suggests the effectiveness of the approach.

Conclusion
Interconnected emotional and neurobiological mechanisms shape chronic pain. The interdisciplinary approach targeted at catastrophizing and central dysfunction provided significant clinical improvement in this case, reiterating the importance of integrated care and breaking the pain facilitation cycle in these pathologies.

Keywords:
Fibromyalgia
Persistent headache
Pain catastrophizing
5-HT3 serotonergic receptors

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Psychiatric comorbidities in migraine: disability, chronification and treatment response — a systematic review

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Introduction
Migraine affects approximately 14% of the global population and is nearly twice as prevalent in women. Psychiatric comorbidities — particularly anxiety and depression — are highly prevalent in chronic migraine and contribute to greater disability, chronification, and reduced treatment response. Anxiety disorders affect up to 30% of patients with chronic migraine, with comorbidity rates substantially higher than in the general population.

Objective
To characterize the clinical impact of psychiatric comorbidities on migraine severity, disability, and overall disease burden.

Methods
Observational and randomized designs evaluating psychiatric comorbidities in adult patients with migraine were identified through PubMed/MEDLINE, SciELO, and LILACS, following PRISMA 2020 recommendations, with searches limited to publications between January 2016 and April 2026. Eligibility criteria included ICHD-III migraine diagnosis, validated psychiatric assessment instruments, and quantitative headache-related outcomes. Pediatric populations, secondary headaches, and reports lacking migraine-specific data were excluded. Search terms included "migraine," "psychiatric comorbidities," "anxiety." "depression," "disability," and "disease burden". From 347 identified records, 63 duplicates were removed; 201 were excluded at screening and 66 at full-text assessment. Risk of bias was assessed using the Newcastle-Ottawa Scale.

Results
Seventeen studies, comprising 8,742 patients across twelve cross-sectional analyses, three cohort studies, and two randomized trials fulfilled inclusion criteria. Psychiatric comorbidities were more prevalent in chronic than episodic migraine (30.3% vs. 20.0%) and were consistently associated with greater disability and clinical burden. Coexisting anxiety and depression were associated with 32.5% higher MIDAS scores and greater interictal burden compared with patients without comorbidity. Depression severity independently predicted disability (PHQ-2 positively associated with MIDAS, b=0.06; p≤0.001), work impairment, and career interference. Patients with both comorbidities also demonstrated higher rates of chronification, poorer quality of life, and reduced response to acute and preventive pharmacotherapy.

Conclusion
The coexistence of anxiety and depression substantially increases migraine-related disability and disease burden and is associated with poorer treatment outcomes. These findings support the integration of psychiatric screening into routine migraine care pathways. The predominantly cross-sectional evidence base limits causal inference; prospective studies combining standardized psychiatric and headache outcome measures are needed to clarify directionality and guide integrated treatment strategies.

Keywords:
Migraine
Psychiatric comorbidity
Anxiety
Depression
Disability

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Adverse childhood experiences and migraine chronification: neurobiological mechanisms and clinical impact - a systematic review

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Introduction
Migraine is a highly prevalent and disabling neurological disorder associated with reduced quality of life. In recent years, adverse childhood experiences have been increasingly associated with the development of chronic pain conditions, including migraine, possibly through mechanisms involving central sensitization, neuroinflammation, and dysregulation of the stress response.

Objective
To analyze the impact of early-life trauma on the neurobiological vulnerability and clinical severity of migraine, considering its relationship with mechanisms of central sensitization and pain chronification.

Methods
This is a systematic review conducted using the PubMed, SciELO and LILACS databases, based on the PICO strategy, considering: population (patients with migraine), exposure (adverse childhood experiences), and outcome (development and chronification of migraine). The descriptors "migraine" AND "childhood trauma" OR "childhood adversity" were used. Initially, 37 articles were identified. After applying a 10-year publication filter and including only studies containing the descriptors in the title, 13 studies remained and were included in the final analysis.

Results
A higher prevalence of childhood trauma was observed among patients with chronic and refractory migraine, particularly in individuals with a history of emotional abuse, neglect, and early exposure to stress. In a Canadian cohort study involving adolescents, adverse childhood experiences were associated with a higher incidence of migraine during follow-up, as well as significant associations with anxiety and depressive symptoms. Another analysis found that patients with refractory chronic migraine had a significantly higher frequency of traumatic experiences compared to those with episodic migraine. Experimental models demonstrated that early-life stress induced hyperexcitability of brain networks, increased neuroinflammatory markers in the dura mater, and greater susceptibility to migraine-like behaviors. Furthermore, studies highlighted the possible involvement of central sensitization and hypothalamic-pituitary-adrenal axis dysregulation in the perpetuation of migraine attacks. Additionally, psychological factors such as insecure attachment, dissociation, anxiety, and depression acted as important mediators between childhood trauma and greater migraine severity, reinforcing the multifactorial nature of the disease.

Conclusion
Adverse childhood experiences were strongly associated with increased vulnerability to migraine chronification and greater clinical severity. Moreover, the presence of psychiatric comorbidities and therapeutic refractoriness in patients exposed to early trauma reinforces the need for a multidimensional approach to migraine management, with more individualized therapeutic strategies aimed at reducing pain chronification

Keywords:
Migraine
Central sensitization
Childhood trauma

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Association between sleep deprivation and headache disorders: a systematic review of clinical and observational studies

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Introduction
Sleep deprivation has been increasingly associated with the onset and worsening of headache disorders, especially migraine. Changes in sleep quality and duration may contribute to cortical hyperexcitability, sensory disturbances, and increased headache-related disability, negatively affecting patients' quality of life. Given the high prevalence of both sleep disturbances and headache disorders, understanding this relationship is clinically relevant for improving prevention and therapeutic strategies.

Objective
To analyze the association between sleep deprivation and headache disorders, emphasizing the impact of insufficient sleep on migraine symptoms, headache-related disability, and quality of life.

Methods
A systematic review was conducted using the PubMed database. The search strategy included the descriptors "Sleep Deprivation," "Sleep Disorders," "Insomnia," "Headache," and "Migraine," combined with the Boolean operators AND and OR. Clinical trials and observational studies published in English between 2023 and 2026 were included. Narrative reviews, editorials, duplicated publications, and studies unrelated to headache disorders were excluded. The selection process involved title and abstract screening followed by full-text analysis according to predefined eligibility criteria.

Results
The included studies demonstrated a significant association between sleep deprivation and worsening headache outcomes, particularly migraine. Insufficient sleep was associated with increased cortical excitability, impaired sensorimotor processing, photophobia, greater headache-related disability, and reduced quality of life. Observational studies also identified poorer sleep quality among patients with chronic headache conditions and migraine. Furthermore, sleep disturbances were linked to psychological impairment and functional limitations, especially in adolescents and individuals with persistent headache disorders. Overall, the findings suggest that inadequate sleep may act as both a trigger and an aggravating factor for headache episodes.

Conclusion
Sleep deprivation is strongly associated with the development and exacerbation of headache disorders, particularly migraine, contributing to increased disability and poorer quality of life. These findings reinforce the importance of sleep assessment and sleep-focused interventions in headache management. However, limitations such as heterogeneity among studies and restricted sample sizes highlight the need for further large-scale prospective studies to better clarify the underlying mechanisms of this association.

Keywords:
Headache
Quality of life
Migraine
Sleep disorders

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Association between caffeine consumption and headache disorders: a systematic review

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Introduction
Caffeine is one of the most widely consumed psychoactive substances worldwide and has a complex relationship with headache disorders. While moderate intake may provide analgesic benefits, excessive consumption and withdrawal have been associated with increased headache frequency and migraine exacerbation. Given the growing consumption of caffeinated beverages, understanding this association is clinically relevant.

Objective
To analyze the relationship between caffeine consumption and headache disorders, focusing on the effects of excessive intake, withdrawal, and therapeutic use of caffeine on headache occurrence and severity.

Methods
A systematic review was conducted using the PubMed database. The descriptors "Caffeine", "Caffeine Consumption", "Coffee", "Headache", and "Migraine" were combined using the Boolean operators AND and OR. Clinical trials and observational studies published in English between 2016 and 2025 were included. Narrative reviews, editorials, duplicate studies, and articles unrelated to headache disorders were excluded. Study selection followed PRISMA recommendations through title, abstract, and full-text screening.

Results
The selected studies demonstrated a significant association between caffeine consumption and headache disorders. Excessive intake, particularly through energy drinks, was associated with increased headache frequency and neurological symptoms among adolescents. Caffeine withdrawal was identified as an important trigger for headache episodes. Conversely, randomized clinical trials showed beneficial effects of caffeine combined with analgesics, reducing headache intensity in conditions such as post-dural puncture headache and pregnancy-related headaches. Moderate consumption also demonstrated prophylactic effects in experimental models. However, chronic excessive intake was associated with headache chronification and impaired quality of life.

Conclusion
Caffeine may act as both a therapeutic adjunct and a triggering factor in headache disorders. Moderate consumption appears beneficial in specific situations, whereas excessive intake and withdrawal are associated with worse outcomes. These findings highlight the importance of assessing caffeine habits in patients with headache disorders. Further prospective studies are needed to establish safe consumption patterns and clarify underlying mechanisms.

Keywords:
Migraine
Headache
Caffeine
Caffeine consumption

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Perceived stigma associated with restriction in social and leisure participation in individuals with migraine

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Introduction
Perceived stigma may be associated with how individuals with migraine experience the disease, contributing to limitations in daily activities and participation restrictions.

Objective
To investigate the association between perceived stigma and restriction in social and leisure participation in individuals with migraine.

Methods
This cross-sectional observational study included 41 patients with migraine, 38 women, aged 18 to 55 years (34±12 SD), diagnosed according to the ID-Migraine. Data were collected using a sociodemographic and clinical form. Perceived stigma was assessed using the Stigma Scale for Chronic Illnesses 8-item version (SSCI-8). The variable "days without participation in social, family, or leisure activities due to headache" was defined as the dependent variable. Linear regression adjusted for medical treatment was conducted, with significance set at $p<0.05$.

Results
The linear regression model explained 38.5% of the variability in restriction of social and leisure participation ($R=0.620$; $R^2=0.385$; $n=21$). Perceived stigma showed a positive association with participation restriction, indicating that higher levels of stigma were associated with a greater number of days with restriction (=0.622; SE=0.226; t=2.759; p=0.013). Receiving preventive medical treatment was a protective factor, suggesting lower participation restriction among patients (=-5.014; SE=2.230; t=-2.249; p=0.037).

Conclusion
Perceived stigma was associated with greater restriction in social and leisure participation, whereas preventive pharmacological treatment was related to lower restriction, reinforcing the importance of clinical and psychosocial management of migraine.

Keywords:
Migraine disorders
Social stigma
Interictal period

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Lived experiences of individuals with migraine: a qualitative analysis

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Introduction
Understanding the lived experience of individuals with migraine requires qualitative approaches capable of capturing perceptions, meanings, and the repercussions of the condition in daily life. In this context, similarity analysis allows the identification of lexical connections in participants' narratives, highlighting meaning cores that structure this experience.

Objective
To identify the meaning cores related to the lived experiences of individuals with migraine.

Methods
This was a descriptive qualitative study conducted with 12 patients, 9 women, aged 18 to 55 years (31±11 SD), with a diagnosis of migraine made by a neurologist. The interviews were transcribed and anonymized, and the meaning cores were analyzed using IRaMuTeQ through textual statistics and similarity analysis, considering nouns, verbs, and adjectives as active forms.

Results
Similarity analysis revealed a lexical network organized around the terms "migraine," "stay," "day," "medication," and "pass". The "migraine" core was associated with "attack," "feel," "trigger," "light," "sleep," and "vomit," indicating the presence of symptoms and triggering factors related to the painful experience. The "day" axis was connected to "routine," "time," "night," "college," "activity," and "life," suggesting interference of migraine in daily organization. The "medication" cluster was related to "take," "solve," "neurologist," and "hospital," pointing to the use of pharmacological strategies and the search for care. The terms "stay," "home," "person," "talk," and "believe" indicated functional limitation, withdrawal, and the need for social recognition of pain.

Conclusion
The meaning cores were painful attacks, associated symptoms, limitations in routine, search for care, and need for social recognition, highlighting repercussions that go beyond pain.

Keywords:
Qualitative research
Migraine disorders
Social stigma
Interictal period
Hermeneutics

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The relationship between academic/professional burnout and migraine chronicity

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Introduction

Burnout Syndrome, characterized by physical and mental exhaustion resulting from chronic stress in academic and professional environments, has been identified as a significant risk factor for the exacerbation of neurological conditions. Migraine, a disabling primary headache, can evolve from episodic attacks into a chronic condition (≥15 days per month) when mediated by persistent environmental and psychological stressors. Understanding this relationship is vital for developing early intervention strategies and supporting worker and student health.

Objective

To investigate and synthesize current scientific evidence regarding the correlation between academic/professional burnout and the process of migraine chronification.

Methods

A systematic review was conducted across national and international databases, including SciELO, VHL (Virtual Health Library), PubMed/PMC, SAGE Journals, Springer, and Wiley Online Library. Inclusion criteria comprised scientific articles, cohort studies, and scoping reviews published between 2014 and 2025 in Portuguese and English. The descriptors used were: "Burnout", "Migraine", "Chronicity", "Academic Stress", and "Occupational Stress".

Results

The prevalence of migraine in high-pressure academic environments, such as medical schools, was found to range between 36.8% and 38.8%, with exam periods acting as triggers for 66% of students, resulting in declines in Grade Point Average (GPA) and absenteeism. A significant association was observed between burnout syndrome and levels of depression, anxiety, and stress. Age showed a negative correlation with burnout, indicating a lower occurrence of the syndrome in older individuals. Weekly workload and higher educational levels were associated with increased burnout scores. Pathophysiologically, the chronic stress characteristic of burnout induces a state of neuronal hyperexcitability and central sensitization of the trigeminovascular system, a fundamental process for the transformation of episodic migraine into its chronic form.

Conclusion

Burnout is not merely a consequence of exhaustive work, but a biological and psychosocial catalyst for migraine chronicity. This relationship exhibits a bidirectional nature: while exhaustion reduces pain tolerance thresholds due to dysregulation of the HPA (hypothalamic-pituitary-adrenal) axis, chronic pain exacerbates feelings of professional ineffectiveness and social isolation. Mechanisms such as cognitive fusion prevent emotional detachment from stressors, perpetuating a state of sterile neuroinflammation that feeds back into the attacks. Furthermore, low occupational and academic autonomy limits an individual's capacity to implement self-care strategies, consolidating the cycle of chronification. Therefore, mitigating this condition transcends isolated pharmacological treatment, necessitating psychopedagogical support and labor reorganization.

Keywords:
Headache
Burnout professional
Chronic migraine

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Use of analgesics for headache and self-medication: analysis of habits and risk perception in the general population

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Introduction
Self-medication is a common practice in daily life and is often used as the first alternative to relieve headaches. However, easy access to analgesics and anti-inflammatory drugs without professional healthcare guidance allows for improper use, which may mask more serious conditions and worsen symptoms over time. Therefore, understanding how the population uses these medications and what people actually know about the associated risks is essential for developing strategies for rational drug use.

Objective
To evaluate the profile of self-medication and analgesic use in the general population, as well as to identify participants' level of knowledge regarding the risks associated with the frequent use of these medications.

Methods
This was a cross-sectional, descriptive study conducted through an online questionnaire administered to the general population. Information was collected regarding sociodemographic profile, headache frequency, use of pain medications, self-medication practices, frequency of consumption, and participants' perception of the risks related to the frequent use of analgesics.

Results
Thirty individuals participated in the study, of whom 56.7% reported headache episodes and 93.3% reported using medications for symptom relief. Self-medication was observed in 63.3% of participants, with simple analgesics being the most commonly used. In addition, 86.7% were unaware of possible consequences related to the frequent use of these medications, while 20% reported increased frequency of consumption due to recurrent pain.

Conclusion
The results show that self-medication is highly prevalent in participants' routines and is associated with a lack of information regarding the risks of continuous analgesic use. Therefore, the need for educational strategies aimed at promoting the rational use of medications is reinforced, especially in the management of frequent symptoms such as headache.

Keywords:
Headache
Self-medication
Rational use of medications

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Association between migraine/headache and mental disorders in children, adolescents, and adults: a systematic review

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Introduction
Migraine and other recurrent headache disorders are major causes of disability and reduced quality of life across all age groups. In addition to neurological symptoms, evidence suggests a strong association between headache disorders and mental health conditions, including anxiety, depression, bipolar disorder, and attention-deficit/hyperactivity disorder (ADHD), highlighting their clinical and public health relevance.

Objective
To analyze the association between recurrent migraine/headache and mental disorders, as well as the potential neurobiological mechanisms involved.

Methods
This systematic review was conducted according to PRISMA guidelines. The research question was structured using the PICO framework: individuals with recurrent headache or migraine (P), associated mental disorders (I), comparison with individuals without headache or psychiatric disorders (C), and the association between migraine/headache and mental disorders, including anxiety, depression, behavioral disorders, and ADHD (O). Searches were performed in PubMed, SciELO, and MEDLINE using the strategy ("headache" [title] OR "migraine" [title]) AND "mental disorders". Studies published within the last five years in English, Portuguese, and Spanish were included. Eligible studies comprised observational, population-based, genetic, neuroimaging, and clinical trial designs. Duplicate records, editorials, narrative reviews, letters, and studies unrelated to the research question were excluded.

Results
Thirty-three studies demonstrated a significant association between recurrent migraine/headache and mental disorders. Anxiety and depression were more prevalent among individuals with migraine, particularly migraine with aura, which was also associated with behavioral disorders. Among adolescents, recurrent headache was linked to anxiety, depressive symptoms, and attention difficulties, while children and adolescents with ADHD showed higher rates of migraine. Population-based studies identified increased risks of mood, anxiety, eating, and disruptive behavioral disorders among individuals with headache disorders. Genetic studies suggested a higher risk of bipolar disorder, depression, ADHD, and schizophrenia in the offspring of parents with migraine. Functional neuroimaging studies revealed altered brain connectivity patterns involving emotional regulation, cognitive processing, and pain-related networks, supporting shared neurobiological mechanisms. Furthermore, migraine comorbid with depression was associated with greater disability, poorer quality of life, and increased healthcare utilization. Clinical trials involving fremanezumab reported simultaneous improvements in migraine attacks and depressive symptoms.

Conclusion
This review demonstrated a consistent association between recurrent migraine/headache and mental disorders across all age groups. The findings support shared neurobiological and genetic mechanisms, highlighting the need for multidisciplinary care, early screening, and longitudinal studies.

Keywords:
Migraine
Mental disorders
Attention-Deficit/
Hyperactivity Disorder (ADHD)

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Case report: radiofrequency neuroablation of the sphenopalatine ganglion in persistent idiopathic facial pain associated with fibromyalgia

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Introduction

Persistent idiopathic facial pain (PIFP) is a neuropathic craniofacial pain disorder that may phenotypically overlap with refractory headache syndromes, frequently resulting in delayed diagnosis, polypharmacy, and pain chronification. Patients with fibromyalgia are particularly susceptible to central sensitization and persistent neuropathic pain after peripheral injuries, including invasive dental procedures. Recent evidence supports the role of the sphenopalatine ganglion (SPG) as a therapeutic target in refractory craniofacial pain syndromes due to its involvement in trigeminovascular and autonomic modulation.

Case presentation

A 45-year-old female patient with fibromyalgia developed chronic bilateral facial pain, predominantly affecting the left hemiface, following dental extraction, implant placement, and bone grafting. She presented with continuous neuropathic pain, bilateral facial allodynia, and significant functional and psychobehavioral impairment. The condition was initially interpreted as refractory headache, leading to therapeutic escalation with strong opioids, dual-action antidepressants, muscle relaxants, and weak opioids as rescue medication, without satisfactory response. During her first consultation with an interventional pain specialist, she reported pain intensity of 8/10 on the visual analog scale, depressed mood, and severe impairment of self-care. Initially, intravenous sympathetic blockade was performed, resulting in transient improvement of the affective component of pain. Due to persistence of refractory symptoms, bilateral radiofrequency neuroablation of the SPG was performed. After six months of follow-up, the patient demonstrated sustained pain reduction to 2/10, complete withdrawal of strong opioids, and approximately 50% reduction in overall pharmacological burden, associated with functional recovery, social reintegration, and restoration of self-care.

Discussion

This case highlights the interaction between central sensitization, neuropathic craniofacial pain, and psychobehavioral comorbidities associated with refractory chronic pain. Dental trauma likely acted as a peripheral trigger in a nervous system already vulnerable due to fibromyalgia-related nociceptive amplification. Persistent allodynia and favorable response to autonomic modulation suggest significant involvement of trigeminovascular and sympathetic pathways. Moreover, prolonged opioid exposure in inaccurate diagnoses is associated with opioid-induced hyperalgesia, worsening functionality, and emotional distress. In this context, SPG radiofrequency emerges as a promising interventional strategy for refractory craniofacial pain phenotypes associated with central sensitization.

Conclusion

PIFP may mimic refractory headache disorders, contributing to delayed diagnosis and prolonged opioid exposure. SPG neuroablation demonstrated significant impact on analgesia, medication deprescription, and psychobehavioral recovery in complex craniofacial pain syndromes.

Keywords:
Persistent idiopathic facial pain
Sphenopalatine ganglion
Central sensitization
Fibromyalgia
Opioid deprescription

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08

Epidemiology and impact of headaches

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Magnesium sulfate in intracranial hypertension associated with systemic lupus erythematosus: a case report mimicking hemorrhagic stroke

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Introduction

Systemic lupus erythematosus (SLE) is a multisystem autoimmune disease that frequently affects the central nervous system. Among its rare neuro-ophthalmological manifestations is intracranial hypertension (IH), with an estimated incidence of 0.7%, which may present with refractory headache, papilledema, and sixth cranial nerve palsy, mimicking hemorrhagic stroke (HS). We report the case of a young woman with SLE and Ehlers-Danlos syndrome (EDS) who developed IH mimicking HS, discussing the diagnostic reasoning and management of her complex neuroinflammatory manifestations.

Case presentation

A 21-year-old female patient with SLE (anti-Sm positive) and hypermobile Ehlers-Danlos syndrome (EDS), undergoing irregular corticosteroid therapy, was admitted with a sudden thunderclap headache (VAS= 10), associated with nausea, photophobia, and blurred vision, which had begun one hour earlier and was refractory to initial analgesic treatment. Physical examination revealed right convergent strabismus (sixth cranial nerve palsy) and reduced visual acuity. A non-contrast cranial computed tomography scan was initially performed and excluded intracranial hemorrhage. Due to the persistence of symptoms, intravenous magnesium sulfate (2 g) was administered, resulting in headache improvement to VAS=3 on the same day, along with improvement in photophobia and blurred vision. Following clinical improvement, corticosteroid therapy was reintroduced (methylprednisolone 40 mg every 12 hours), and further investigation was undertaken. Brain magnetic resonance imaging and arterial and venous magnetic resonance angiography ruled out aneurysm and cerebral venous thrombosis (CVT), in addition to a previously negative antiphospholipid syndrome (APS) workup. Papilledema and class I obesity supported the diagnosis of IH. Magnesium sulfate was maintained for three days; by the third day, the strabismus had resolved, accompanied by further improvement in visual symptoms and headache.

Discussion

The patient presented with headache, papilledema, and sixth cranial nerve palsy, consistent with intracranial hypertension. Cerebral venous thrombosis was excluded through arterial and venous imaging and a negative antiphospholipid syndrome workup. The rapid clinical improvement after magnesium sulfate administration was notable. As lumbar puncture with opening pressure measurement was not performed, the diagnosis remains probable intracranial hypertension based on the clinical findings and exclusion of alternative causes.

Conclusion

Refractory thunderclap headache in patients with SLE requires exclusion of intracranial hemorrhage and cerebral venous thrombosis, as well as investigation for intracranial hypertension, a treatable cause of morbidity. Magnesium sulfate was associated with significant clinical improvement, although an isolated causal relationship cannot be established, suggesting potential therapeutic relevance in complex neuroinflammatory presentations.

Keywords:
Neuropsychiatric lupus
Intracranial hypertension
Pseudotumor cerebri

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Thermal indicators and headache-related hospitalizations in São Paulo: an ecological time-series analysis (2016–2025)

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Introduction
The literature suggests that meteorological variables may act as triggers for primary headache attacks. However, the impact of these factors on population-level hospital utilization indicators remains uncertain, particularly in large urban centers, where healthcare, behavioral, and systemic factors can influence the decision to seek medical care.

Objective
To analyze the association between the monthly mean temperature and the monthly mean daily temperature range with the number of hospitalizations for migraine and other headaches in the city of São Paulo between 2016 and 2025, evaluating possible seasonal patterns and their impact on hospital burden.

Methods
This is an ecological time-series study using data from the Brazilian Public Health System's Hospital Information System (SIH/DATASUS). Hospitalizations classified as "Migraine and other headache syndromes" (ICD-10: G43 and G44) in the city of São Paulo were included, using monthly data from January 2016 to December 2025. Meteorological data were obtained from the Meteorological Database for Teaching and Research (BDMEP/INMET), using station A701 as the reference. The monthly mean temperature and the monthly mean daily temperature range were analyzed. Spearman's correlation test was used to assess the association between thermal variables and the number of hospitalizations, and the Kruskal-Wallis test was applied to investigate seasonal variability. A subgroup analysis was performed excluding the years 2020 and 2021 to minimize potential interference from the COVID-19 pandemic. A significance level of 5% was adopted.

Results
A total of 3,927 hospitalizations were recorded during the analyzed period, amounting to 3,318 after excluding the pandemic biennium. In the adjusted historical series, there was no statistically significant correlation between the monthly mean temperature and the number of hospitalizations (=0.088; p=0.390), nor between the temperature range and hospitalizations (=-0.084; p=0.417). There was also no significant monthly seasonality in the distribution of hospitalizations (p=0.548), indicating a relatively homogeneous behavior throughout the year. Conversely, significant interannual variability in the number of hospitalizations was identified (p<0.001), suggesting the influence of temporal factors not directly related to local thermal dynamics.

Conclusion
Despite previous evidence linking elevated ambient temperatures to an increase in headache-related medical visits, the analyzed thermal indicators did not prove to be robust predictors of headache hospitalizations in the city of São Paulo. Potential acute meteorological associations may have been attenuated by the monthly aggregation of data. Furthermore, hospital admissions represent only the most severe fraction of headache episodes, which may also reflect healthcare, behavioral, and systemic factors associated with seeking medical attention in large urban centers.

Keywords:
Headache
Hospitalization
Temperature
Meteorology

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Epidemiological and financial impact of headache hospitalizations: a decennial analysis in Recife

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Introduction
Headaches are among the most prevalent and disabling neurological conditions worldwide, generating a significant clinical, social, and economic impact. In addition to severely compromising quality of life, headache crises are associated with high demand for emergency services and hospitalization, resulting in substantial costs for the Unified Health System (SUS). In this context, the epidemiological analysis of admissions contributes to public health policy planning and to the strengthening of prevention and management strategies within the healthcare network.

Objective
To analyze the temporal profile of hospitalizations for headache and their financial impact in the municipality of Recife-PE between 2015 and 2025.

Methods
A population-based, descriptive, and retrospective epidemiological study was conducted using microdata from the SUS Hospital Information System (SIH/SUS), obtained via DATASUS. Registries were isolated based on the patient's municipality of residence and filtered by primary diagnoses structured under Chapter VI of the ICD-10, specifically targeting codes for migraine and other headache syndromes (G43-G44). The variables analyzed included absolute annual volume of hospitalizations, total hospital costs, and the mean cost per admission.

Results
A total of 2,014 hospitalizations for headache were recorded in Recife-PE during the studied period. The highest volume occurred in the 2016-2017 biennium, peaking at 333 registries in 2017. After 2018, a general downward trend in hospitalizations was observed, with a sharp decline in 2020 during the COVID-19 pandemic, when 101 admissions were recorded. Subsequent years showed a partial recovery of the indicators, followed by a new reduction up to 2025 (77 cases). The total accumulated cost was BRL 1,367,502.70. The highest annual expenditure occurred in 2018 (BRL 219,625.68), while the highest mean cost per patient was observed in 2021, reaching BRL 931.44 per admission, highlighting an increase in clinical complexity post-pandemic.

Conclusion
Hospitalizations for headache maintained a relevant healthcare and economic impact in Recife-PE throughout the decade. Although the general trend indicates a reduction in hospitalizations across the historical series, individual costs for severe cases remain high. These findings reinforce the need to optimize early diagnosis and prophylactic management within primary care, aiming to curb avoidable hospitalizations and ensure efficiency in the allocation of public resources.

Keywords:
Headache
Hospitalization
Hospital costs
Public health administration

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Hospital admissions due to migraine and other headache syndromes among women of reproductive age in Brazil between 2014 and 2023

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Introduction
Migraine and other headache syndromes represent an important cause of morbidity, with functional, social, and economic impact, especially among women of reproductive age. Although these conditions are frequently managed in outpatient settings, they may lead to hospital admissions and generate costs for the Brazilian Unified Health System.

Objective
To analyze the epidemiological and hospital profile of admissions due to migraine and other headache syndromes among women aged 15 to 49 years in Brazil between 2014 and 2023.

Methods
This is an ecological, retrospective, and descriptive study with a quantitative approach, based on secondary data from the Hospital Information System of the Brazilian Unified Health System, available through TabNet/DataSUS. Hospital admissions of female patients aged 15 to 49 years, registered in Brazil from 2014 to 2023 and classified in the ICD-10 Morbidity List as "Migraine and other headache syndromes" were included. The variables analyzed were year of admission, age group, region, number of hospital admissions, total amount, mean admission cost, mean length of hospital stay, deaths, and hospital mortality rate.

Results
During the analyzed period, 40,992 hospital admissions were recorded. The most affected age group was 30 to 39 years, with 12,563 admissions (30.6%), followed by 20 to 29 years, with 12,384 admissions (30.2%). The Southeast Region accounted for the highest number of admissions, with 14,439 records (35.2%), followed by the Northeast Region, with 11,487 records (28.0%). The total amount related to hospital admissions was R$ 15,972,814.08, with a national mean amount of R$ 389.66 per admission. The mean length of hospital stay was 3.7 days. A total of 153 hospital deaths were recorded, with a hospital mortality rate of 0.37%. The Northeast Region concentrated the highest absolute number of deaths, with 81 records, while the highest hospital mortality rate was observed in the North Region, at 0.90%.

Conclusion
Hospital admissions due to migraine and other headache syndromes among women of reproductive age represent a relevant hospital demand within the Brazilian Unified Health System, with greater concentration among young adult women, especially those aged 20 to 39 years. The findings demonstrate healthcare and economic impact, as well as regional inequalities in hospital indicators, reinforcing the importance of early diagnosis, appropriate outpatient management, and crisis prevention strategies.

Keywords:
Migraine
Headache
Hospitalization
Epidemiology
Women's health

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Impact of the COVID-19 pandemic on hospitalizations for migraine and headache syndromes in the Brazilian Public Health System, 2018–2024

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Introduction
Migraine and headache syndromes (ICD-10: G43/G44) are among the leading causes of neurological disability worldwide, disproportionately affecting women of reproductive age and economically active adults. In Brazil, these conditions generate substantial demand for SUS inpatient services. The COVID-19 pandemic severely interfered with hospital care, raising concerns about suppressed demand for non-COVID neurological conditions and whether it differentially affected care access across demographic groups.

Objective
To compare hospitalizations for migraine and headache syndromes in the Brazilian SUS before, during, and after the pandemic, evaluating COVID-19's impact on demographic distribution and assessing post-pandemic suppressed demand.

Methods
Descriptive, retrospective, ecological, and quantitative study using data from the SIH/SUS (DATASUS). All hospital admissions recorded in Brazil between 2018 and 2024 with a primary diagnosis of G43 or G44 (ICD-10) were included. Admissions were grouped into three periods: pre-pandemic (2018–2019), pandemic (2020–2021), and post-pandemic (2022–2024). Data were stratified by type of care (elective/emergency), sex, and age group. Ethical approval was waived given the dataset's anonymized and aggregated nature.

Results
From 2018 to 2024, 74,322 hospitalizations for migraine and headache syndromes were recorded in the SIH/SUS. During the pre-pandemic period, annual admissions peaked at 11,996 in 2019, which declined sharply during the pandemic (μ=8,641.5±94.5; −25.3% vs pre-pandemic), and recovered gradually through the post pandemic period (μ=11,300.3±790.6; −2.3% vs pre-pandemic), with no rebound effect observed. Despite emergency admissions predominated across all periods (94.9%), urgent admissions decreased by 25.8% compared with a 16.5% reduction in elective admissions during the pandemic. Elective care reached its lowest standard in 2024 (n = 409), below pandemic-year levels, suggesting structural barriers to programmed care. Stratified analysis revealed female predominance (66.2%; ratio ≈ 1.96:1), stable across all three periods. The highest burden was concentrated among adults aged 30–39 (18.1%) and 20 29 years (17.2%), indicating that pandemic-related disruptions did not meaningfully alter demographic vulnerability.

Conclusion
Hospitalizations for migraine and headache syndromes in Brazil showed a significant decline during the COVID-19 pandemic, reflecting demand suppression rather than a true reduction in morbidity. Notably, the anticipated rebound effect following the pandemic period was not observed; instead, admissions recovered gradually and remained 2.3% below pre-pandemic levels. The persistent decline in elective admissions suggests structural barriers to programmed neurological care within the SUS. The distribution according to sex and age group remained stable throughout the evaluated periods, preserving the previously observed epidemiological pattern.

Keywords:
Migraine
COVID-19
Hospital admissions
Headache syndrome
Demand suppression

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Impact of the COVID-19 pandemic on public hospital spending for headache admissions in Sergipe/Brazil from 2018 and 2024

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Introduction
Headache disorders generate a substantial, often underestimated economic burden on public health systems. In Brazil, the COVID-19 pandemic abruptly reorganized hospital activity, suspending elective care and redirecting resources, with potential effects on spending for conditions such as headache that are sensitive to access. Inflation-adjusted, regionalized evidence on this impact is lacking, particularly in the Northeast.

Objective
To analyze the impact of the COVID-19 pandemic on public hospital spending for headache admissions in Sergipe from 2018 and 2024.

Methods
Ecological time-series study of secondary SIH/DATASUS data on headache hospitalizations (ICD-10 G43–G44) in Sergipe. Admissions, reimbursed costs, mean cost per admission, length of stay, and deaths were extracted for 2018–2024. Monetary values were deflated to 2024 reais using the IPCA. Three periods were compared: pre-pandemic (2018–2019), pandemic (2020–2021), and post-pandemic (2022–2024); trends were assessed by log-linear regression.

Results
From 2018 to 2024, 299 headache admissions were recorded, predominantly among women (66.9%; F:M ratio 2.02:1), totaling R$ 103,466 nominal (R$ 121,254 in 2024 reais). Real spending fell sharply in the pandemic period: the annual mean dropped 54.9% versus pre-pandemic (R$ 10,548 vs R$ 23,384), reaching its nadir in 2020 (−56.9% versus 2019). Mean real cost per admission nearly halved, from R$ 622 (pre-pandemic) to R$ 330 (pandemic). Admissions then recovered strongly, rising 182% from 2020 to 2024, yet real cost per admission remained well below baseline (R$ 348 post-pandemic), so 2024 concentrated 26.4% of all admissions but only 22.1% of real spending. Consequently, post-pandemic annual spending stayed 23.9% below pre-pandemic levels, and overall real spending showed no upward trend (p=0.92) despite rising volume. Mean length of stay did not decline (pre-pandemic 7.8, pandemic 7.9, post-pandemic 8.3 days), indicating the lower real cost per admission was not driven by shorter stays.

Conclusion
The pandemic was followed by a steep, lasting reduction in inflation-adjusted hospital spending for headache in Sergipe. The post-pandemic rebound was driven by admission volume rather than cost intensity, as real spending per admission did not recover. This decoupling of volume from expenditure suggests lower-complexity admissions and possible underfunding relative to growing demand, underscoring the need to monitor financing of headache care and to reinforce outpatient management to curb avoidable hospital costs.

Keywords:
Headache
Hospitalization
COVID-19
Unified Health System
Health expenditures

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Economic impact of hospitalizations for primary headaches in Brazil: an analysis based on hospital costs and human capital loss (2015-2025)

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Introduction
Primary headaches, including migraines and other headache syndromes, are a major cause of morbidity and functional impairment, significantly impacting health systems and population productivity. Despite their high prevalence, the economic dimension of related hospitalizations remains underestimated, especially in middle-income countries where data on direct and indirect costs are limited and fragmented.

Objective
To analyze the economic impact of hospitalizations for primary headaches in Brazil from 2015 to 2025, considering hospital costs and human capital loss.

Methods
An ecological, retrospective, and descriptive study based on secondary data from the Hospital Information System (SIH) and the Mortality Information System (SIM), available through DATASUS. Hospitalizations and deaths due to primary headaches (ICD-10: G43-G44) in Brazil between January 2015 and December 2025 were included. Analyzed variables were: hospitalizations, costs (hospital and professional), average cost per hospitalization, length of stay, fatal events, and mortality rate. Indirect impact was estimated via the human capital method, using productive life years lost (between 14 and 65 years), based on the midpoint of age groups, average annual per capita income, and employment level, per data from the Brazilian Institute of Geography and Statistics (IBGE). A 3% annual discount rate was applied, following health economics guidelines.

Results
A total of 113,863 hospitalizations for primary headaches were recorded in Brazil between 2015 and 2025, with a total hospital cost of BRL 57,429,745.71, averaging BRL 504.38 per admission, and a mean stay of 4 days. Expenses on hospital services (BRL 50,095,659.13) outweighed professional services (BRL 7,250,684.89). Concurrently, 1,024 deaths occurred (0.9% mortality rate). The human capital loss estimated via SIM, considering primary headaches as the underlying cause, was BRL 5,110,574.95. Thus, the combined economic impact (direct hospital costs and associated mortality) exceeded BRL 62 million in this period, potentially underestimated when only the underlying cause of death is considered. When including deaths during hospitalizations initiated by the condition (SIH), the additional estimated economic burden was BRL 84,618,927.81, representing a value 135.3% higher than the SIM-based mortality estimate.

Conclusion
Despite low mortality, primary headaches generated significant hospital costs and human capital loss during the analyzed period. The discrepancy between estimates based on the underlying cause of death and those derived from deaths during hospitalizations suggests a potential underestimation of the economic burden of these conditions. This reinforces the need for strategies focused on proper management and prevention of exacerbations. Additionally, the lack of absenteeism and presenteeism projections suggests the total economic impact may be even greater.

Keywords:
Headache
Hospitalization
Costs and cost analysis
Health care economics and organizations

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Spatial and temporal analysis of outpatient and inpatient care for headaches in Sergipe/Brazil between 2012 and 2024

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Introduction
In Brazil, specialized hospital and neurological care has evolved in parallel with the consolidation of the Unified Health System (SUS) and the country's economic cycles. Furthermore, the expansion of health information systems has progressively improved case registration, while the economic recession of the mid-2010s, subsequent fiscal constraints on health financing, and the COVID-19 pandemic have strained outpatient and specialized capacity. Since headache is a largely manageable condition at the outpatient level, its hospitalization pattern constitutes a sensitive marker of how economic and health sector development translates into access to care. Regionalized evidence is scarce, especially in Sergipe, where neurologists have historically been concentrated in Aracaju, deepening territorial inequalities.

Objective
To analyze the spatial and temporal trends of outpatient and inpatient care for headaches in Sergipe between 2012 and 2024.

Methods
An ecological time-series study was conducted using secondary data from the Hospital Information System (SIH/DATASUS) and Outpatient Information System (SIA/DATASUS) and population denominators from the 2022 Brazilian Demographic Census. Hospitalization and outpatient visit rates per 100,000 inhabitants were assessed using Prais-Winsten regression and the Mann-Kendall test. Territorial inequity was quantified using the Gini index of the distribution of hospitalizations and neurologists among the 75 municipalities of the state. A significance level of 5% ($p<0.05$) was adopted.

Results
Between 2012 and 2024, 427 hospitalizations for headache were recorded. The hospitalization rate increased significantly from 0.25 to 3.58 (+14.1%; p=0.002; Mann-Kendall p=0.005), with the post-pandemic period exceeding the pre-pandemic baseline level by 86.5%. Hospitalizations predominated among women (67.3%; female:male ratio of 2.06:1) and adults of working age aged 20 to 59 years (63.5%), with a peak in the 30 to 39 age group. The average length of stay was 7.5 days, the hospital mortality rate was 1.4% (6 deaths/427 hospitalizations) , and the total costs amounted to R$ 131,617.89 (average of R$ 309.69 per hospitalization). In parallel, specialized outpatient consultations did not show significant differences when analyzed over time (1.52 times; APC +2.6%; p = 0.14), and the number of neurologists increased from 55 to 77. Access proved markedly unequal: the Gini index reached 0.80 for hospitalizations (five municipalities concentrated 61.1% of cases) and 0.97 for neurologists, of whom 81.8% were located in the capital. Furthermore, 64 of the 75 municipalities did not have a neurologist.

Conclusion
Hospitalizations for headaches in Sergipe increased sharply during the study period, mainly among women of working age, while specialized outpatient capacity and the number of neurologists remained constant. This mismatch highlights inequity in access to neurological care. Strengthening primary care diagnosis and decentralizing specialized services can help meet growing population needs.

Keywords:
Migraine
Headache
Epidemiology
Health equity
Unified Health System

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Average length of hospital stay for migraine and other headache syndromes in the SUS by region of Brazil: a time-series analysis from 2015 to 2024

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Introduction
Headache is a very common symptom in healthcare settings, and may result from causes such as migraine, tension-type headache and infections. In Brazil, the prevalence of headache in the general population is estimated to range between 43% and 93%. In severe cases, headache is a relevant cause of emergency care and hospital admission, generating considerable demand on the Unified Health System (SUS). Given the regional inequalities in the provision of health services in Brazil, it is relevant to investigate whether the length of hospital stay for headache differs across regions of the country over time.

Objective
To analyze the average length of hospital stay for headache by region of Brazil in the SUS between 2015 and 2024.

Method
A descriptive epidemiological time-series study was conducted using data from the Hospital Information System of the SUS (SIH/SUS), made available by the Department of Informatics of the SUS (DATASUS). All hospital admissions recorded with a diagnosis of migraine and other cephalic pain syndromes were analyzed for the period 2015 to 2024, stratified by geographic region of Brazil.

Results
Over the 2015–2024 period, the national average length of hospital stay for migraine and other headache syndromes was 4.0 days. The North and Northeast regions recorded the highest averages for the period, at 4.8 and 4.9 days respectively, while the Midwest (2.9 days) and South (3.1 days) regions registered the lowest values. The Southeast region held an intermediate position, with a mean of 3.7 days. Regarding temporal trends, the North reached 5.7 days in 2020, the highest mean recorded in the entire period analyzed, and closed the series with an average of 4.7 days in 2024. The Northeast showed modest variation between 4.5 and 4.9 days throughout the series, with the exception of 2022 and 2023, which reached 5.2 and 5.6 days respectively. The Southeast demonstrated stability over the years, fluctuating between 3.4 and 3.9 days. The South region saw a reduction in mean days from 2015 to 2024, falling from 3.5 to 3.1 days. The Midwest recorded the largest cumulative reduction in the period, declining from 3.2 days in 2015 to 2.3 days in 2022, the lowest value recorded across the entire series.

Conclusion
The data reveal marked regional inequality in the length of hospital stay for headache in the SUS throughout the study period, with the North and Northeast regions presenting averages substantially higher than those of other regions. This disparity may reflect reduced access to specialized outpatient services in these regions, resulting in delayed and more complex hospitalizations. On the other hand, the downward trend in length of stay observed in the South and Midwest regions over the series suggests a possible improvement in care resolution in these areas. Taken together, these findings highlight the need to expand access to specialized headache care and treatment in regions with the longest lengths of stay.

Keywords:
Migraine
Headache
Brazil
Hospital stay
Epidemiological study

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Status migrainosus in Brazil: trends in hospitalizations and in-hospital case fatality in the Public Health System from 2020 to 2025

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Introduction
According to the International Classification of Headache Disorders (ICHD-3), status migrainosus is a neurological emergency defined by debilitating migraine attacks lasting more than 72 hours. Its pathophysiology remains poorly understood, and high-quality evidence-based treatments are limited, demanding considerable healthcare resources and hospitalizations. In Brazil, indicators suggest a strong relationship with sociodemographic aspects, showing a considerable annual increase in admissions between 2020 and 2025.

Objective
To analyze temporal trends in hospitalizations and in-hospital case fatality due to status migrainosus (ICD-10 G43.2) in Brazil from 2020 to 2025 using data from the Brazilian Unified Health System (SUS). It also aims to describe the sociodemographic profile and regional distribution, calculate case fatality, and investigate factors associated with the annual increase in admissions.

Methods
This ecological, retrospective time-series study used secondary data from the Hospital Information System (SIH/SUS) via DATASUS. We included all hospitalizations in Brazil between 2020 and 2025 with a primary diagnosis of status migrainosus (ICD-10 G43.2). Variables included the absolute number of hospitalizations, in-hospital deaths, geographic region, sex, and age group. Hospitalization rates per 100,000 inhabitants and overall case fatality rates were calculated. Temporal trends were assessed using quasi-Poisson regression to estimate the Annual Percent Change.

Results
Between 2020 and 2025, Brazil recorded 23,212 status migrainosus hospitalizations, with a cumulative rate of 1.83 admissions per 100,000 person-years and 313 in-hospital deaths, resulting in an overall case fatality rate of 1.35%. Admissions progressively increased from 3,399 in 2020 to 4,350 in 2025. Regionally, the Northeast had the highest admission volume (n=9,994) and cumulative rate (2.93/100,000), followed by the South (2.86/100,000). While the Northeast and South remained temporally stable, the North, Southeast, and Central-West showed a statistically significant increase in admissions. Females predominated (64.6%), showing higher hospitalization rates than males and a significant increase over the period. Admissions were primarily concentrated among adults aged 20-39 years, although the highest cumulative rate was observed in individuals aged 60 or older.

Conclusion
Status migrainosus exhibited a progressive increase in hospitalizations within the Brazilian public health system between 2020 and 2025, predominantly affecting women and working-age adults, with the Northeast region bearing the highest burden. These findings highlight regional disparities and the growing healthcare burden on the SUS, underscoring the urgent need for strengthened outpatient management, early intervention, and improved access to specialized neurological care.

Keywords:
Hospitalization
Epidemiology
Unified Health System
Status migrainosus
Neurological emergency

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Variations in ambient temperature and their relationship to the number of hospitalizations due to headaches in the state of Maranhão: a 10-year time series

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Introduction
Headaches affect people during the most productive phase of life, between the ages of 25 and 55, causing various direct and indirect impacts. Approximately 53% of individuals report needing to take time off from important activities, while 30% state that they have missed work or school at least once in the past three months. The association between headache and temperature variation is influenced by various physiological and environmental factors.

Objetive
To evaluate temperature index variations and their relationship with the number of hospitalizations over the past 10 years in Maranhão.

Methods
The study employed a quantitative research method, using a descriptive and cross-sectional analysis. Temperature data were collected from the National Institute of Meteorology (INMET) platform, and variables were extracted using DATASUS TABWIN based on the following descriptors: "outpatient care", "hospitalizations", "headache syndromes", "Maranhão" and "sex". The data were analyzed using SPSS Statistics (v.32). Categorical variables were described using absolute and relative frequencies, and numerical variables using the median and interquartile range (Q1–Q3). The chi-square test was used to compare categorical variables, and the Kruskal-Wallis test with Dunn's post hoc test was used for numerical variables, with a statistical significance level of $p<0.05$.

Results
Between 2015 and 2024, there were 6,522 hospitalizations, with a predominance of females (68.2%), and no statistically significant difference between the sexes ($p>0.05$). There was a progressive increase in hospitalizations between 2015 and 2019 (195 to 1,028 cases), a decrease in 2020 (615 cases), a new rise in 2021–2022, and a slight decline in 2023–2024. Temperature showed a significant difference across the years ($p<0.05$), ranging from 26.1 °C to 34.1 °C, as did the number of hospitalizations. The largest increases occurred between 2016 and 2018, while the largest decrease was recorded in 2020 (−40.7%).

Conclusion
A progressive increase in hospitalizations was observed throughout the time series, with a predominance of female patients and significant fluctuations after 2019. Furthermore, there were significant differences in temperature and the number of hospitalizations between the years evaluated, suggesting a possible influence of temporal and environmental factors on hospitalization patterns during the study period.

Keywords:
Headache
Pain
Hospitalization
Temperature

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The hospital cost of headache admissions: efficiency of public spending

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Introduction
The sustainability of SUS depends on optimizing resources in low-complexity pathologies. Hospital admission for headache, when not supported by a secondary diagnosis, represents an inefficient use of the tertiary network. Although most attacks are manageable on an outpatient basis, referral to the hospital level generates high operational costs, including accommodation, intravenous supplies, and staff maintenance. Analyzing the disparity between the billed value of Hospital Admission Authorizations (AIH) and the length of stay is fundamental to understanding the efficiency of public spending and proposing adjustments in flow management that favor decentralized care.

Objective
To analyze the average cost of hospitalizations for headache or migraine (G43/G44) in SUS, measuring the correlation between the total billed cost, the length of hospital stay, and the efficiency in utilizing financial resources by Brazilian region during the period from 2019 to 2023.

Methods
An observational and retrospective epidemiological study based on SIH/DATASUS microdata. The sample (n = 51,306) was processed via RStudio to consolidate the nominal values spent on the AIHs and the average length of stay. Data were stratified by Brazilian macro-regions and hospital size. Linear regression analysis was applied to verify the impact of the length of stay on the final billed value for each hospitalization, seeking to identify bottlenecks in the allocation of public funds for the hospital management of pain syndromes.

Results
The total accumulated cost over the five-year period was BRL 23,450,780.00, with an average cost per hospitalization of BRL 457.00. It was identified that 65% of the total amount spent is directly linked to the length of hospital stay, with a positive correlation ($r = 0.68$; $p < 0.001$) between days of hospitalization and billed cost. The North and Northeast regions presented the highest average cost per day, despite recording lower hospitalization volumes than the Southeast. The analysis demonstrated that spending efficiency is inversely proportional to the stay: hospitalizations of less than 3 days concentrate most of the fixed costs, while stays over 5 days disproportionately increase variable spending on supplies and support.

Conclusion
The results show that the cost of hospitalizations for headache is severely impacted by prolonged stays. The current AIH billing model, which links fixed costs to bed time, perpetuates the inefficiency of public spending in conditions that should have a rapid resolution. Reducing the hospital stay through early discharge protocols and optimized outpatient management could generate significant annual savings for SUS. It is imperative that managers review the financial transfer policy, prioritizing rapid diagnostic efficiency and discouraging bed occupancy by conditions that do not require intensive hospital support.

Keywords:
Headache
Hospitalization
Health care costs
Costs and cost analysis
Length of stay

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Migraine and mood disorders in Brazil before and after the COVID-19 pandemic: an ecological study with narrative review

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Introduction

Migraine affects approximately 1 in 10 people worldwide and is among the leading causes of disability. Its bidirectional association with mood disorders (MDs) is robust: 50-60% of patients present anxiety and/or depression (ICHD-3, 2018, A12.3 and A12.8). The COVID-19 pandemic imposed psychosocial stress, isolation, and disruption of care, factors recognized as being associated with worsening of migraine and increased depressive and anxiety symptoms. Investigating how these two groups of conditions behaved in Brazil in the pre- and post-pandemic period is relevant for healthcare planning.

Objective

To evaluate the variation in the number of migraine and mood disorder cases in the Brazilian population aged 15 to 69 years between the pre-pandemic (2016–2019) and post-pandemic (2022-2025) periods, exploring the regional correlation between both.

Methods

An ecological, descriptive, and analytical epidemiological study using secondary data aggregated by year, age group, and region. Periods 2016-2019 and 2022-2025 are compared. Percentage variations and the Pearson correlation between the increase in MDs and migraine across the five regions were calculated. This is complemented by a narrative literature review on the impact of the pandemic on these conditions.

Results

MDs increased by 28.1% (195,781 250,745) and migraine by 7.6% (25,383 27,315). The increase in migraine was concentrated in individuals over 40 (40-49: +16.8%; 50-59: +17.3%; 60-69: +18.6%), with a decline among adolescents (15-19: -7.7%). Regionally, MDs rose in all regions; North (+54.9%), Southeast (+41.3%), Northeast (+41.1%); migraine increased mainly in the North (+101.4%) and Central-West (+37.7%), remained stable in the Southeast, and declined in the South (-12.4%). The correlation was positive, but moderate and non-significant (r=0.52; p=0.37). The literature corroborates, in Kuwait, >50% of patients experienced worsening of migraine during the pandemic, with anxiety/depression in 79.5% and chronification in 10.3%; affective symptoms were independent predictors of worsening (OR 1.56). Post-COVID patients with migraine had higher rates of anxiety (20.6 vs. 7.4%) and depression (20.6 vs. 10.3%) than controls. In the Brazilian ELSA-Brasil cohort, however, symptoms did not increase globally, suggesting population heterogeneity.

Conclusion

In the post-pandemic period, Brazil recorded an increase in both migraine and MDs, more pronounced for MDs (+28.1%) and geographically concentrated in the North region. Although the regional correlation was only moderate and non-significant (r=0.52; p=0.37), limited by the ecological design and the small number of regions, the convergence of trends and the consistency of the literature support the hypothesis of interaction between psychological distress and migraine. These findings reinforce the need for systematic screening of affective comorbidities in migraine patients and for integrated health policies, with special attention to the most vulnerable regions in contexts of health crises.

Keywords:
Migraine
COVID-19
Ecological studies
Mood disorders

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Temporal and spatial analysis of headache prevalence in the state of Sergipe from 2014 to 2024

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Introduction

Headaches, particularly migraine, are among the leading causes of disability worldwide. When inadequately managed in primary care, they may progress to conditions requiring hospitalization, generating potentially avoidable costs and significant socioeconomic burden.

Objective

To analyze the epidemiological and temporal distribution and healthcare demand of headache hospitalizations in Sergipe between 2014 and 2024.

Methods

A cross-sectional, analytical, ecological time-series study using secondary data from SIH/SUS (TABNET/DATASUS). Hospital Admission Authorizations classified under ICD-10 codes G43 and G44 with municipality of residence in Sergipe were included, aggregated by Health Region. The following variables were analyzed: number of hospitalizations, average hospitalization cost per patient in each region, and average length of hospital stay in days. Temporal trends were assessed using simple linear regression and chi-square goodness-of-fit with expected frequencies weighted by the population proportion of each region. Prevalence rates were calculated per 100,000 inhabitants.

Results

A total of 402 hospitalizations were recorded, with a total expenditure of R$ 129,661.19. Annual state prevalence rates progressively increased from 0.59 in 2014 to 3.36 after ten years, representing a 474% growth over the series. The chi-square goodness-of-fit test confirmed a heterogeneous regional distribution (²=62.72; df=6; P<0.0001): Nossa Senhora do Socorro showed the greatest increase (+64.91%; residual=+5.05) and Itabaiana the greatest reduction (−55.28%; residual=−3.70) relative to what was expected based on the population proportion of each region. Mean annual prevalences were highest in Nossa Senhora do Socorro (2.65) and Aracaju (1.96). Significant upward trends were identified in Aracaju (R^2=0.55; P=0.009) and Itabaiana (R^2=0.40; P=0.036), although Itabaiana's absolute hospitalization volume remained below its expected share based on population size. The average cost per hospitalization was R$ 322.54 statewide, with Estância as the region with the highest unit cost (R$ 640.72). Regarding length of stay, residents of Nossa Senhora da Glória (13.3) had a mean daily length of stay 2.8 times greater than residents of Itabaiana (4.7).

Conclusion

The results suggest a progressive increase in headache hospitalizations in Sergipe, with the highest prevalence rate recorded in 2024 and a heterogeneous regional distribution across health regions. The burden in Nossa Senhora do Socorro, the high costs in Estância, and the prolonged length of stay in Nossa Senhora da Glória indicate differences in primary care demands among the regions.

Keywords:
Migraine
Headache
Hospitalization
Descriptive epidemiology
Health inequalities

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Temporal patterns of air pollution and hospitalizations for migraine and other headache syndromes in the metropolitan region of São Paulo (2021–2024)

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Introduction
Atmospheric pollution in the Metropolitan Region of São Paulo, particularly fine particulate matter (PM2.5), has been suggested as a potential trigger for migraine episodes. These particles are hypothesized to promote neuroinflammation and the activation of the trigeminovascular system, potentially contributing to acute headache episodes.

Objective
To describe temporal patterns between PM2.5 levels and the number of hospital admissions for migraines and other headache syndromes (ICD-10 G43 and G44) in the Metropolitan Region of São Paulo from 2021 to 2024.

Methods
A descriptive ecological study was conducted using annual hospitalization counts from the SUS Hospital Information System (SIH/SUS/DATASUS) and air quality reports from the Environmental Company of the State of São Paulo (CETESB) and IQAir indicators. Atmospheric data prioritized concentrations of PM2.5. As a descriptive analysis, causal inference cannot be established.

Results
A total of 1,760 hospitalizations for migraines and headache syndromes were recorded in the analyzed period. The annual distribution of cases in the capital was: 318 (2021), 384 (2022), 367 (2023), and 383 (2024). Air quality indicators fluctuated, with PM2.5 annual averages of 16 µg/m³ (2021), 14 µg/m³ (2022), 15 µg/m³ (2023), and 18 µg/m³ (2024). The number of days exceeding daily standards was 9, 9, 5, and 34, respectively. According to IQAir, São Paulo exceeded WHO guidelines by 2 to 3 times in 2021 (index 14.8), 2022 (13.5), and 2023 (14.3), while the 2024 index (15.9) reached the 3-to-5-times threshold. Admissions remained elevated in years with high hospitalization burden, while the lowest volume occurred in 2021 during pandemic-related mobility restrictions.

Conclusion
These findings demonstrate a temporal coexistence between elevated PM2.5 levels and high hospitalization rates for migraine and headache syndromes in the Metropolitan Region of São Paulo. The results suggest a possible association and indicate the need for future analytical studies to further investigate these environmental determinants.

Keywords:
Migraine disorders
Air pollution
Particulate matter
Ecological studies

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Pediatric and adolescent hospitalizations for primary headaches in the Brazilian Public Health System

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Introduction
Primary headaches in children and adolescents are frequently underdiagnosed and undertreated. When a pediatric patient requires hospitalization for a benign primary headache, it usually indicates a severe failure in outpatient prophylaxis, school-level health education, or an intractable crisis, such as status migrainosus. Hospitalizing a child or adolescent carries high psychosocial costs, causes school absenteeism, and exposes the pediatric patient to nosocomial risks. Understanding the epidemiological profile of this specific demographic within the Brazilian Public Health System (SUS) is crucial for developing targeted pediatric triage protocols and preventive strategies.

Objective
To analyze the epidemiological profile, gender distribution, and the average length of hospital stay of pediatric and adolescent patients (0 to 19 years old) admitted for primary headache or migraine (ICD-10 G43 and G44) in the SUS between 2019 and 2023.

Methods
A national, retrospective, and descriptive epidemiological study was conducted using official microdata from the Hospital Information System (SIH/DATASUS). The data, encompassing the 2019-2023 period, were processed in RStudio. From the total universe of headache admissions, the cohort was filtered to include only patients aged 0 to 19 years. The analyzed variables included absolute admission volume, gender prevalence (to observe the onset of hormonal disparities), admission character (elective vs. urgency), and mean length of stay in days.

Results
Out of the 51,306 total national admissions in the five-year period, 4,874 records (9.5%) corresponded to the pediatric and adolescent population (0-19 years). Within this group, a clear female predominance was already evident, representing 68.2% of the cases, a disparity strongly driven by the 12-19 age bracket, coinciding with the onset of hormonal triggers. The average length of hospital stay for this young cohort was 3.2 days. Alarmingly, 97.8% of these pediatric admissions occurred on an urgent/emergency basis, with almost zero elective admissions for investigation.

Conclusion
The hospitalization of nearly 5,000 children and adolescents for inherently benign primary headaches highlights a critical gap in pediatric outpatient neurology. The massive percentage of emergency admissions indicates that the emergency room is acting as the primary point of care for pediatric pain, rather than the basic health units. The 3.2-day average stay represents a significant burden of school absenteeism and psychosocial stress. Strengthening pediatric primary care, training pediatricians in early migraine prophylaxis, and implementing school-based pain education are essential steps to intercept these crises and prevent early, unnecessary hospitalizations.

Keywords:
Length of stay
Pediatric neurology
Primary headache

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Epidemiological profile of hospitalizations due to migraine and other headache syndromes in northeastern Brazil between 2021 and 2026

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Introduction
Migraine and other headache syndromes are among the most prevalent neurological disorders worldwide and are associated with significant disability and reduced quality of life. Despite their high prevalence, regional epidemiological studies addressing hospitalizations related to these conditions remain limited in Brazil.

Objective
To describe the epidemiological profile of hospitalizations due to migraine and other headache syndromes in Northeastern Brazil between January 2021 and March 2026.

Methods
This was a retrospective, cross-sectional, quantitative epidemiological study based on secondary data obtained from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS), available through DATASUS. The category "Migraine and Other Headache Syndromes" from the ICD-10 Morbidity List was selected. The analyzed variables included hospitalizations, deaths, mortality rate, sex, and age group. Data were restricted to residents of Northeastern Brazil between January 2021 and March 2026 and were analyzed using descriptive statistics.

Results
A total of 17,387 hospitalizations due to migraine and other headache syndromes were recorded during the study period. Females accounted for most hospitalizations, with 11,254 cases (64.7%), while males represented 6,133 cases (35.3%). The highest frequency of hospitalizations occurred among individuals aged 30–39 years (3,084 cases; 17.7%), followed by those aged 20–29 years (2,887 cases; 16.6%) and 40–49 years (2,863 cases; 16.5%). A total of 317 deaths were reported, including 177 among females (55.8%) and 140 among males (44.2%). The overall mortality rate was 1.82, with a higher rate among males (2.28) compared with females (1.57). Although hospitalizations predominated among young adults, deaths were more frequent in older age groups, particularly among individuals aged 80 years and older (60 deaths) and those aged 60–69 years (57 deaths).

Conclusion
Hospitalizations due to migraine and other headache syndromes in Northeastern Brazil predominantly affected women and young adults, especially those aged 30–39 years. However, deaths were concentrated among older adults, suggesting increased vulnerability and severity in this population. Furthermore, mortality rates were higher among men despite their lower hospitalization rates. These findings highlight the importance of strengthening preventive strategies, early diagnosis, and appropriate management of headache disorders, particularly among high-risk populations.

Keywords:
Migraine
Hospitalization
Epidemiology
Headache disorders

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Epidemiology of migraine, tension-type headache, and other headaches in a Brazilian cohort

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Introduction
Migraine and tension-type headache (TTH) are the most common primary headache disorders and constitute a major public health burden worldwide. Although TTH is frequently reported as the most prevalent subtype, population-based data consistently show that migraine accounts for the greatest, particularly due to its higher pain intensity and tendency toward chronification.

Objective
To evaluate the prevalence, pain intensity, and attack frequency of migraine and TTH in a prospective birth cohort followed into adulthood.

Methods
This population-based study analyzed data from a longitudinal birth cohort comprising 2,474 participants. Diagnoses were established according to the International Classification of Headache Disorders, 3rd edition (ICHD-3) criteria. Outcomes included the prevalence of headache subtypes, sociodemographic characteristics, mean pain intensity assessed via the Visual Analog Scale (VAS, 0–10), and headache frequency (days per month).

Results
The overall prevalence of any headache was 66.8%. Migraine was the most common primary headache disorder, affecting 47.5% (n=1,173) of the cohort, compared with TTH in 14.1% (n=349) and other headaches in 5.1% (n=127). The migraine group had a mean age of 32.3 (SD=7.5) years and exhibited a marked female predominance (70.9%), contrasting with the TTH (40.1% female; mean age 31.4, SD=7.7) and headache-free (33.8% female; mean age 33.7, SD=6.9) groups. Furthermore, a first-degree family history of headache was reported by 49.7% of migraineurs. Regarding clinical presentation, throbbing pain was the predominant feature in migraine (67.6%), whereas pressure-like pain was most frequent in TTH (43.3%). Mean VAS pain intensity was 6.2 (SD=2.9), substantially higher than for TTH (3.7, SD=1.8) and other headaches (4.2, SD=2.2). Chronic migraine (≥15 headache days/month) was present in 18.5% of migraineurs—comprising 11.4% with >14 headache days but not daily, and 7.1% with daily headaches. Among TTH sufferers, 7.7% met criteria for chronic TTH (3.7% and 4.0%, respectively).

Conclusion
In this large prospective cohort, migraine was the most prevalent primary headache disorder. The strong female predominance, elevated chronification rate, and higher pain intensity among migraineurs, compared with TTH, reinforce the disproportionate burden of this condition and support the need for targeted public health strategies.

Keywords:
Migraine disorders
Epidemiology
Tension-type headache

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Association between birth-related factors and tension-type headache in adulthood: a prospective birth cohort study

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Introduction
Tension-type headache (TTH) is a highly prevalent primary headache disorder. While perinatal factors are recognized predictors for various adult neurological conditions, their specific influence on the longitudinal trajectory of TTH requires further investigation.

Objective
To describe the prevalence of TTH and investigate its association with early-life birth-related variables in a prospective longitudinal birth cohort.

Methods
This population-based study evaluated 2,468 participants followed from birth to adulthood. TTH diagnosis was established according to the International Classification of Headache Disorders, 3rd edition (ICHD-3) criteria. Evaluated independent birth-related variables included maternal and paternal age, number of prenatal visits, maternal smoking during pregnancy, prematurity, birthweight classification, Kramer index, mode of birth, and sex. Associations were analyzed using a multivariable binary logistic regression with a backward stepwise approach (likelihood ratio method).

Results
The prevalence of TTH in adulthood was 14.1% (n=349). The TTH group had a mean age of 31.4 (SD=7.7) years and comprised 40.1% females. In the final multivariable regression model, female sex was the only variable significantly associated with the outcome, presenting a lower likelihood of TTH diagnosis compared to males (OR=0.509; 95% CI: 0.397–0.653; p<0.001). Maternal smoking during pregnancy showed a non-significant inverse trend (OR=0.746; 95% CI: 0.554–1.005; p=0.054). Notably, the overall model demonstrated low explanatory power (Nagelkerke R^2=0.027) and a sensitivity of 0.0%, reflecting a limited capacity to accurately predict TTH cases based on the assessed early-life variables.

Conclusion
Early-life and birth-related factors evaluated in this cohort demonstrated limited association with the occurrence of TTH in adulthood. Although female sex was inversely associated with TTH diagnosis, the very low predictive capacity of the perinatal model indicates that these intrauterine conditions do not substantially contribute to the pathogenesis of tension-type headache later in life.

Keywords:
Tension-type headache
Prenatal exposure delayed effects
Cohort studies

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Epidemiological profile of hospitalizations for headache in Brazil: the impact on women of childbearing age

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Introduction
Headache, particularly migraine, is a highly prevalent neurological condition that disproportionately affects the female population due to hormonal fluctuations and psychosocial factors. In women, the chronicity and intensity of attacks significantly impact quality of life and productivity. When these crises become refractory or acute, they require urgent medical attention, resulting in hospital admissions that strain the public healthcare system, especially during the reproductive years.

Objective
To analyze the epidemiological profile of hospitalizations for headache among women in Brazil, highlighting the impact on the population of childbearing age, from January 2020 to March 2026.

Methods
This is a descriptive, retrospective epidemiological study using secondary data from the Hospital Information System (SIH/SUS), obtained through the DATASUS/TABNET platform. Hospitalizations of female patients occurred between January 2020 and March 2026 were selected, using the disease category "Migraine and other headache syndromes" (corresponding to ICD-10 codes G43 and G44). The analyzed variable was age group. Data were organized and analyzed using descriptive statistics.

Results
During the analyzed period, 45,135 hospital admissions for headache in women were recorded in Brazil. The population of childbearing age (defined between 15 and 49 years old) accounted for 28,223 of these hospitalizations, representing 62.5% of all cases. When evaluating age groups in isolation, the peak of admissions was concentrated in the 30 to 39 age group with 8,633 cases (19.1%), followed by 20 to 29 years old with 8,403 cases (18.6%), and 40 to 49 years old with 8,071 cases (17.9%). Conversely, age extremes showed the lowest frequencies of hospitalization (infants under 1 year old with 51 cases and elderly women over 80 years old with 1,135 cases).

Conclusion
The profile of hospitalizations for headache in Brazil demonstrates that the disease heavily burdens the healthcare system within the young and adult female population. These findings highlight the imperative need to strengthen public health policies focused on women's health in primary care, with emphasis on specific care pathways for hormonal headaches, health education to prevent self-medication, and access to effective preventive treatments, aiming to reduce hospital admission rates.

Keywords:
Migraine disorders
Headache
Epidemiology
Women's health

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The hospital cost of primary pain: a BRL 27.9 million analysis of headache admissions in the Brazilian Public Health System

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Introduction
Primary headache syndromes, such as migraines and tension-type headaches, are essentially outpatient clinical conditions. However, failures in the primary care network, the shortage of specialist consultations, and the difficulty in accessing prophylactic medications continue to drive the acute exacerbation of these conditions. Faced with intractable pain and home treatment failure, patients resort to emergency departments, resulting in a massive volume of hospitalizations for intravenous rescue analgesia. Understanding the true financial impact of this influx is crucial to evaluate the allocative efficiency of resources in the Brazilian Public Health System (SUS).

Objective
To measure the total financial cost and the profile of hospital expenditures associated with admissions for headache and migraine (ICD-10 G43 and G44) within the SUS during the five-year period from 2019 to 2023.

Methods
An epidemiological, retrospective, and descriptive national-based study was conducted. Raw microdata were extracted from the Hospital Information System (SIH/DATASUS) and processed in RStudio using the microdatasus package. All Hospital Admission Authorizations (AIHs) featuring ICD-10 codes G43 (Migraine) or G44 (Other headache syndromes) as the primary billing diagnosis were filtered. The primary economic outcome variable evaluated was the total amount billed by healthcare institutions.

Results
The analysis consolidated a universe of 51,214 admissions nationwide over the evaluated five years. The total gross financial impact generated by this patient contingent reached the exact amount of BRL 27,987,588.71 spent by public coffers. The average cost per individual admission was approximately BRL 546.48. This billing was mostly concentrated on the fixed costs of hospital hotel services and general clinical support, since the standard management of these crises predominantly involves the infusion of analgesics, corticosteroids, and fluid therapy, without the routine association of surgical procedures or high-complexity technology.

Conclusion
The expenditure of nearly 28 million reais on hospitalizing inherently benign and controllable pathologies exposes a severe inefficiency in the SUS healthcare network. This amount represents a high opportunity cost for public health: the resources currently consumed by hospital daily rates at the tertiary level would be applied infinitely more efficiently at the primary level. Investing in the decentralization of neurological care, training family health teams to manage chronic headaches, and facilitating access to modern preventive treatments has the potential to mitigate patient suffering, decongest emergency rooms, and save millions in resources currently sustaining preventable hospitalizations.

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Epidemiological profile of hospitalizations for migraine and other headache syndromes in women in Brazil: a national analysis from 2020 to 2025

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Introduction
Migraine and other headache syndromes represent a significant public health concern due to their high prevalence, disability, and healthcare-related costs. These conditions predominantly affect women, especially during the reproductive years, owing to hormonal influences. After puberty, migraine becomes more frequent among females and is most commonly observed between 30 and 40 years of age. The use of combined hormonal contraceptives may influence its occurrence, whereas pregnancy is often associated with symptom improvement. This scenario highlights the importance of studies investigating hospitalizations related to these conditions among women.

Objective
To analyze the epidemiological profile of hospitalizations for migraine and other headache syndromes among Brazilian women between 2020 and 2025.

Methods
This observational, retrospective, quantitative study was conducted using secondary data obtained from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS), available through DATASUS. Hospitalizations for migraine and other headache syndromes (ICD-10 codes G43–G44) recorded in Brazil between January 2020 and December 2025 were analyzed. The variables evaluated included sex, age group, geographic region, and hospitalization costs. Data were subjected to descriptive statistical analysis and presented as absolute and relative frequencies.

Results
During the study period, 64,519 hospitalizations for migraine and other headache syndromes were recorded in Brazil. Of these, 43,020 (66.7%) occurred among women and 21,499 (33.3%) among men, demonstrating a marked female predominance. Among women, the age groups of 30–39 years (8,216 hospitalizations), 20–29 years (7,997), and 40–49 years (7,672) accounted for the highest numbers of hospitalizations. Regarding geographic distribution among the female population, the Southeast region recorded the highest number of hospitalizations (13,772), followed by the Northeast (12,296) and South (10,159) regions. An increasing trend in hospitalizations was observed throughout the study period, rising from 8,688 admissions in 2020 to 12,614 in 2025, corresponding to a 45.2% increase. The total hospitalization cost was BRL 36,386,585.77, of which BRL 22,556,171.07 (62.0%) were related to female hospitalizations.

Conclusion
Hospitalizations for migraine and other headache syndromes showed a marked predominance among women. In addition to the high frequency of hospital admissions, an increase in hospitalization rates over the analyzed years and a substantial economic burden on the public healthcare system were observed. These findings highlight the need for strategies focused on early diagnosis, appropriate treatment, and continuous follow-up of these conditions, with special attention to the female population, which accounted for the largest proportion of hospitalizations and healthcare costs related to these diseases.

Keywords:
Migraine disorders
Hospitalization
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Epidemiological profile of headache hospitalizations in Brazil (2010–2025): a population-adjusted analysis of risk groups and temporal trends

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Introduction
Headaches are among the most prevalent neurological conditions and a leading cause of global disability. In Brazil, comprehensive epidemiological data on hospitalizations are scarce, which limits health policy planning. Standardizing data by population size is essential to reveal hidden disparities and identify high-risk groups that absolute numbers may obscure.

Objective
To characterize the epidemiological profile of headache hospitalizations in Brazil between 2010 and 2025, identifying high-risk groups and temporal trends through population-weighted analysis.

Methods
This is a descriptive-analytical ecological study using data from the SUS Hospital Information System (SIH/SUS) for headache diagnoses (ICD-10: G43–G44). Rates were standardized per 100,000 inhabitants using 2022 Census data, stratified by age, sex, race/color, and region. Statistical analysis included Incidence Ratios (IR), Chi-square tests for proportional distribution, linear regression for trends, and joinpoint analysis to identify inflection points.

Results
A total of 145,113 hospitalizations were recorded, with a 160.3% increase in annual volume between 2010 and 2025. Joinpoint analysis identified 2020 as an inflection point, with growth acceleration (980.9 cases/year) post-2020, potentially linked to the COVID-19 pandemic. Females faced an 85% higher risk than males (IR=1.31). Regarding race/color, the Asian-descendant population presented the highest risk (IR=4.36), while Black (IR=0.32) and Indigenous (IR=0.15) populations were significantly underrepresented, suggesting structural access barriers. Regionally, South region had the highest rate (IR=1.75). Age distribution was bimodal, peaking in young adults (20–49 years) and remaining high among the elderly (≥70 years).

Conclusion
Population-weighted analysis revealed critical disparities invisible in absolute counts, notably the high risk for the Asian-descendant group and potential inequities for Black and Indigenous populations. The significant growth in hospitalizations, accelerated by the pandemic, underscores the need for strengthening primary care, expanding specialized neurology services, and implementing equitable health policies to reduce avoidable hospitalizations.

Keywords:
Headache
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Epidemiological analysis of hospitalizations due to migraine and other headaches in the state of Amazonas

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Introduction
Migraine stands out as one of the most prevalent neurological diseases in the world, predominantly affecting individuals of working age and occurring more frequently in women, having a significant impact on quality of life, work productivity, and the use of health services. Therefore, it is important to investigate the behavior of hospitalizations for migraine and other headaches in the state of Amazonas, considering its population and regional characteristics.

Objective
To analyze the epidemiological profile of hospitalizations for migraine and other headache syndromes in the state of Amazonas, between January 2021 and March 2026.

Methods
This is an ecological, descriptive, and retrospective study based on hospital admission data collected from the Brazilian Unified Health System's Hospital Information System (SIH/SUS) via the DATASUS TABNET platform, using the parameters of sex, race/color, and age group with the ICD-10 filter of "migraine and other headache syndromes", considering the period from January 2021 to March 2026.

Results
In the state of Amazonas, 614 hospitalizations for migraine and other headache syndromes were recorded. Regarding sex, a higher prevalence was observed in females, corresponding to 408 cases (66.4%), while males accounted for 206 hospitalizations (33.6%). As for the age distribution, a higher frequency of hospitalizations was observed among young adults and middle-aged individuals. The 30-39 age group had the highest number of records, with 137 hospitalizations (22.3%), followed by the 20-29 age group, with 131 cases (21.3%), and the 40-49 age group, with 100 hospitalizations (16.3%). Regarding the variable race/color, a predominance of the mixed-race population was observed, representing 519 hospitalizations (84.5%). Indigenous people accounted for 32 cases (5.2%), while people of yellow race/color had 13 hospitalizations (2.1%), whites 12 cases (2.0%) and blacks 5 records (0.8%).

Conclusion
This study analyzed the epidemiological profile of hospitalizations for migraine and other headache syndromes in the state of Amazonas, revealing a higher prevalence in females, particularly among young adults aged 20 to 39 years. A predominance of hospitalizations was also observed in the self-declared mixed-race population, reflecting the predominant demographic profile of the state. The findings reinforce the idea that headaches, especially migraines, represent a significant public health problem due to their potential for disability and impact on quality of life and the demand for hospital services. Furthermore, the concentration of cases in economically active individuals highlights possible social and economic repercussions related to reduced productivity and increased use of healthcare services.

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Headache
Epidemiology
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Female predominance in migraine-related hospitalizations in Brazil: a national epidemiological analysis between 2014 and 2025

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Introduction
Migraine is one of the most prevalent neurological disorders worldwide and is associated with substantial functional impairment and reduced quality of life. In addition to its clinical burden, migraine represents an important public health issue due to its impact on hospitalizations and productivity loss among affected individuals.

Objective
To analyze the epidemiological profile of hospitalizations for migraine and other headache syndromes in Brazil between 2014 and 2025, with emphasis on sex distribution.

Methods
This is a retrospective, descriptive, ecological epidemiological study based on secondary data obtained from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS), available through the DATASUS platform. Hospitalizations related to migraine and other headache syndromes in Brazil between 2014 and 2025 were analyzed according to sex and year of occurrence. Data were organized and quantitatively analyzed using absolute and relative frequencies of hospital admissions.

Results
Between 2014 and 2024, a total of 108,259 hospitalizations for migraine and other headache syndromes were recorded in Brazil. A higher frequency of hospitalizations was observed among females, accounting for 71,512 cases (66.1%), whereas males represented 36,747 hospitalizations (33.9%). The highest number of hospital admissions occurred in 2019, with 12,120 recorded cases, followed by a reduction in 2020, a period associated with the COVID-19 pandemic. In subsequent years, hospitalizations progressively increased again, while female predominance remained consistent throughout the entire historical series analyzed.

Conclusion
Migraine exerts a significant epidemiological and functional burden, particularly among the economically active population, negatively affecting quality of life, productivity, and healthcare demand. In the present study, a marked predominance of hospitalizations among females was observed throughout the analyzed period, a finding widely supported by the literature. Scientific evidence suggests that this sex disparity may be associated with hormonal factors, neurobiological differences, inflammatory pathways, and genetic mechanisms involved in migraine pathophysiology. Furthermore, occupational factors such as stress, sleep deprivation, irregular work schedules, and shift work appear to contribute to the onset and worsening of migraine attacks, particularly among women. These findings reinforce the need for more individualized preventive and therapeutic strategies, as well as the expansion of public health policies focused on early diagnosis and appropriate migraine management, considering sex-related biological and occupational factors.

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Migraine disorders
Epidemiology
Women's health
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Migraine hospitalization rates in Brazil compared to selected neurological conditions: an epidemiological analysis of the last 10 years (2016–2025)

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Introduction
Migraine is a neurological disorder characterized by throbbing and recurring headaches that affects approximately 15.2% of Brazilians. It is predominantly managed through outpatient follow-up, but in severe or prolonged cases, hospitalization may be necessary. A comparative analysis of migraine hospitalization rates allows for the identification of epidemiological patterns and provides an understanding of the relationship between outpatient management and hospital utilization.

Objective
To analyze regional trends and the epidemiological profile of hospitalizations due to migraine compared to stroke and epilepsy in Brazil from 2016 to 2025.

Methods
This is an ecological, descriptive, and retrospective study conducted using secondary data extracted from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS) and made available by the Department of Informatics of the Unified Health System (DATASUS). Records for migraine (ICD-10: G43), stroke (ICD-10: I60–I69), and epilepsy (ICD-10: G40) were analyzed over a 10-year period (2016–2025) in Brazil. The variables analyzed included hospitalization rates across conditions, proportion of hospitalizations, and mean length of stay compared across Brazilian regions.

Results
A total of 105,704 migraine hospitalizations were recorded, accounting for 4.39% of selected neurological admissions, with a national rate of 5.05/100,000 inhabitants, significantly lower than epilepsy (27.89) and stroke (82.25). Regional disparities were marked, with the South presenting the highest rate (9.00/100,000), followed by the Northeast (5.51), North (4.62), Centro-Oeste (3.76), and Southeast (3.72), likely reflecting differences in diagnostic infrastructure rather than true disease burden. The mean length of stay for migraine was 3.96 days, shorter than epilepsy (6.12) and stroke (7.34). Notable regional variation persisted, as the Northeast recorded the longest stay (4.90 days) despite an intermediate admission rate, suggesting delayed presentation or limited access to abortive therapies, while the South combined its highest rate with the shortest stay (3.11 days), indicating efficient in-hospital management. Total migraine-attributable hospital days reached 418,550, compared to 3,570,559 for epilepsy and 12,617,726 for stroke.

Conclusion
Despite lower hospitalization rates than stroke and epilepsy, migraine remains an important cause of hospital utilization in Brazil. The regional disparities identified suggest differences in healthcare access and disease management, reinforcing the need for stronger preventive strategies, optimized outpatient care, and regionally tailored interventions to reduce potentially avoidable hospitalizations.

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Migraine disorders
Hospitalization
Stroke
Epilepsy
Health inequalities

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Epidemiological profile of hospitalizations for headache associated with hypertensive diseases in northeast Brazil between 2019 and 2024

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Introduction
Headache is a frequent neurological manifestation and an important cause of hospital visits and admissions. Besides primary forms, it can be associated with hypertensive diseases, especially uncontrolled blood pressure, increasing the risk of neurological and cardiovascular complications. In Northeast Brazil, demographic and epidemiological factors related to hypertension control influence the profile of hospitalizations due to headache.

Objective
To analyze the temporal trend and epidemiological profile of hospitalizations due to headache associated with hypertensive diseases in Northeast Brazil between 2019 and 2024.

Methods
Epidemiological, descriptive, and quantitative study based on data from the Hospital Information System (SIH/SUS). Hospitalizations for "Migraine and other headache syndromes," "Essential (primary) hypertension," and "Other hypertensive diseases" (ICD-10) registered in the Northeast region of Brazil between 2019 and 2024 were included. The variables analyzed were year of care, region, sex, age group, and race/ethnicity. The data were subjected to quantitative descriptive analysis to characterize the sociodemographic distribution and frequency of hospitalizations.

Results
Between 2019 and 2024, there were 418,570 hospitalizations in Brazil due to migraine, headache syndromes, and hypertensive diseases, showing a decreasing trend. In 2019, there were 78,515 cases, whereas in 2024, the number reached 63,942, with a peak in 2019. A reduction was observed between 2020 and 2021, with 70,559 and 65,490 records, respectively, followed by a decline in subsequent years. Essential hypertension accounted for 58.0% of cases, other hypertensive diseases 26.9%, and migraine 15.1%. Regional analysis revealed that 35.83% of hospitalizations occurred in the Northeast, 31.19% in the Southeast, and 14.74% in the South. Females predominated, accounting for 58.3% of cases, with higher frequencies in migraine (65.9%). Concerning age, the highest concentration occurred among individuals aged 60 to 69 years (20.4%), followed by 70 to 79 (18.0%). Migraine predominated among younger adults, especially those aged 30 to 39 (17.9%). Regarding race/ethnicity, mixed-race ("pardos") predominated (48.81%), followed by White (27.59%), Black (5.24%), Asian (2.94%), and Indigenous (0.17%). Records lacking ethno-racial info totaled 15.22%. As for mortality, there were 14,834 deaths, decreasing from 2,752 in 2019 to 2,234 in 2024, a 0.81-fold decrease.

Conclusion
The findings showed more hospitalizations in the Northeast, mainly among females and brown individuals. Headache crises mostly affected young adults, while hypertensive diseases predominated in the elderly. The results highlight the need for public policies on headache management and hypertension control. The high rate of missing race/ethnicity data also indicates the need for more reliable hospital reporting.

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Hypertension
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Temporal and seasonal patterns of public expenditures on headache-related hospitalizations: a population-based analysis

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Introduction
Financial management within the Brazilian Unified Health System (SUS) requires predictability. Unlike infectious diseases, which present well-defined seasonal peaks, headache disorders are often perceived as a constant and linear healthcare demand. However, this assumption of stability may conceal relevant financial fluctuations driven by periods of increased pressure on emergency care networks, such as holiday seasons, seasonal transitions, or economic downturns that may compromise access to medications. Understanding whether a seasonal pattern exists in the costs of headache-related hospitalizations (ICD-10: G43–G44) is essential for state and municipal health managers to establish more dynamic and efficient budget planning throughout the fiscal year.

Objective
To investigate the presence of significant seasonality in hospital expenditures and hospitalization volume related to headache disorders within the SUS from 2019 to 2023, comparing monthly costs and variations in average hospital length of stay throughout the twelve months of the year.

Methods
This retrospective observational study was based on microdata from SIH/DATASUS. The sample (n=51,306) was stratified by monthly reporting periods, totaling 60 temporal observation points. Time-series decomposition methods (trend and seasonality component analysis) were performed using RStudio software. The analyzed variables included total billed cost, absolute number of hospitalizations, and average length of stay. Autocorrelation function (ACF) tests were applied to determine whether public expenditures followed a repetitive annual cycle.

Results
The time-series analysis demonstrated remarkable stability, with no statistically significant seasonality identified in expenditures ($p>0.05$). Mean monthly costs ranged from BRL 380,000.00 to BRL 410,000.00, without peaks consistently associated with specific months. The findings suggest that financial costs were primarily determined by hospitalization volume — directly influenced by the COVID-19 pandemic in 2020 — rather than by climatic or seasonal factors. A slight increase in costs was observed in hospitalizations billed during December and January (approximately 8% above the annual average), potentially related to reduced elective bed availability and increased emergency department burden during the end-of-year holiday period.

Conclusion
The absence of expenditure seasonality suggests that hospital demand for headache disorders within the SUS represents a persistent epidemiological phenomenon, largely unaffected by predictable annual cycles. This pattern may facilitate budget planning by enabling healthcare managers to adopt stable expenditure targets. However, financial costs remain elevated due to the sustained rate of hospitalizations, reinforcing the importance of strengthening outpatient management and primary healthcare strategies to reduce avoidable hospital admissions.

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Health expenditures

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Headache-related hospitalizations among adolescents in the Brazilian public health system: sex differences across pubertal age groups

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Introduction
Headache is a leading cause of disability during adolescence. While prepubertal prevalence is comparable between sexes, a marked female predominance in primary headaches emerges after menarche. Fluctuations in ovarian steroids—particularly estrogen—are thought to modulate trigeminovascular system activation. In Brazil, epidemiological data on headache presentations requiring hospitalization among adolescents remain scarce.

Objective
To analyze the epidemiological profile of hospitalizations due to migraine and other headache syndromes among adolescents in the Brazilian Unified Health System (SUS) from 2015 to 2025, with emphasis on sex-related differences across pubertal age groups.

Methods
A descriptive ecological study was conducted using secondary data from the Hospital Information System (SIH/SUS) via DATASUS/TabNet. Hospitalizations coded under the ICD-10 category "Migraine and Other Headache Syndromes" were analyzed for adolescents aged 10–14 and 15–19 years across all Brazilian regions from 2015 to 2025. Variables included sex, age group, geographic distribution, length of hospital stay, hospitalization costs, and in-hospital mortality. A chi-square test was used to compare sex distribution between age groups, with a significance level of 5%.

Results
A total of 469 hospitalizations were recorded: 314 (66.9%) in females and 155 (33.1%) in males (female-to-male ratio: 2.02:1). In the 10–14 age group, the female-to-male ratio was 1.63:1 (130 vs. 80), rising to 2.45:1 in the 15–19 age group (184 vs. 75). Female hospitalizations increased by 41.5% between age groups, whereas male admissions decreased by 6.3%. The difference in the female-to-male ratio between age groups was statistically significant (^{2} = 4.38, df = 1, p = 0.036). The Southeast region accounted for 41.4% of female hospitalizations, followed by the Northeast (30.6%). The mean length of hospital stay among females was 3.9 days, with no in-hospital deaths recorded.

Conclusion
The progressive increase in the female-to-male hospitalization ratio across adolescent age groups was statistically significant and demonstrates an epidemiological pattern consistent with the sex differences observed in primary headache disorders after puberty. Although hormonal levels were not directly measured, these findings align with current pathophysiological models that implicate estrogen-related modulation of trigeminovascular susceptibility. As limitations, this study relies on administrative data, which are subject to underreporting and lack clinical diagnostic confirmation. These findings underscore the need for sex- and age-sensitive strategies in the prevention and management of headache disorders among Brazilian adolescents.

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Adolescent
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Temporal analysis and care demand of female hospitalizations due to headache crises in the state of Sergipe (2019-2025)

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Introduction
Headaches are among the most prevalent neurological disorders globally, associated with significant functional disability, reduced quality of life and high socioeconomic impact. They present related etiologies such as stress, work overload and analgesic overuse, predominantly affecting women of childbearing age. This scenario is aggravated by underdiagnosis and the consequent chronic pain development.

Objective
To analyze the epidemiological profile of hospitalizations for headache in women in the state of Sergipe between 2019 and 2025.

Methods
Epidemiological, retrospective and descriptive, time series study, based on secondary data from DATASUS (2019-2025) on hospitalizations for headache (ICD-10 G43 and G44) in women in Sergipe. The variables were evaluated: year of hospitalization, nature of care, age group and total amount spent. Statistical analysis was performed using the Chi-square, linear correlation and paired Wilcoxon tests, adopting a significance level of $p < 0.05$.

Results
In the period from 2019 to 2025, the Northeast region recorded 14,532 hospitalizations for headache in women, of which the state of Sergipe accounted for 1.42% (n=207). Comparison of data from Sergipe with the male group (n=117) revealed a statistically significant association between sex and the volume of hospitalizations (X^2=18.927; p<0.0001), alongside a progressive and consistent increase in female cases throughout the historical series studied (r=0.882; p=0.0086), with a peak prevalence rate of 3.95 in 2024, which occurred proportionally and parallel between both sexes (X^2=2.810; p=0.8323). Regarding the nature of care, there was homogeneity between genders (X^2=1.222; p=0.2690), with 206 urgent cases and 1 elective case. In relation to the age profile, the range of 30 to 39 years was the most affected in women (n=48, prevalence 251.78) due to the statistically significant chronological distribution between the sexes (X^2=.453; p=0.0397). Regarding care demand, 68.87% of the amount used comes from the female group, with an mean cost per hospitalization (R$ 325.90) higher than that of men (R$ 260.55) (p=0.0156).

Conclusion
Hospitalizations for headaches in Sergipe present a real and linear temporal escalation in females, with marked selectivity for fertile and productive age (30 to 39 years). Women are consolidated as the main group facing the public system's headache care demands, generating higher and more persistent hospital costs. There is an urgent need for public policies aimed at outpatient and preventive management of headaches aimed at women's health, with the aim of reducing the care burden and economic impact in the state of Sergipe.

Keywords:
Headache
Epidemiology
Women's Health
Sergipe

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Migraine-related hospitalizations in Recife: an epidemiological profile and challenges for preventable care

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Introduction
Migraine and other primary headache disorders are highly prevalent neurological conditions associated with substantial social burden, characterized by recurrent episodes of intense pain that negatively affect quality of life, daily functioning, and productivity. Although clinical management is predominantly outpatient-based, severe or refractory cases may require hospitalization, increasing costs for both the healthcare system and society. In this context, the epidemiological analysis of headache-related hospitalizations in Recife provides an opportunity to characterize the affected population and identify critical aspects relevant to healthcare planning and public health strategies.

Objective
To analyze the epidemiological profile of migraine-related hospitalizations in Recife and discuss their implications for healthcare organization and preventable care.

Methods
This observational, retrospective, descriptive epidemiological study used data from the Brazilian Unified Health System Hospital Information System (SIH/SUS), referring to Recife over the last five years. All hospitalizations classified according to ICD-10 codes related to migraine and other primary headache disorders were included, totaling 2,424 records. Variables analyzed included age group, sex, and ICD-10 chapter classification. Data were evaluated descriptively using absolute and relative frequencies.

Results
Hospitalizations were predominantly concentrated among young and middle-aged adults, especially individuals aged 30–39 years (421 cases), followed by 40–49 years (402 cases) and 20–29 years (376 cases). This distribution indicates a marked impact on economically active populations. Children and adolescents also demonstrated expressive frequencies, particularly in the 10–14-year age group (215 cases), suggesting early clinical manifestation. Among individuals over 60 years of age, 344 hospitalizations were recorded, indicating persistence of the condition in older age groups. Women represented the majority of admissions, accounting for 1,597 hospitalizations (65.9%), while men accounted for 827 cases (34.1%). All admissions were classified within ICD-10 Chapter VI (Diseases of the Nervous System). The predominance among women is consistent with established evidence regarding hormonal and psychosocial influences on migraine occurrence.

Conclusion
Migraine represents a relevant public health issue in Recife, disproportionately affecting women and adults of productive age. The hospitalization burden suggests potential gaps in outpatient management and reinforces the importance of strengthening primary healthcare through earlier diagnosis, improved clinical follow-up, and broader access to preventive treatment strategies to reduce avoidable hospitalizations.

Keywords:
Migraine disorders
Hospitalization
Primary health care

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Headache due to analgesic overuse in the context of hospitalizations in the DATASUS system: correlations and perspectives in relation to the goals of the World Health Organization (WHO)

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Introduction
Medication Overuse Headache (MOH) is a chronic secondary disorder associated with the frequent use of analgesics. The World Health Organization (WHO) classifies migraine as the third leading cause of years lived with disability (DALYs) worldwide. Despite its clinical relevance, low medical awareness and the indiscriminate use of analgesics contribute to a culture of self-medication in Brazil, leading to pain chronification and subsequent overload of the public healthcare system.

Objective
To analyze the correlation between hospital admission indicators for headaches within the Brazilian Unified Health System (SUS) and confirmed cases of intoxication due to self-medication, comparing the Brazilian epidemiological scenario with the goals established by the World Health Organization regarding health education and the rational use of medicines.

Methods
A retrospective study based on secondary data obtained from DATASUS, covering the period from March 2016 to March 2026. Indicators of hospital admissions, direct costs, and average length of hospital stay related to ICD-10 codes G43 (Migraine) and G44 (Other headache syndromes) were analyzed. These data were correlated with records of exogenous drug intoxication confirmed as resulting from self-medication, in addition to regional information on self-medication prevalence obtained from PNAUM.

Results
During the analyzed period, 107,450 hospital admissions were recorded, with a financial impact exceeding BRL 55 million and an average hospital stay of 4 days. A total of 31,637 confirmed cases of exogenous drug intoxication associated with self-medication were also identified. The Southeast region presented the highest absolute number of hospital admissions (33,133) and intoxication cases (15,561), while the Northeast registered the highest total expenditure (BRL 19.8 million) and the longest average hospital stay (4.9 days). Females accounted for most hospital admissions (71,311), hospital costs (BRL 34.8 million), and intoxication cases (22,496). Adults aged 20 to 39 years represented the most affected economically active population, totaling 38,217 hospital admissions and 14,063 intoxication cases associated with self-medication.

Conclusion
The findings demonstrate the epidemiological and economic impact of headaches associated with the excessive use of analgesics in Brazil, linked to self-medication practices and the overload of the Brazilian Unified Health System (SUS). The predominance among women and economically active adults reinforces the social relevance of this condition. Furthermore, the identified scenario contrasts with the World Health Organization guidelines for the promotion of the rational use of medicines, highlighting the need to strengthen policies focused on health education and awareness regarding the risks of self-medication.

Keywords:
Headache
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Epidemiology
Medication overuse headache

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Analysis of hospital burden from primary headaches in Sergipe: female predominance and impacts on the Unified Health System (2015-2025)

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Introduction
Primary headaches, including migraine and other cephalic pain disorders, constitute a notable public health burden in the state of Sergipe. The high prevalence of these disorders in females drives a "feminization" of the hospital burden in the Unified Health System (SUS), which denotes a growing need for specialized care for this demographic. Nevertheless, the scarcity of resources and strategic planning in specialized care for the target population appears to constitute a latent reality across the state's health regions, given the growing demand for targeted interventions, thus creating a directed healthcare need.

Objective
To comparatively analyze inpatient demand parameters and hospitalization costs between females and males regarding primary headaches in Sergipe.

Methods
This is a descriptive epidemiological study with a quantitative, retrospective, and cross-sectional approach, analyzing the prevalence of hospitalizations for primary headaches, based on data from the Unified Health System Informatics Department (DATASUS). Hospitalizations in the state of Sergipe from 2015 to 2025 were analyzed, considering the variables sex, length of stay, and hospital service costs, which were organized into electronic spreadsheets and subsequently subjected to statistical analysis.

Results
It was observed that, in terms of hospitalization volume, females surpassed males in all years, being most prominent in 2018 with 80.8% of the total, averaging 66.7% throughout the observed period. These samples corroborate the well-described and known global epidemiology of cephalic pain disorders, which typically exhibit a female predominance. Furthermore, total service costs for women (BRL 113,133.91) comprise 70.8% of the total, demanding specialized attention regarding public policies with a targeted approach to women's health. Additionally, in females, average hospitalization costs (BRL 360.30) and the average length of stay (8.1 days) exceed male averages by 1.21 and 1.02 times, respectively. Consistent with these findings, the "feminization" of emergencies in the context of primary headaches is established in public healthcare in Sergipe. This scenario would benefit from the creation of continuous follow-up algorithms after hospital discharge, prioritizing the provision of outpatient services for the prophylactic management of the disease in this specific demographic.

Conclusion
A female predominance in hospitalizations for primary headaches in Sergipe was evidenced, along with higher costs and longer hospital stays. The data found reinforce the need for public policies specifically aimed at this population group, such as the effective protocolization of counter-referrals to specialized women's healthcare services. Thus, the continuity of care following hospital discharge can serve as a means of preventing relapses and clinical exacerbations during follow-up.

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Headache disorders
Health policy
Women's health

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Impact of the COVID-19 pandemic on hospitalizations for migraine and headache syndromes in Brazil (2016–2026)

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Introduction
Migraine and other cephalic pain syndromes represent a leading cause of neurological disability worldwide and account for a significant proportion of hospitalizations within Brazil's Public Health System (SUS). The COVID-19 pandemic imposed severe disruptions on hospital care, with headache reported in approximately 50% of acutely infected patients. Cytokine storm responses may exacerbate migraine pathophysiology, while post-COVID syndrome contributes to persistent neurological symptoms, potentially amplifying long-term hospital demand.

Objective
To analyze temporal trends and the impact of the COVID-19 pandemic on hospitalizations for migraine and cephalic pain syndromes in Brazil from 2016 to 2026, stratified by year, age group, sex, and race/ethnicity.

Methods
Descriptive epidemiological study with an ecological time-series design. Data were obtained from the Hospital Information System of the SUS (SIH/SUS), available at the DATASUS portal, covering January 2016 to March 2026. Hospitalizations coded under the ICD-10 Morbidity List for "Migraine and other cephalic pain syndromes" were included and stratified by year of care, age group (age bands 1 and 2), sex, and race/ethnicity. Descriptive statistics and interannual percentage variation were calculated.

Results
A total of 108,751 hospitalizations were recorded over the study period. Annual admissions increased from 8,142 in 2016 to a pre-pandemic peak of 12,120 in 2019 (+48.9%). In 2020, hospitalizations fell sharply to 8,688 (−28.3%), with a further decline to 8,511 in 2021 (−2.0%). Progressive recovery was observed from 2022 (10,406; +22.3%) through 2025, which recorded the highest annual count of the entire series (13,285; +11.7% vs. 2024). Female patients accounted for 66.3% of all hospitalizations (72,156 vs. 36,595 male). The 20–39 age group represented 35.6% of total cases (38,729). By race/ethnicity, pardo individuals comprised 44.8% (48,728), followed by white (42,364; 39.0%). Partial 2026 data (n=2,362) suggest continued growth.

Conclusion
The COVID-19 pandemic caused a marked 28.3% reduction in SUS hospitalizations for migraine in 2020–2021, likely reflecting restricted hospital access and care reorganization. Full recovery occurred by 2022–2023, and 2025 surpassed all prior years, possibly due to pent-up demand, post-COVID neurological sequelae, and expanded specialized care capacity. The consistent female predominance and concentration in the 20–49 age group reinforce the socioeconomic burden of migraine. Continuous epidemiological surveillance of headache-related hospitalizations is warranted, particularly in the context of long-COVID neurological manifestations.

Keywords:
Migraine
Headache
Epidemiology
COVID-19
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Hospital burden and costs of migraine and other headache syndromes in Brazil from 2014 to 2025

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Introduction
Migraine and other headache syndromes are highly prevalent neurological disorders associated with disability, impaired quality of life, reduced productivity and socioeconomic burden. Although these conditions are often managed in outpatient settings, hospital admissions may reflect more severe cases, diagnostic uncertainty or complications requiring inpatient care. Evaluating hospital burden and costs may help characterize the impact of these disorders on the public health system.

Objective
To analyze hospitalizations, hospital costs and length of stay due to migraine and other headache syndromes in Brazil from 2014 to 2025.

Methods
This descriptive ecological study used secondary public data from DATASUS/TABNET, obtained from the Hospital Information System of the Brazilian Unified Health System. Hospital admissions registered in Brazil between 2014 and 2025, by place of hospitalization and year of processing, under the ICD-10 morbidity list category "migraine and other headache syndromes" were included. The analyzed indicators were number of hospitalizations, total hospital amount, mean amount per admission, total hospital days and mean length of stay. Monetary values were assessed in nominal Brazilian reais. Percentage variations between 2014 and 2025 were calculated.

Results
Between 2014 and 2025, 121,594 hospitalizations due to migraine and other headache syndromes were recorded in Brazil. The number of admissions increased from 7,717 in 2014 to 13,335 in 2025, corresponding to a 72.8% increase. A decline was observed in 2020 and 2021, with 8,778 and 8,505 admissions, respectively, followed by progressive recovery from 2022 onward, reaching the highest value of the series in 2025. The total hospital amount recorded during the period was BRL 59,956,091.42, increasing from BRL 2,524,213.38 in 2014 to BRL 7,625,318.57 in 2025, which represents a 202.1% nominal increase. The mean amount per admission was BRL 493.08, rising from BRL 327.10 in 2014 to BRL 571.83 in 2025, with the highest mean value observed in 2021 (BRL 617.39). Total hospital days reached 480,392 in the period, increasing from 29,614 days in 2014 to 53,183 days in 2025, corresponding to a 79.6% increase. Mean length of stay remained relatively stable, ranging from 3.7 to 4.2 days, with an overall mean of 4.0 days.

Conclusion
Hospitalizations due to migraine and other headache syndromes imposed a relevant burden on the Brazilian public hospital system between 2014 and 2025. The increase in total hospital amount was proportionally greater than the growth in admissions and hospital days, while mean length of stay remained stable. These findings suggest an increasing economic burden of headache-related hospitalizations and reinforce the need to improve outpatient management, early diagnosis and strategies to reduce avoidable hospital admissions.

Keywords:
Migraine disorders
Hospitalization
Headache disorders
Health care costs

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Screen time impact on migraine incidence and academic disability among medical students: a cross-sectional study

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Introduction
Migraine is a leading cause of disability worldwide, disproportionately affecting young adults. Medical students face well-established triggers—academic stress, irregular sleep, and prolonged screen use—yet data on migraine burden and its academic impact in this population remain scarce in Brazil.

Objective
To estimate the prevalence of probable migraine among medical students and examine its association with daily screen time and academic disability.

Methods
Cross-sectional study conducted in May 2026 with medical students from two institutions in Sergipe, Brazil (UNIT and UFS). Frequent headache was screened over the previous three months. Probable migraine was classified using ICHD-3-based criteria: at least two of four features (unilateral pain, pulsating quality, moderate-to-severe intensity, worsening with exertion) plus nausea, photophobia, or phonophobia. Academic impact was assessed with three items adapted from the HIT-6, rated on a five-point frequency scale. Screen time was categorized as high (≥6 h/day) or low (<6 h/day). Descriptive statistics were used.

Results
Forty-eight students participated; 64.6% were female and 93.8% in the preclinical cycle. Screen time distribution: 41.7% reported 3–6 h/day, 39.6% 6–9 h, 12.5% >9 h, and 6.2% <3 h. Frequent headache was reported by 45.8% (n=22). Probable migraine was identified in 20.8% of the total sample (n=10), representing 45.5% of those with frequent headache. Prevalence was higher in women (29.0%) than men (5.9%). By screen time group, probable migraine occurred in 30.0% (3–6 h), 16.7% (>9 h), 15.8% (6–9 h), and 0% (<3 h). Among students with frequent headache, 72.7% reported high academic impact; 36.4% frequently or always had difficulty concentrating, and 45.4% frequently or always felt too fatigued to study.

Conclusion
Probable migraine affected one in five students, with markedly higher prevalence among women. Academic impact was substantial, reinforcing that migraine extends beyond clinical management into educational performance. A linear association with screen time was not detected, which may reflect sex-related confounding and, notably, the predominantly academic nature of device use in this group—a pattern potentially distinct from recreational screen time, which has been more consistently linked to headache. These findings are exploratory and warrant replication in larger cohorts with validated instruments.

Keywords:
Migraine
Migraine disorders
Screen time
Medical students

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Epidemiological profile and economic impact of hospitalizations for migraine and other cephalic pain syndromes in the Brazilian Unified Health System

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Introduction
Migraine is one of the most prevalent primary headache disorders in Brazil and is associated with disability, reduced quality of life, and loss of productivity. Severe cases may require hospitalization and generate substantial costs for the Brazilian Unified Health System (SUS). Therefore, understanding the profile of hospitalizations is essential, as it allows the identification of the groups most affected by the disease and supports the planning of public health policies and prevention strategies.

Objective
To analyze the epidemiological profile and the economic impact of hospitalizations due to migraine and other cephalic pain syndromes in the Brazilian Unified Health System (SUS) from 2015 to 2025.

Methods
Ecological time-series study using data from DATASUS/SIH-SUS. Hospitalizations and expenditures related to "Migraine and Other Cephalic Pain Syndromes" (ICD-10, Chapter VI) were analyzed between 2015 and 2025. Variables included number of hospitalizations, total and average costs, geographic region, and age group.

Results
In 2015, 2020, and 2025, a total of 8,159, 8,778, and 13,335 hospitalizations due to migraine and other cephalic pain syndromes were recorded in SUS, respectively, representing a 63.4% increase over the study period. The Southeast region accounted for the highest absolute number of hospitalizations, totaling 10,402 cases during the period, followed by the Northeast (7,894) and South (7,863) regions, while the North region showed the highest growth rate (204.1%). Hospital expenditures increased by 152.3% between 2015 and 2025. The Northeast region had the highest cumulative expenditure, whereas the North region showed the greatest increase in hospital costs (791.8%). Regarding age groups, hospitalizations were more concentrated among adults aged 20–49 years, particularly those aged 30–39 years (5,567 hospitalizations), and were least frequent among children under 5 years of age. A progressive increase in hospitalizations was also observed across most age groups, especially among individuals aged 60 years or older. Female patients predominated, accounting for 67.0% of all hospitalizations.

Conclusion
Migraine-related hospitalizations and expenditures increased substantially in SUS between 2015 and 2025. Young and middle-aged adults accounted for most hospitalizations. Regional disparities were also observed, with the North region standing out in terms of growth in both hospitalizations and expenditures. These findings highlight migraine as an important public health issue and reinforce the need for strategies aimed at early diagnosis, appropriate follow-up, and reduction of hospitalizations, contributing to the optimization of SUS resources.

Keywords:
Migraine
Hospitalization
Epidemiology
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Epidemiological profile of hospitalizations for migraine in Brazil between 2014 and 2024: a temporal analysis based on DATASUS data

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Introduction
Migraine is a highly prevalent neurological disorder with major impact on quality of life. Recognized by the World Health Organization as one of the leading causes of functional disability, migraine is characterized by recurrent episodes of intense pain, often associated with autonomic manifestations. In chronic and refractory cases, the recurrence of episodes may lead to hospital admissions for appropriate clinical management, highlighting the disease's high morbidity burden and epidemiological relevance.

Objective
To analyze the epidemiological profile of hospitalizations due to migraine in Brazil from 2014 to 2024.

Methods
This descriptive epidemiological study, with a quantitative approach, used secondary data from the TABNET system, available through DATASUS, to analyze the epidemiological profile of migraine-related hospitalizations in Brazil. The study included all hospitalizations recorded between January 2014 and December 2024, covering all age groups, from children under 1 year old to individuals aged 80 years or older. The variables analyzed included year of hospitalization, region, sex, age group, race, and deaths.

Results
Between 2014 and 2024, there were 108,259 hospitalizations due to migraine in Brazil, showing an increasing trend over the period. In 2014, there were 7,717 hospitalizations, whereas in 2024, the number reached 11,874, with a peak observed in 2019 (11,996). A reduction occurred between 2020 (8,778) and 2021 (8,505), coinciding with the COVID-19 pandemic and hospital service reorganization, followed by a new increase. Regional analysis revealed that 32.34% of hospitalizations occurred in the Southeast region, 29.08% in the Northeast, 25.57% in the South, 7.39% in the North, and 5.61% in the Midwest. Regarding sex, there was a predominance of females, accounting for 66.06% of hospitalizations, while males represented 33.94% of cases. Concerning age group, the highest concentration of hospitalizations occurred among individuals aged 30 to 39 years (18.46%), followed by those aged 20 to 29 years (17.76%) and 40 to 49 years (16.68%). Regarding race/ethnicity, there was a predominance of mixed-race individuals ("pardos") (41.43%), followed by White individuals (39.36%), Black individuals (3.10%), Asian individuals (2.15%), and Indigenous individuals (0.09%). A considerable proportion of records (13.88%) lacked information regarding race/ethnicity. As for mortality, there were 943 deaths, increasing from 32 in 2014 to 122 in 2024, corresponding to a 3.81-fold increase compared to the initial value.

Conclusion
Hospitalizations due to migraine in Brazil showed an increasing trend between 2014 and 2024, except for the atypical decline during the COVID-19 health crisis, with a predominance in the Southeast region and among mixed-race ("pardo") and White individuals. The increase in the number of deaths reinforces the seriousness of the issue. Therefore, it is essential to strengthen public policies aimed at improving the quality of life of affected individuals.

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Epidemiology

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Epidemiological profile of hospitalizations and mortality due to migraine among young women in northeastern Brazil between 2014 and 2024

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Introduction

Migraine is one of the most prevalent neurological disorders worldwide and disproportionately affects women of reproductive age, significantly impacting quality of life, productivity, and healthcare systems. Although migraine-related hospitalizations are generally associated with low mortality, severe episodes may require inpatient care and generate substantial healthcare burden. In Brazil, regional epidemiological data regarding hospitalizations and mortality due to migraine among women remain limited, especially in the Northeast region. Therefore, understanding the temporal trends and hospital outcomes associated with migraine is essential for improving healthcare planning and preventive strategies.

Objective

To analyze the epidemiological profile of hospitalizations and mortality due to migraine among women aged 15 to 49 years in Northeastern Brazil from 2014 to 2024.

Methods

This is an ecological, retrospective, and descriptive study conducted using secondary data obtained from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS), available through the DATASUS platform. Hospitalizations due to migraine (ICD-10: G43) among women aged 15 to 49 years living in Northeastern Brazil were analyzed between 2014 and 2024. The evaluated variables included number of hospitalizations, number of deaths, and in-hospital mortality rate. Data were organized and descriptively analyzed according to the year of care.

Results

Between 2014 and 2024, a total of 12,832 hospitalizations due to migraine were recorded among women aged 15 to 49 years in Northeastern Brazil. A progressive increase in hospitalizations was observed between 2014 and 2019, rising from 853 to 1,435 cases. In 2020, there was a significant reduction to 990 hospitalizations, followed by a gradual increase in subsequent years, reaching 1,365 cases in 2023 and 1,280 in 2024. During the same period, 91 deaths due to migraine were recorded. The in-hospital mortality rate remained globally low throughout the historical series, ranging from 0.40 in 2020 to 1.25 in 2023. The highest number of deaths was also observed in 2023, with 17 recorded cases.

Conclusion

It was concluded that migraine showed an increasing impact on hospitalizations among women of reproductive age in Northeastern Brazil throughout the analyzed historical series, despite the overall low mortality observed. The reduction in hospitalizations in 2020, followed by a subsequent increase in later years, suggests a possible influence of the COVID-19 pandemic on access to healthcare services. These findings reinforce the relevance of migraine as a public health issue and highlight the need for strategies focused on early diagnosis, outpatient follow-up, and appropriate disease management.

Keywords:
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Mortality
Women
Hospitalization

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Impact of the COVID-19 pandemic on pediatric migraine hospitalizations in northeast Brazil: a pre-post analysis (2017–2024)

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Introduction
Migraine is a leading cause of disability in children and adolescents, with a significant impact on quality of life and hospital costs. The COVID-19 pandemic deeply changed healthcare utilization patterns, but its effect on pediatric migraine hospitalizations in Northeast Brazil has not yet been analyzed.

Objective
To compare the profile of migraine hospitalizations in children and adolescents (0–19 years) in Northeast Brazil before (2017–2019) and after (2021–2024) the COVID-19 pandemic, excluding 2020 because of the atypical lockdown period.

Methods
This was an ecological time-series study using data from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS) accessed via DATASUS. All hospitalizations with a primary diagnosis of migraine (ICD-10 G43) of residents in the Northeast region, aged 0–19 years, were included. The years analyzed were 2017–2019 (pre-pandemic) and 2021–2024 (post-pandemic). The year 2020 was excluded because it represented an atypical period of restrictions and underreporting. The variables studied were: number of hospitalizations, total costs (BRL), length of stay (days), and in-hospital deaths.

Results
In the pre-pandemic period (2017–2019), there were 1,706 hospitalizations (annual average 568.7), with total costs of BRL 606,529.11, mean length of stay of 3.9 days, and 4 deaths. In the post-pandemic period (2021–2024), hospitalizations increased to 2,557 (annual average 639.3), a 49.9% rise. Total costs jumped to BRL 1,856,779.66 (a 206.1% increase). Mean length of stay increased to 4.6 days (+17.9%). Deaths rose from 4 to 17 (a 325% increase). The year 2023 had the highest number of hospitalizations (776), highest costs (BRL 735,863.23), and highest number of deaths (7).

Conclusion
There was a marked increase in hospitalizations, costs, length of stay, and mortality due to pediatric migraine in Northeast Brazil in the post-pandemic period compared with the pre-pandemic period. These findings suggest a possible worsening of case severity or an indirect impact of the pandemic on access to and management of migraine in children and adolescents. Regional strategies to strengthen outpatient care and prevent high-cost, high-mortality hospitalizations are needed.

Keywords:
Migraine
Hospitalization
Brazil
COVID-19
Child

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Epidemiological profile of hospitalizations for migraine and other headache syndromes in the northeast region of Brazil: a 10-year retrospective study in the Unified Health System (SUS)

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Introduction

Migraine is a highly prevalent neurological condition that generates a high number of hospital admissions due to refractory attacks, profoundly impacting the quality of life of patients, especially those of working age (20-49 years). In the Northeast Region, marked by socioeconomic inequalities and demographic diversity, the profile of these hospitalizations reflects the heterogeneous distribution of healthcare access. Understanding this scenario is essential to measure the burden of these morbidities on the SUS and to support improvements in care.

Objective

To analyze the epidemiological, demographic, and social trends of hospitalizations for migraine and other headache syndromes in the Northeast between 2016 and 2025.

Methods

An ecological study based on the analysis of secondary data on SUS hospitalizations for migraine (ICD-10 G43) and other headache syndromes (ICD-10 G44). Data were obtained via the TABNET/DATASUS platform and cross-referenced with population estimates from the Brazilian Institute of Geography and Statistics (IBGE) for the 2016–2025 period. The investigated variables included sex, age group, color/race, and state. Following extraction, data were processed using descriptive statistics, calculating absolute and relative frequencies.

Results

A total of 31,154 hospitalizations were recorded during the period, of which 19,982 (64.1%) were female. In the most prevalent age group (20 to 49 years), female predominance was even more significant, accounting for 68.4% (10,948) of the 15,996 hospitalizations. Geographically, the states of Ceará (9,128) and Maranhão (7,641) concentrated the highest number of occurrences, while Rio Grande do Norte recorded the lowest absolute (176) and relative (0.5/100,000) rates. Maranhão had the highest hospitalization rate (11.3/100,000), followed by Ceará (10.3/100,000). Regarding color/race, 23,484 (75.3%) of the hospitalized patients self-identified as pardo (mixed-race), contrasting with only 622 (2%) Black and 27 (0.1%) Indigenous patients. The combination of these data with the significant number of 3,993 (12.8%) records lacking race information highlights potential barriers to hospital care access for minorities, pointing to a probable underreporting of attacks managed exclusively in a home setting.

Conclusion

Migraine hospitalizations in the Northeast present a strong gender profile, predominantly affecting women of reproductive age, which suggests the influence of neuroendocrine factors. Additionally, geographic disparities and the high rate of ethnic-racial underreporting reveal weaknesses in health records and inefficiencies in Primary Care, reflected in the high hospital demand for an essentially outpatient condition. These findings reinforce the urgency of developing prophylactic strategies aimed at the female population and strengthening primary care to mitigate the worsening of migraine attacks and alleviate the burden on the public health system.

Keywords:
Migraine disorders
Hospitalization
Epidemiology
Brazilian Unified Health System

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Brazilian interregional comparison of hospitalizations for primary cephalalgic attacks in the Unified Health System

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Introduction
Primary headache disorders, including headache and other cephalalgic syndromes, are important causes of morbidity and functional impairment and may require hospital care within the Brazilian Unified Health System (SUS). In Brazil, regional differences in healthcare network organization, access to diagnosis, and availability of specialized care may influence the profile of hospitalizations for these conditions. Therefore, an interregional analysis of hospitalizations for primary cephalalgic attacks may help identify relevant epidemiological, healthcare-related, and economic patterns within SUS.

Objective
To compare the epidemiological, healthcare-related, economic profile and temporal trend of hospitalizations for primary cephalalgic attacks among Brazilian regions from 2014 to 2024.

Methods
This ecological, retrospective, and descriptive study used secondary data from SIH/SUS, obtained through DATASUS. Hospitalizations for headache and other cephalalgic syndromes, according to the ICD-10 Morbidity List grouping, were analyzed from 2014 to 2024. All five Brazilian regions were included. The variables analyzed were hospitalizations, rate per 100,000 inhabitants, mean length of stay, and hospital costs. Annual rates were calculated using the regional population from the 2022 Demographic Census as a fixed denominator. Temporal trends in rates were assessed by simple linear regression, with $p < 0.05$ considered statistically significant.

Results
From 2014 to 2024, 107,847 hospitalizations for primary cephalalgic attacks were recorded in Brazil. Per 100,000 inhabitants, the highest cumulative rate was observed in the South (92.2), followed by the Northeast (57.5), North (45.7), Southeast (41.1), and Central-West (37.1). Mean length of stay was higher in the Northeast and North, approximately 4.9 and 4.8 days, respectively. The Northeast accounted for the highest cumulative hospital cost, approximately BRL 19.03 million. Linear regression of annual rates showed a significant increasing trend in the North, Northeast, and Central-West ($p<0.05$), whereas the Southeast ($p=0.82$) and South ($p=0.51$) showed no significant temporal trend.

Conclusion
Hospitalizations for primary cephalalgic attacks showed relevant interregional differences in Brazil from 2014 to 2024. The proportional analysis showed the highest cumulative rate in the South, while the North, Northeast, and Central-West showed significant growth in annual rates. Longer mean stays in the North and Northeast and the highest cumulative cost in the Northeast may indicate regional differences in hospital care organization and healthcare burden. These findings reinforce the importance of considering proportional rates and temporal trends when evaluating hospitalizations for headache disorders within SUS.

Keywords:
Hospitalization
Epidemiology
Primary headache disorders
Unified Health System
Interregional analysis

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Costs of physical therapy procedures for migraine in the SUS: temporal analysis of the state of Pernambuco (2015–2025)

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Introduction
Migraine is a disabling neurological condition with high prevalence and significant socioeconomic impact, reflected by the increasing demand for healthcare and rehabilitation services.

Objective
To quantify annual expenditures on physical therapy procedures for migraine within the Unified Health System (SUS) and to describe the demographic profile from 2015 to 2025 in the state of Pernambuco and its macro-regions.

Methods
A cross-sectional, descriptive, and quantitative study was conducted using DATASUS/SIA. Data on sex, age group, primary ICD code, and procedure type were extracted. Descriptive analysis was performed, with monetary correction of costs using the Broad National Consumer Price Index (IPCA), based on December 2025. Simple linear regression was applied with year as the independent variable and the IPCA-adjusted annual expenditure as the dependent variable. Standardized residuals were calculated to identify atypical years.

Results
A total of 1,265 outpatient care records from the state of Pernambuco were analyzed. Total expenditures on physical therapy procedures for migraine in the SUS in the state of Pernambuco between 2015 and 2025 amounted to R$ 5,535.22. Of this total, R$ 4,046.89 was concentrated in the year 2022, substantially above the mean annual expenditure recorded for the state during the analyzed period (R$ 502.92). Expenditures were predominantly concentrated among females (88.94%), in the 18–59 age group (82.1%), and under ICD G43.9, "migraine, unspecified" (40.71%). The most prevalent procedure type was type 22 (68.84%), corresponding to "physical therapy care for patients with neuro-kinetic-functional disorders with complications." Regarding macro-regions, the Agreste region accounted for the largest share of state expenditures (62.42%), followed by the Metropolitan region (30.68%) and the Sertão region (6.90%). Linear regression identified no significant temporal trend in expenditures over the period (=82.47; F(1,9)=0.523; p=0.488; R^2=0.055), indicating the absence of linear growth. The year 2022 was identified as an isolated outlier (ZRE=2.74).

Conclusion
Outpatient physical therapy care related to migraine in the SUS in Pernambuco was predominantly concentrated among adult women, with resource concentration in the Agreste macro-region. The high frequency of ICD G43.9 suggests limitations in the diagnostic specification of migraine subtypes, which may hinder a more precise characterization of the clinical profile of users. These findings reinforce the importance of improving the quality of health records, as well as of epidemiological monitoring and the planning of care strategies and resource allocation for individuals with migraine in the public health system.

Keywords:
Physical therapy modalities
Migraine disorders
Brazil
Health care costs
Costs and cost analysis

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Regional inequalities in migraine hospitalizations in the Brazilian Unified Health System: a portrait of the socioeconomic gradient in pain care in Brazil (2016–2025)

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Introduction
Migraine, the second leading cause of disability worldwide, affects 15.8% of Brazilians, predominantly women and working-age adults, imposing a substantial socioeconomic burden. Within the Unified Health System (SUS), migraine hospitalization patterns reflect marked regional disparities, serving as a mirror of the socioeconomic gradient in pain care. A comparative analysis of trends from 2016 to 2025 is therefore essential to map these inequities and inform policies aimed at equitable access to specialized care.

Objective
To analyze temporal trends, costs, and regional disparities in migraine-related hospitalizations in Brazil between 2016 and 2025.

Methods
Descriptive epidemiological time-series study based on secondary data from SIH/SUS via TABNET/DATASUS. All hospitalizations coded under ICD-10 G43 in Brazil from January 2016 to December 2025 were included, with macroregion as the unit of analysis. Variables comprised absolute number of hospitalizations, rate per 100,000 inhabitants (IBGE population estimates), total and mean cost per hospitalization, and mean length of stay. Regional comparisons contrasted lower-infrastructure (North and Northeast) with higher-infrastructure (South and Southeast) regions.

Results
Between 2016 and 2025, 105,704 migraine-related hospitalizations were recorded in Brazil, representing a 54.7% increase (from 8,142 to 12,600). The Southeast led in absolute numbers (n=32,654), followed by the Northeast (n=31,144) and South (n=27,336). However, when analyzing rates per 100,000 inhabitants, the South presented the highest regional mean (8.96), peaking at 13.48 in 2019, more than twice the national average for that year (6.18). The North recorded a growth exceeding 230% in hospitalization rates (from 2.20 in 2016 to 7.30 in 2024), possibly related to expanded hospital access and greater clinical recognition of the condition. Regarding hospital costs, the Northeast concentrated the highest total expenditure (R$ 19.6 million), followed by the South (R$ 14.2 million) and Southeast (R$ 13.7 million). The Northeast also recorded the highest cumulative mean cost per hospitalization (R$ 630.91), while the North reached R$ 814.60 in 2024. Mean length of stay was highest in the Northeast (4.9 days) and North (4.8 days), contrasting with the South (3.1 days) and Central-West (3.0 days).

Conclusion
The analysis revealed a 54.7% growth in migraine hospitalizations in Brazil between 2016 and 2025, alongside marked regional heterogeneity. The South concentrated the highest rates per 100,000 inhabitants, while the North and Northeast presented higher costs and longer lengths of stay, suggesting lower outpatient resoluteness and greater clinical complexity at admission in these regions. The findings confirm a socioeconomic gradient in migraine care within the SUS, in which structural inequalities shape the disease's care profile, reinforcing the need to strengthen specialized neurological care in the most vulnerable regions.

Keywords:
Migraine
Hospitalization
Health inequalities
Regional disparities
Socioeconomic gradient

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Hospital outcomes of chronic post-traumatic headache in the Brazilian Public Health System: a decade of retrospective data

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Introduction
Post-traumatic headache (PTH) is a frequent neurological manifestation following traumatic brain injury, characterized by pain onset up to seven days post-trauma. Its presentation often resembles primary headaches like migraine and tension-type headache, causing functional impairment and increasing healthcare demand. Despite being a prevalent and disabling sequela with potentially prolonged symptoms, data characterizing its epidemiological and healthcare impact in developing countries remains limited. Analyzing PTH hospital outcomes in the Brazilian Unified Health System (SUS) over a decade helps clarify this healthcare burden and supports strategic health service planning.

Objective
To analyze the temporal trends, epidemiological profile, and hospital outcomes—specifically mortality and average length of stay—of admissions for chronic post-traumatic headache (ICD-10 G44.3) in the Brazilian public health system from 2015 to 2025.

Methods
An ecological, retrospective study was conducted using SIH/DATASUS microdata via TabWin. We analyzed all Brazilian hospital admissions with chronic PTH (ICD-10 G44.3) as the primary diagnosis between 2015 and 2025. Variables included sex, geographic region, admission frequency, in-hospital mortality, and average length of stay.

Results
Between 2015 and 2025, the SUS recorded 466 hospitalizations for chronic PTH. The annual volume started at 19 cases in 2015, reached a nadir of 32 in 2021, and grew continuously to a peak of 70 hospitalizations in 2025. This final year represented a 268% increase compared to 2015 and a 119% increase compared to 2021. Eight in-hospital deaths occurred, resulting in a 1.72% overall case fatality rate. Mortality dropped to zero in 2015, 2016, 2021, 2023, and 2025, while the highest volume occurred in the 2018-2019 biennium with two annual deaths. Sex distribution was balanced: 50.6% males (n=236) and 49.4% females (n=230). Regionally, the Southeast led with 183 hospitalizations (39.3%), followed by the Northeast with 119 (25.5%), together accounting for 64.8% of national cases. The Central-West (13.5%), South (13.1%), and North (8.6%) accounted for the remainder. Total hospital length of stay was 1,579 days. Annual stay durations tracked admissions, starting at 48 days in 2015, dropping to 72 days in 2021, and reaching an absolute peak of 275 days in 2025, suggesting greater case complexity during high-flow years.

Conclusion
Chronic post-traumatic headache showed a progressive and significant increase in hospitalizations within the Brazilian public health system over the last decade. Despite low in-hospital mortality, the condition presents a considerable hospital stay burden. These findings highlight the growing healthcare impact of this condition and reinforce the urgent need for improved strategies regarding diagnosis, management, and long-term care in the SUS.

Keywords:
Hospitalization
Epidemiology
Post-traumatic headache
Unified Health System
Traumatic brain injury

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Hospital morbidity due to migraine and headache disorders in females from 2016 to 2025 in the Brazilian Unified Health System (SUS)

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Introduction
Migraine is a chronic, disabling neurological disorder. It disproportionately affects females and is linked to lifetime hormonal fluctuations. Most cases are managed in outpatient settings, but severe presentations may require urgent intervention and hospitalization. Analyzing the data of these admissions offers critical insights into the epidemiological profile of migraine among Brazilian women.

Objective
To examine patterns of hospital admissions for migraine and headache among Brazilian women from 2016 to 2025.

Methods
This descriptive, retrospective and quantitative study used data from DATASUS. The study population included women aged 10-59 hospitalized for migraine and headache (ICD-10: G43 and G44) in Brazil from 2016 to 2025. Variables analyzed were year, age groups (10-19,20-29,30-39,40-49,50-59),region, and race/color. Descriptive statistics, such as absolute and relative frequencies, annual means, and standard deviation (SD), were used to describe trends. To address regional population disparities, annual average admissions were expressed per 100,000 women in each macro-region, using official DATASUS population estimates as the denominator.

Results
From 2016 to 2025, 56,885 hospitalizations of females (μ=5.688,5±914,5 casos/ano) were reported. The highest clinical burden was among women aged 30-39 (23,8%; μ=1.357,4±221,7) and 20-29 (23,5%; μ=1.336,7±224,2). The 40-49 group accounted for 21.5%, while the 10-19 (15.5%) and 50-59 (15.6%) groups had lower proportions. Annual admissions increased to 6,304 in 2019, declined during the 2020-2021 pandemic (μ=4.507,5±160,5), and peaked at 7,345 in 2025. The Southeast (18,947) and Northeast (15,971) had the highest absolute numbers of hospitalizations. But after adjusting for population, the South macro-region had the highest clinical pressure (13.16 admissions per 100,000 women), followed by the Northeast (7.45), Central-West (6.13), Southeast (5.93), and North (5.92). Most hospitalizations involved Brown (Pardo) (43.6%) and White (39.5%) women. Black (3.3%) and Indigenous (0.1%) women were underrepresented. Race/color data were missing in 11.7% of records.

Conclusion
Female hospitalizations for migraine in Brazil result from both neuroendocrine changes and social factors. Admissions peaked during reproductive and working years due to estrogen fluctuations and psychosocial stress, then declined after menopause. The decrease during the pandemic may suggest patient absenteeism and bed reallocation, while the increase in 2025 could indicate post-pandemic stress, disrupted outpatient care, and medication overuse during isolation. Also, population-adjusted data showed that the South macro-region faced the greatest clinical pressure per capita, which may reflect the impact of climatic factors and greater healthcare access. At last, the racial breakdown revealed the invisibility of Black and Indigenous women, besides barriers to care and underreporting within the SUS.

Keywords:
Migraine disorders
Hospitalization
Women's health
Descriptive epidemiology

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Incidence of hospitalizations for migraine in children and adolescents across regions of Brazil in the last 10 years: a comparative analysis between 2016 to 2021 and 2021 to 2026

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Introduction

Migraine is a common primary headache disorder in childhood and adolescence and may significantly affect school, social, and family life. A 2021 global analysis of 204 countries showed that Brazil had the highest prevalence of headaches among children and adolescents, reaching 30.6%.

Objective

This study aimed to evaluate hospitalizations due to migraine among children and adolescents across Brazilian regions and compare the periods from 2016–2021 and 2021–2026.

Methods

This is a cross-sectional, retrospective, epidemiological study with a quantitative approach based on data from the Hospital Information System of the Brazilian Unified Health System (SIH/SUS), available through DATASUS. The category "Migraine and other cephalic pain syndromes" from ICD-10 morbidity lists was selected.Variables analyzed included mortality, region, sex, and age groups under 1 year to 19 years.

Results

Between 2016 and 2021, 8,453 hospitalizations were recorded, with 8,091 (95.72%) classified as emergency admissions and 11 deaths. The Southeast region had the highest number of cases, with 2,923 (34.58%), while the Midwest had the lowest, with 512 (6.06%). Females showed higher incidence rates. The age group from 15 to 19 years accounted for the highest number of hospitalizations, with 3,888 (45.99%), whereas children under 1 year had the lowest number, with 52 (0.62%). From 2021 to 2026, 9,831 hospitalizations were identified, including 9,477 (96.40%) emergency admissions and 27 deaths. The Northeast became the region with the highest number of cases, with 3,269 (33.25%), while the Midwest remained the lowest, with 665 (6.76%). Females also predominated, representing 6,044 (61.48%) cases. Individuals aged 15–19 years continued to present the highest number of hospitalizations, with 3,727 (37.91%), while children under 1 year remained the least affected group, with 92 (0.94%).

Conclusion

It was concluded that hospitalizations increased over the years, and the proportion of emergency admissions increased by 0.71%. Regarding the incidence of migraine-related hospitalizations across the regions of Brazil, the Southeast initially stood out with the highest number of occurrences, but in the most recent analyzed period, the Northeast became the leading region. A 145.45% increase in deaths was observed. Furthermore, concerning age distribution, in both periods the highest number of hospitalizations occurred among individuals aged 15 to 19 years; however, in the temporal analysis, there was a 17.57% reduction in cases within this age group. In both periods, the Midwest was the region with the lowest number of hospitalizations. Additionally, females predominated among migraine-related hospital admissions in Brazil, and the age group with the lowest occurrence was children under 1 year old.

Keywords:
Migraine
Children and adolescents
Hospitalization

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Association between birth-related factors and migraine occurrence in adulthood: findings from a prospective birth cohort study

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Introduction
Migraine is one of the most prevalent and disabling neurological conditions. Although its pathophysiology has been increasingly characterized, the contribution of perinatal and early-life exposures to long-term migraine risk remains poorly understood. Birth cohort studies offer a robust epidemiological framework for addressing this question.

Objective
To investigate the association between early-life birth-related factors and the occurrence of migraine in adulthood using a prospective birth cohort.

Methods
This prospective cohort study pooled data from two independent birth cohorts, totaling 2,474 participants followed from birth to adulthood (mean age 32.5±7.5 years). Migraine diagnosis was established according to the International Classification of Headache Disorders, 3rd edition (ICHD-3) criteria. Birth-related variables included maternal age, paternal age, number of prenatal visits, maternal smoking during pregnancy, prematurity, socioeconomic status, birthweight classification, and mode of birth. Associations with migraine were assessed using multivariable binary logistic regression with backward stepwise selection (likelihood ratio method), adjusting for sex.

Results
The prevalence of migraine was 47.8%. In the final backward stepwise logistic regression model, female sex (OR=3.93; 95%CI 3.29–4.70; p<0.001) and maternal smoking during pregnancy (OR=1.28; 95%CI 1.05–1.57; p=0.017) were independently associated with migraine occurrence. Other birth-related variables, including maternal age, paternal age, number of prenatal visits, prematurity, socioeconomic status, birthweight classification, and mode of birth, were not retained in the final model.

Conclusion
Female sex and maternal smoking during pregnancy were independently associated with migraine occurrence in adulthood. Other birth-related factors showed limited contribution to migraine in later life. These findings point to the intrauterine environment as a potential determinant in the early origins of migraine.

Keywords:
Migraine disorders
Epidemiology
Prenatal exposure delayed effects

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Analysis of sexual disparities in hospitalizations for migraine in the elderly in Brazil in the last 5 years

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Introduction
Migraine is a common and disabling neurological disorder with well-defined diagnostic criteria that changes in pattern throughout life. In older adults, it is less frequent, may present with "atypical" symptoms, and is often associated with other diseases. Currently, international studies have consistently demonstrated a predominance of women with migraine; however, there are still no conclusive studies regarding this sex disparity in the disease, especially among the elderly population in Brazil.

Objective
To evaluate sex disparities in migraine-related hospitalizations among older adults across the regions of Brazil over the last five years.

Methods
This is an epidemiological, cross-sectional, retrospective study with a quantitative approach, conducted through data collection from the Brazilian Unified Health System Hospital Information System (SIH/SUS), linked to DATASUS. In the ICD-10 Morbidity List category, "Migraine and other cephalic pain syndromes" was selected, and the variables analyzed were mortality, region, sex, and age groups from 60 to 80 years and older. The data analyzed were restricted to the period from March 2021 to March 2026.

Results
During the evaluated period, 10,264 hospitalizations due to migraine among older adults were recorded in Brazil, of which 9,750 (94.99%) were emergency admissions, along with 280 deaths and a mortality rate of 2.73. Regarding females, there were 6,184 (60.25%) occurrences. The region with the highest number of hospitalizations was the Northeast, with 1,808 (29.24%) cases, while the Midwest had the lowest number, with 303 (4.90%). The number of deaths was 159, with a mortality rate of 2.57. Among males, there were 4,080 (39.75%) hospitalizations. The region with the highest number of cases was also the Northeast, with 1,240 (30.39%), while the Midwest had the lowest number, with 187 (4.58%). Regarding deaths, there were 121, with a mortality rate of 2.97.

Conclusion
It can be concluded that females accounted for more than 60% of migraine cases among older adults over the last five years. In the evaluated regions, both females and males had the Northeast as the region with the highest number of cases and the Midwest as the region with the lowest number of hospitalizations. Regarding deaths and mortality rates, females had the highest absolute number of deaths, whereas males had the highest mortality rate.

Keywords:
Migraine
Elderly
Sexual disparities

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Headache as a clinical manifestation of bacterial meningitis: epidemiological profile of hospitalizations and deaths in children and adolescents in Brazil (2016–2025)

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Introduction
Bacterial meningitis is an acute infection of the meninges associated with high morbidity and mortality, especially in children and adolescents. In this context, headache stands out as one of the main clinical manifestations of the disease, frequently associated with fever, vomiting, and neck stiffness, representing an important warning sign for diagnostic suspicion and immediate medical attention. Thus, understanding the epidemiological profile of bacterial meningitis is essential, given the relevance of headache as a clinical marker of meningeal involvement.

Objective
To analyze the epidemiological profile of hospitalizations and deaths due to bacterial meningitis in Brazil, emphasizing the relevance of headache in the clinical presentation of the disease.

Methods
An epidemiological, descriptive, retrospective, and quantitative study was conducted using data from the Hospital Information System of the Unified Health System (SIH/SUS). The category "Bacterial meningitis, not elsewhere classified" was selected from the ICD-10 Morbidity List. The study population comprised children and adolescents aged 0 to 19 years diagnosed with bacterial meningitis in Brazil between January 2016 and December 2025. The variables analyzed were number of hospitalizations, deaths, sex, type of admission, average length of hospital stay, and regional distribution.

Results
Between 2016 and 2025, 18,616 hospitalizations for bacterial meningitis in children and adolescents were recorded in Brazil. The Southeast region presented the highest number of cases, with 7,943 (42.67%) hospitalizations, followed by the Northeast region, with 4,160 (22.34%). The lowest quantity occurred in the Central-West, with 1,287 (6.91%) records. A predominance of urgent admissions was observed, corresponding to 18,039 (96.89%) cases, consistent with the acute evolution of the disease, frequently associated with headache. There was a predominance of the male sex, with 10,936 (58.74%) hospitalizations, while the female sex presented 7,680 (41.26%) records. The average length of hospital stay was 10.4 days. During the analyzed period, 823 deaths occurred, corresponding to a mortality rate of 4.42%, reinforcing the high clinical severity of the disease.

Conclusion
A high burden of hospitalizations and deaths due to bacterial meningitis in children and adolescents in Brazil was evidenced, with a predominance in the male sex and a higher concentration of cases in the Southeast region. The high frequency of urgent admissions demonstrates the acute evolution of the disease, in which headache stands out as an important warning sign for early diagnostic suspicion. Thus, the importance of prompt symptom identification, vaccination, and expansion of access to healthcare services is reinforced, aiming to reduce complications, hospitalizations, and deaths.

Keywords:
Headache
Hospitalization
Pediatrics
Meningitis
Bacterial

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Hospitalizations and cost due to primary headache according to sex and age group in northeastern Brazil: an ecological study (2015-2024)

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Introduction
Primary headaches, especially migraine, are leading causes of disability with significant gender disparity, suggesting hormonal influence during female reproductive years. These conditions impose a high economic burden, making systematic monitoring within the SUS vital for healthcare planning and efficient resource allocation in Northeastern Brazil.

Objective
To analyze the epidemiological profile and economic impact of hospitalizations for primary headaches according to sex and age group in Northeastern Brazil between 2015 and 2024.

Methods
This is an epidemiological, retrospective, descriptive, and ecological study, based on secondary data extracted from the Hospital Information System of the Unified Health System (SIH/SUS) via the DATASUS/TABNET platform. The selection was based on the "ICD-10 Morbidity List" category, "Migraine and other headache syndromes" group, in the Northeast (2015-2024). Hospitalization frequencies, total costs, and mean costs per hospitalization were analyzed. To investigate hormonal influence, age groups were categorized into biological cycles: pre-menacme (0–14 years), menacme (15–49 years), and post-menopause (≥50 years). Statistical analysis was performed using R Software, considering $p < 0.05$.

Results
The Northeast registered 29,611 hospitalizations for primary headaches between 2015 and 2024, of which 63.96% occurred in women, with a peak occurrence in the 35–39 age group (2,803 cases). The gender disparity (female-to-male ratio > 2.0) was particularly marked between 20 and 39 years of age, reaching a peak of 2.47 in the 20–24 age group, whereas male predominance was restricted to childhood, with a ratio of 0.88 among individuals aged 1–9 years. Hormonal influence was confirmed by the statistically significant association between sex and life stages (χ^2=379.46; p<0.0001), demonstrating a higher concentration of women during the reproductive period. Of the total hospitalization cost of R$ 18,218,191.59, 59.49% was attributable to female patients. However, the average cost per hospitalization was 20.8% higher among men (R$ 691.55) than among women (R$ 572.24). Additionally, the postmenopausal group (≥ 50 years) presented the highest mean hospitalization cost (R$ 855.03), indicating that, despite the lower number of cases in this life stage, there is greater complexity in clinical management and potentially greater severity of the conditions presented.

Conclusion
Hospitalizations for headaches in the Northeast are influenced by hormonal and age factors, with greater female vulnerability during the menacme. In the economic sphere, although women concentrate the total financial volume, men and the elderly (post-menopause) generate the highest mean costs per hospitalization. These findings reinforce the need for targeted outpatient management strategies to optimize SUS resources and reduce the impact of high-cost hospitalizations.

Keywords:
Hospitalization
Brazil
Hospital costs
Primary headaches
Hormonal Influence

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Correlation between primary headaches and occupational workload: an ecological study of hospitalizations in Brazilian capitals (2015-2025)

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Introduction
Primary headaches such as migraine, cluster headache, and tension-type headache are among the leading causes of disability worldwide, causing impairments, especially in the occupational sphere. However, exhausting working hours constitute stressful and demanding behavioral routines, notably marked by pain syndromes like headaches. Thus, workers with long shifts have components in their routines that feed back into a pain process and may be involved in the genesis of headaches in large urban centers. Therefore, it is necessary to understand the relationship between Brazilian capitals with the longest working hours and the prevalence of headache hospitalizations.

Objective
To correlate the hospitalization rates for primary headaches in Brazilian capitals with their respective working hours.

Methods
This is an analytical ecological study with a quantitative and retrospective approach, using secondary data extracted from sources such as the Unified Health System Informatics Department (DATASUS) and the Brazilian Institute of Geography and Statistics (IBGE). Data on the hospitalization rates for headaches in Brazilian capitals from 2015 to 2025 were analyzed. Variables included average length of stay, estimated populations per capital, and average working hours. A correlation analysis was performed between average working hours and headache hospitalization rates.

Results
There were 29,106 hospitalizations for migraine and other cephalic pain syndromes recorded in Brazilian capitals during the analyzed period, with the highest number of cases in 2025 (3,361) and the lowest in 2020 (1,760). Recife stood out for having the highest absolute number of hospitalizations (6,435) and the highest rate per 100,000 inhabitants (405.1), associated with high weekly working hours (39.2) and a high average hospital length of stay (6.4 days). Furthermore, Aracaju had one of the highest average lengths of hospital stay (10 days), concomitantly with the country's third-highest weekly working hours (39.3 hours), suggesting an association between occupational overload, clinical worsening, and a greater need for hospital care. In contrast, Macapá showed a low hospitalization rate (7.8/100,000 inhabitants) and the shortest weekly working hours (37.3). São Paulo, despite recording the highest average weekly working hours (40.1 hours) and a high absolute number of hospitalizations (4,302), exhibited a low proportional rate (36.1/100,000 inhabitants) and a shorter hospital stay (4.1 days), representing a divergent finding.

Conclusion
The data analysis allowed inferring a strong association between longer weekly working hours and increased hospitalization rates and length of hospital stay for primary headaches in Brazilian capitals. However, divergent findings suggest the influence of additional factors beyond occupational workload, reinforcing the need for further investigations and strategies for promoting workers' health and preventing occupational stress.

Keywords:
Hospitalization
Headache disorders
Work hours

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Temporal trends and equity determinants of hospitalizations and outpatient access for headache disorders in Sergipe, Brazil (2015–2024): a population-based ecological study

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Introduction

Limitations in health-care access across Brazilian regions, with specialized services concentrated in major urban centers and insufficient outpatient care, lead patients to seek emergency services. Headache disorders illustrate this gap: although disabling and generally manageable in the outpatient setting, they become a cause of hospitalization when such access fails. Tracking the evolution of hospitalizations and outpatient care and their distribution across the territory allows the equity of access to be assessed — still understudied in Sergipe.

Objective

To investigate municipal determinants of equity in health-care access and temporal trends in hospitalizations and specialized outpatient care for headache disorders in Sergipe between 2015 and 2024.

Methods

Ecological time-series study using secondary data from DATASUS and denominators from the 2022 Census. Headache hospitalizations (ICD-10 G43–G44) were the outcome. The analyzed variables were the hospitalization rate per 100,000 inhabitants by sex and age group, the Gini index, and neurologist density. Trends were assessed by Prais-Winsten regression and the Mann-Kendall test (significance level 5%; $p<0.05$); equity associations by Spearman correlation; and geographic concentration by the Gini index of distribution.

Results

Between 2015 and 2024, the mean annual headache hospitalization rate in Sergipe (1.7) was about 64% lower than the national average (4.8); however, the state rate grew more steeply (+238% vs. +40% nationally), approaching the national level. Outpatient production fell sharply in 2020 (−26.4% versus 2019), followed by significant recovery (+168.5% by 2024; rho=1.00; $p<0.001$ post-2020). Hospitalizations predominated among women (67.1%; F:M ratio 2.04:1) and the 20–59 age group (63.5%; peak at 30–39 years). Specialized supply was scarce and concentrated: only 15% of municipalities (11/75) had a neurologist, and five (Aracaju, Nossa Senhora do Socorro, Capela, São Cristóvão, and Lagarto) accounted for 61.1% of hospitalizations (Gini=0.78). The rate correlated inversely with the income Gini index (rho=−0.38; $p<0.01$), and the number of neurologists was associated with hospitalization volume (rho=0.42; $p<0.01$), but not with the population-adjusted rate ($p=0.12$), indicating diagnosis-dependent registration.

Conclusion

Sergipe showed a hospitalization rate lower than the national rate, though in rapid convergence. The 2020 outpatient drop and subsequent recovery reveal the impact of the COVID-19 pandemic on specialized access, with interruption of elective care followed by pent-up demand. The scarcity and concentration of neurologists indicate marked territorial inequity, reinforced by lower hospitalization in poorer municipalities and by greater hospitalization where specialized therapeutic care is available. These findings support strengthening diagnosis in primary care and decentralizing neurology to mitigate avoidable hospitalizations.

Keywords:
Migraine
Headache
Epidemiology
Health equity
Unified Health System

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Temporal trend of hospitalizations for migraine and other cephalic pain syndromes in northeastern Brazil: analysis of hospitalization patterns before, during, and after the COVID-19 pandemic between 2015 and 2025

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Introduction
Migraine is one of the most prevalent and disabling neurological diseases in the world, representing a significant cause of morbidity and healthcare resource utilization. The COVID-19 pandemic brought about profound changes in the dynamics of hospital services, potentially impacting hospitalization patterns for non-infectious conditions. Therefore, the analysis of the temporal trend of hospitalizations for migraine and other cephalic pain syndromes may contribute to understanding the indirect effects of the pandemic on neurological care in Northeastern Brazil.

Objective
To analyze the temporal trend of hospitalizations for migraine and other cephalic pain syndromes in Northeastern Brazil between 2015 and 2025, with emphasis on hospitalization patterns during and after the COVID-19 pandemic.

Methods
An ecological, retrospective, and descriptive study, conducted using data from the Hospital Information System of the SUS (SIH/SUS), obtained from DATASUS. Hospitalizations for migraine and other cephalic pain syndromes in Northeastern Brazil between 2015 and 2025 were analyzed. Data were subjected to descriptive analysis, with assessment of temporal trends and percentage variation across the pre-pandemic, pandemic, and post-pandemic periods.

Results
A total of 32,993 hospitalizations for migraine and other cephalic pain syndromes were recorded in Northeastern Brazil between 2015 and 2025. An increasing trend in hospitalizations was observed between 2015 and 2019, with an 86.3% rise over this period, growing from 1,925 to 3,586 admissions, with an annual mean of 2,811.2 cases. In 2020, a 30.7% decrease was recorded, with 2,485 hospitalizations compared to the 3,586 of the previous year. In 2021, there were 2,927 hospitalizations, a figure 18.4% lower than that observed in 2019. The annual mean for 2020 and 2021 was 2,706.0 cases, representing a 3.7% reduction compared to the mean observed between 2015 and 2019. From 2022 onward, a recovery in hospitalizations was observed, with 3,459 admissions, followed by 3,431 in 2023, 3,329 in 2024, and 3,306 in 2025. The annual mean between 2022 and 2025 was 3,381.3 hospitalizations, corresponding to a 25.0% increase relative to the mean recorded in 2020 and 2021. Despite the recovery following the pandemic period, the number of hospitalizations in 2025 remained 7.8% below the peak recorded in 2019.

Conclusion
An interruption of the increasing trend in hospitalizations for migraine and other cephalic pain syndromes was observed during the pandemic period, followed by a gradual recovery from 2022 onward, although the figures recorded in 2025 remain below the peak observed in 2019. These findings suggest that the COVID-19 pandemic context was associated with temporary changes in hospitalization patterns for these conditions in Northeastern Brazil, highlighting possible indirect repercussions on access to and utilization of healthcare services.

Keywords:
Headache
Hospitalization
Brazil
COVID-19
Descriptive epidemiology

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Association between endometriosis and increased risk of migraine in women: a systematic review

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Introduction
Endometriosis is a chronic inflammatory gynecological disease that primarily affects women of reproductive age, leading to significant impacts on quality of life. Likewise, migraine has a high prevalence among women and is often associated with hormonal and inflammatory factors. In this context, recent studies suggest an association between endometriosis and an increased risk of migraine, possibly due to shared pathophysiological mechanisms.

Objective
To investigate the association between endometriosis and an increased risk of migraine in women.

Methods
This study is a systematic literature review based on articles selected from the Virtual Health Library and PubMed databases using the descriptors "Endometriosis" AND "Migraine." Full-text articles freely available in English and published between 2017 and 2025 were included. In addition, the PICO strategy was applied to structure the research question, considering: population (women), exposure (presence of endometriosis), comparison (women without endometriosis), and outcome (increased risk of migraine). Case reports, duplicate studies, and studies with limited relevance to the proposed topic were excluded. Initially, 48 articles were identified, of which only 10 met the eligibility criteria and were included in the study.

Results
The analyzed studies demonstrated a significant association between endometriosis and an increased risk of migraine in women. The main meta-analysis included in this review, comprising 331,655 participants, showed that women with endometriosis were approximately 2.25 times more likely to develop migraine compared to those without the disease (OR=2.25; 95% CI: 1.85–2.72), with an even stronger association observed for migraine without aura (OR=2.64; 95% CI: 1.89–3.69). Furthermore, some studies identified a relationship between moderate to severe forms of endometriosis and a higher occurrence of migraine symptoms, suggesting a direct impact of disease severity on headache manifestation. Additionally, the articles highlighted possible shared pathophysiological mechanisms between endometriosis and migraine, including estrogen-related hormonal changes, systemic inflammation, increased prostaglandin release, central sensitization, and activation of the trigeminovascular system, all of which may contribute to the development and chronicity of pain.

Conclusion
The association between endometriosis and migraine in women was shown to be significant across the analyzed studies, particularly among patients with more severe forms of the disease. The findings emphasize the possible involvement of shared hormonal, inflammatory, and neuroimmune mechanisms, reinforcing the importance of early recognition of this association and the adoption of individualized and multidisciplinary clinical approaches.

Keywords:
Migraine
Endometriosis
Women

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Epidemiological profile of patients hospitalized for migraine and other headache syndromes by age group in Sergipe between 2015-2025

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Introduction

According to the WHO, migraines and headaches are leading causes of global disability, severely affecting productivity. In Sergipe, Brazil, there is a shortage of recent studies linking clinical diagnoses to local demographics. Since these conditions peak during adulthood, identifying the age-based epidemiological profile is vital for public policy and mitigating economic costs. This study examines SIH/SUS data from the last decade to outline Sergipe's regional landscape.

Objective

To analyze the age distribution and temporal trends of migraine and other headache syndrome notifications in the state of Sergipe between 2015 and 2025.

Methods

This is an epidemiological, retrospective cross-sectional study, with a quantitative approach, based on data collection from the SIH/SUS system via DATASUS. In the Morbidity List category (ICD-10), "Migraine and other headache syndromes" was selected. The analyzed variables referred to the state of Sergipe between 2015 and 2025. The analysis correlated the age group of hospitalized patients with information from scientific articles published within the last 5 years, searched in PubMed using the descriptors "Headache" and "Hospitalizations."

Results

From 2015 to 2025, Sergipe recorded 470 hospitalizations for migraines and headaches via SIH/SUS. The historical series showed progressive growth, peaking in the 2024–2025 biennium with 154 cases—32.7% of the decade's total and a sharp increase from the 23 cases in 2015. The profile predominantly affects working-age adults: the 30–39 (19.3%) and 20–29 (18%) groups lead, and together with the 40–49 cohort, they represent 52.3% of morbidity. Clinical relevance was noted in the 10–14 age group (40 cases), while figures declined in senescence, with only 5 records among those aged 80+. The recent surge in the last biennium is linked to psychosocial factors, like anxiety and sleep disorders, alongside Long COVID. Neuroinflammation and chronic trigeminovascular activation in "post-COVID headaches" often cause resistance to conventional treatment, necessitating hospitalization for refractory cases.

Conclusion

In Sergipe, headache disorders strain the healthcare system by primarily affecting the productive population (ages 20 to 49). The surge in hospitalizations during the 2024–2025 period reflects new challenges, such as the impact of mental health and severe Long COVID sequelae, which demand specialized care. Consequently, there is an urgent need to strengthen neurology and mental health care networks within the state, focusing on early diagnosis and outpatient management to prevent hospitalizations. Furthermore, continuous monitoring of post-pandemic neurological effects is vital to guide effective preventive and therapeutic strategies.

Keywords:
Migraine
Headache
Pain
Hospitalization

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Epidemiological analysis of death cases due to migraine and other cephalic pain syndromes in northeastern Brazil (2021-2025)

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Introduction

Neurological disorders are an important public health issue due to their impact on quality of life, hospitalizations, and mortality. Among them, migraine and other cephalic pain syndromes are highly prevalent and may be associated with severe complications. In Northeastern Brazil, epidemiological studies on mortality related to these conditions remain limited. Therefore, this study analyzes SIH/SUS data from the last five years to describe the epidemiological profile of deaths caused by migraine and other cephalic pain syndromes in Northeastern Brazil.

Objective

To analyze the epidemiological profile of deaths caused by migraine and other cephalic pain syndromes in Northeastern Brazil between 2021 and 2025.

Methods

This is a retrospective, cross-sectional epidemiological study with a quantitative approach, conducted through data collection from the Brazilian Unified Health System Hospital Information System (SIH/SUS), linked to DATASUS. In the ICD-10 Morbidity List category, "Migraine and other cephalic pain syndromes" was selected, and the variables analyzed included gender, age group, and region. The data analyzed were restricted to death cases involving patients from the Northeastern region of Brazil, covering the period from 2021 to 2025.

Results

Between 2021 and 2025, 311 deaths caused by migraine and other cephalic pain syndromes were recorded in Northeastern Brazil. Ceará presented the highest incidence, with 230 cases (73.9% of the total), while Rio Grande do Norte registered the lowest incidence, with only 1 case. Regarding gender, there was a predominance among females, accounting for 172 deaths (55.3%), whereas males corresponded to 139 cases (44.7%). In addition, concerning age groups, older adults were the most affected, especially individuals aged 80 years and older, who accounted for 60 deaths (19.3%), followed by the 60–69 years age group, with 55 cases (17.7%). These findings demonstrate the greater vulnerability of the elderly population to complications related to cephalic pain syndromes.

Conclusion

In conclusion, the findings indicate important regional and demographic differences in deaths related to migraine and other cephalic pain syndromes in Northeastern Brazil. The higher number of cases observed in Ceará may be associated with the concentration of specialized healthcare services and referral centers in the state, whereas the lower incidence in Rio Grande do Norte may reflect differences in reporting and healthcare distribution. The predominance among females is consistent with the known influence of hormonal factors on migraine occurrence, while the greater mortality among older adults may be related to increased clinical vulnerability and the presence of comorbidities. Overall, the results reinforce the importance of strengthening epidemiological surveillance, improving access to healthcare services, and promoting early diagnosis and appropriate management of cephalic pain syndromes.

Keywords:
Migraine
Headache
Pain
Mortality
Death

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Headache associated with sexual activity: analysis of gender differences and diagnostic barriers

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Introduction

Headache Associated with Sexual Activity (HASA) is a rare disorder occurring in approximately 0.37% of patients evaluated at tertiary headache centers. Unlike most primary headaches, which predominantly affect women, HASA demonstrates clear male predominance, with a male-to-female ratio ranging from 2.9:1 to 3:1. Recent studies show that men are diagnosed with HASA more frequently than women (1.54% vs. 0.61% in sex-specific analyses). However, it remains uncertain whether this difference reflects higher prevalence in men or underdiagnosis in women due to cultural, social, and physician–patient communication barriers. In Brazil, cultural aspects related to female sexuality may further amplify these barriers.

Objective

To analyze gender differences in the prevalence and diagnosis of Headache Associated with Sexual Activity, identify potential barriers to diagnosis in women, and discuss Brazilian cultural factors that may influence the reporting of this condition.

Methods

A narrative literature review was conducted using the PubMed/MEDLINE databases, focusing on epidemiological studies and case series published between 1988 and 2025. Demographic data, sex ratio, clinical characteristics, and factors potentially influencing differential diagnosis between men and women were analyzed. A critical analysis of possible reporting biases and cultural barriers specific to the Brazilian context was also performed.

Results

A recent meta-analysis involving 40,702 individuals demonstrated a prevalence of HASA of 0.37% in tertiary centers, with significant male predominance (ratio 2.9–3:1). Sex-specific analysis revealed that 1.54% of men versus 0.61% of women presented with HASA. However, an Asian study found a balanced proportion (50% women), suggesting the influence of regional cultural factors. The mean age of onset is similar between sexes (37–40 years), as are clinical characteristics, pain location, and comorbidities. Patients frequently report difficulty discussing the condition with physicians, often resulting in limitation of sexual activity due to embarrassment. Studies indicate that therapeutic counseling plays an essential role in management, in addition to pharmacological treatment. In the Brazilian context, cultural taboos related to female sexuality, lower perceived sexual autonomy among women, and possible gender bias in medical evaluation may contribute to underreporting in women.

Conclusion

The male predominance observed in HASA may reflect not only a true biological difference but also underdiagnosis in women resulting from cultural and communication barriers. Brazilian cultural aspects related to female sexuality may further intensify these barriers. Strategies to improve physician–patient communication, reduce stigma, and facilitate symptom reporting by women are essential for accurate diagnosis. Brazilian epidemiological studies are needed to characterize the true profile of this condition in the national population and to identify gender disparities in diagnosis.

Keywords:
Headache
Sexual activity
Gender differences
Diagnostic barriers

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Hospitalizations for migraine and cephalic algic syndromes in the SUS in Sergipe (2015–2025): analysis of the epidemiological profile by sex, age group and temporal tendency

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Introduction
Migraine and other cephalic pain syndromes are highly prevalent conditions worldwide and represent a significant burden for healthcare systems, patients, beeing one of the most disabling neurological conditions globally, and imposing substantial economic burden through, particularly, working-age adults. In Brazil, the SUS serves as the primary source of care for most of the population, yet epidemiological studies on headache disorders remain concentrated in southeastern centers, leaving northeastern states significantly underrepresented. Sergipe, the smallest Brazilian state, faces structural vulnerabilities including limited access to specialized neurology services, making regional hospitalization data essential for evidence-based health planning.

Objective
To analyze the epidemiological profile and temporal trends of hospital admissions for migraine and cephalic pain syndromes in Sergipe between 2015 and 2025, with emphasis on sex, age group and length of stay.

Methods
Retrospective ecological study using secondary data from SIH/SUS for Sergipe, 2015–2025. Variables included year of admission, sex, age group, length of stay and mortality. Statistical analyses: simple linear regression for temporal trend; chi-square test for sex distribution; Mann-Whitney U test comparing length of stay between the Economically Active Population (EAP, 20–59 years) and non-EAP groups. Significance level: $p<0.05$.

Results
A total of 471 hospitalizations were recorded. Linear regression identified a significant upward trend ($\beta=3.84$/year; $R^2=0.464$; $p=0.021$), with a 230.4% increase from 2015 (n=23) to 2025 (n=76). Female sex predominated (66.7%; F:M=2:1; $\chi^2=52.33$; $p<0.001$). The EAP accounted for 63.9% of admissions, with mean stay of 9.30 vs. 8.1 days overall. Length of stay peaked at 40–49 years (11.2 days), following an inverted-U pattern across age groups. EAP patients had significantly longer hospitalizations than non-EAP (median 9.4 vs. 6.2 days; U=51,170; $p<0.001$).

Conclusion
Migraine-related hospitalizations in Sergipe showed a significant upward trend over the decade, disproportionately affecting women and the economically active population. The female predominance reflects well-established hormonal and neurobiological mechanisms. The concentration in the EAP, combined with longer stays in this group, suggests relevant indirect economic impact through workforce absenteeism — particularly significant in a state with limited outpatient neurological care. The inverted-U pattern peaking at 40–49 years indicates that mid-life adults face the most complex presentations. These findings reinforce the need for targeted preventive strategies and expanded regional health policies for headache management in Sergipe.

Keywords:
Migraine
Hospitalization
Epidemiology
Unified Health System

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09

Acute and preventive treatment of migraines



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The outpatient collapse translated into 48,408 urgent admissions for headache in the Brazilian Public Health System

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Introduction
The ideal care workflow in the Brazilian Public Health System (SUS) dictates that primary pain syndromes, such as migraines, should be screened, diagnosed, and managed longitudinally within Primary Health Care and specialty outpatient clinics. The need for hospitalization due to a primary headache should theoretically be a rare and elective event for refractory investigation. However, chronic lack of assistance, the shortage of neurologists in the basic network, and the unavailability of adequate prophylaxis divert the patient's natural flow. Faced with intractable crises and preventive failures, the population is forced to use emergency rooms not only for pain relief but as their only viable point of access to medical care.

Objective
To quantify and analyze the admission character (elective versus urgent) of patients hospitalized with a primary diagnosis of headache or migraine (ICD-10 G43 and G44) in the SUS between 2019 and 2023, aiming to measure the acute overload imposed on the emergency hospital network.

Methods
An epidemiological, observational, descriptive, and retrospective study was developed using the entirety of national microdata from the Hospital Information System (SIH/DATASUS). The extraction and treatment of the cohort were automated in RStudio, filtering Hospital Admission Authorizations (AIHs) from the 2019-2023 quinquennium. The primary dependent variable analyzed was the Admission Character, stratifying the sample between elective and urgent/emergency admissions.

Results
The analysis of the definitive universe of 51,214 admissions revealed a severe logistical asymmetry in the hospital entry flow. It was identified that the overwhelming majority of admissions, totaling 48,408 records (94.5% of the national sample), occurred on an urgent basis. Conversely, electively scheduled admissions represented a minimal fraction, totaling only 2,806 cases (5.5%). This finding demonstrates that almost all patients occupying beds for primary headache syndromes enter the system already in a state of severe acute exacerbation, refractoriness, or status migrainosus, demanding immediate intravenous intervention.

Conclusion
The finding that 94.5% of headache admissions occur on an urgent basis consolidates the thesis of a collapse in the preventive neurological outpatient network in the SUS. The Brazilian emergency room has, in practice, become the primary pain clinic for the underserved population. This massive volume of acute patients not only reveals chronically undertreated suffering but also directly competes for physical beds, supplies, and medical time with life-threatening conditions, such as stroke and polytrauma. The creation of rapid triage workflows and the restructuring of primary care are imperative to intercept crises before they progress to the emergency department doors.

Keywords:
Emergency medicine
Primary health care
Status migrainosus

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Clinical improvement in HIT-6 and pain scores after cranial nerve blocks in patients with migraine treated at a referral headache center

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Introduction
Cranial nerve blocks (CNB) have been increasingly used as an adjunctive strategy in patients with migraine, particularly in those with prolonged attacks, partial response to conventional therapy, contraindications to acute medications, or refractory symptoms. The procedure commonly involves blockade of the greater and lesser occipital nerves and branches of the trigeminal nerve, including the supraorbital, supratrochlear, and auriculotemporal nerves.

Objective
To evaluate the clinical response to cranial nerve blocks in patients with migraine treated at the Headache Outpatient Clinic of Santa Casa de Misericórdia de São Paulo using the Headache Impact Test (HIT-6) and the Visual Analog Scale (VAS) before and after the procedure.

Methods
This was an open observational study including patients with migraine and partial symptom control treated at the Headache Outpatient Clinic of Santa Casa de Misericórdia de São Paulo between 2021–2022 and 2025–2026 who underwent cranial nerve blocks. Clinical response was evaluated through comparison of HIT-6 and VAS scores obtained before and one month after the procedure. Paired comparisons between pre- and post-procedure scores were performed using paired Student's t-tests, with 95% confidence intervals.

Results
Thirty-two patients were included. Most participants were female (87.5%), with a mean age of 50.9 years (range: 18–80). Regarding preventive treatment, 78.1% of patients were using at least one prophylactic medication, while combined preventive therapy was observed in 50%. The mean VAS score before the procedure was 8.93 (range: 7–10), decreasing to 5.27 (range: 2–9) after CNB. Paired analysis demonstrated a statistically significant reduction in VAS scores following the intervention (mean difference: −3.66±1.44; t(31)=−14.40; p<0.001; 95% CI: −4.18 to −3.14). The mean HIT-6 score before CNB was 64.88 (range: 48–78), decreasing to 54.66 (range: 36–76) after the intervention. This reduction was also statistically significant (mean difference: −10.22±7.50; t(31)=−7.71; p<0.001; 95% CI: −12.92 to −7.52). These findings demonstrated significant improvement in both pain intensity and headache-related disability after cranial nerve block treatment.

Conclusion
Cranial nerve blocks showed potential as a complementary therapeutic strategy to assist conventional migraine treatment, with significant reductions in pain intensity and headache-related functional impact measured by VAS and HIT-6 scores. Although this was an open study and therefore does not allow definitive conclusions regarding treatment efficacy, the findings corroborate previous studies suggesting a potential benefit of cranial nerve blocks in migraine management.

Keywords:
Migraine
Cranial nerve blocks
Migraine treatment

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Effect of vitamin D supplementation on migraine prophylaxis in adults: a systematic review of randomized clinical trials

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Introduction
Migraine is a prevalent neurological condition with significant impact on quality of life. Its pathophysiology involves trigeminovascular system activation and release of neuropeptides such as Calcitonin Gene-Related Peptide (CGRP), alongside inflammatory processes in chronification. Vitamin D, given its anti-inflammatory properties, has been investigated as an adjuvant.

Objective
To evaluate the effect of vitamin D supplementation, as monotherapy or combined, on frequency, intensity, and duration of migraine attacks in adults, as well as on inflammatory markers.

Methods
A systematic review per PRISMA 2020, based on the PICO strategy. Randomized clinical trials with adults diagnosed with migraine receiving vitamin D at any dose or frequency, with or without other treatments, versus placebo were included. Primary outcomes were attack frequency, intensity, and duration; secondary outcomes were inflammatory markers. The search was performed up to April 2026 in PubMed, SciELO, Virtual Health Library, Web of Science, and Cochrane Library, without language or date restrictions, using descriptors "vitamin D" and "migraine." Study selection and data extraction were done by two independent reviewers. Risk of bias was assessed using the RoB 2.0 tool.

Results
844 records were identified; after screening, 5 publications were included: 4 unique randomized clinical trials (n=194) and one post-hoc analysis. Two studies evaluated vitamin D as monotherapy and two as combination therapy (probiotics or simvastatin). In monotherapy, 4000 IU/day (24 weeks) reduced monthly migraine days versus placebo ($p<0.001$), without altering severity or duration. The 2000 IU/day dose (12 weeks) outperformed placebo ($p<0.05$) in frequency, duration, and severity, besides reducing iNOS ($p=0.001$) and marginally IL-6 ($p=0.055$). Its post-hoc analysis showed lower interictal CGRP in the active group ($p=0.02$). In combination therapy, vitamin D plus probiotics surpassed placebo in frequency ($p=0.031$) and severity ($p=0.017$), with no impact on duration. Vitamin D plus simvastatin (1000 IU twice daily) reduced attack frequency at weeks 1-12 and 13-24 versus placebo ($p<0.001$), without changes in severity or duration. Limitations include dose and treatment duration heterogeneity, with risk of bias in blinding and allocation concealment.

Conclusion
Available evidence signals a trend toward reduced migraine frequency in both monotherapy and combined protocols. Current study designs do not allow inferring superiority of combination over isolated therapy, given the absence of direct comparative arms and marked heterogeneity in doses and intervention times. Intensity and duration outcomes proved heterogeneous, raising the hypothesis of a context-dependent effect. Reduction in inflammatory markers and CGRP in studies assessing these outcomes lends biological plausibility. Future trials with standardized protocols, greater power, and appropriate comparators are needed to confirm this trend and define vitamin D's role in migraine management.

Keywords:
Migraine disorders
Systematic review
Biomarkers
Vitamin D
Dietary supplements

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Impact of anti-CGRP monoclonal antibodies on disability reduction and quality of life improvement in patients with migraine: a systematic review

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Introduction
Migraine is a highly disabling neurological condition associated with significant functional impairment and reduced quality of life. In recent years, anti-CGRP monoclonal antibodies have emerged as a targeted therapeutic option for migraine prophylaxis, demonstrating benefits not only in reducing attack frequency but also in improving patient functionality.

Objective
To analyze the impact of anti-CGRP monoclonal antibodies on functional outcomes and quality of life in patients with migraine.

Methods
This is a systematic review based on the PICO strategy, defined as follows: P - patients with migraine; I - use of anti-CGRP monoclonal antibodies; C - absence of anti-CGRP therapy or use of conventional preventive therapies; O - reduction in disability and improvement in quality of life. The search was conducted in the PubMed, LILACS and SciELO database using the descriptors "migraine" AND ("anti-CGRP" OR "monoclonal antibodies") AND ("MIDAS" OR "HIT-6"), initially yielding 223 articles. Studies published within the last 12 months, conducted in humans, and freely available in full text were included. After applying the eligibility criteria, 16 studies remained for analysis.

Results
The studies demonstrated consistent benefits of anti-CGRP monoclonal antibodies in reducing migraine-related disability and improving quality of life. Significant reductions in HIT-6 and MIDAS scores were observed, along with decreases in monthly migraine days (MMD), particularly among patients with resistant and refractory migraine. In a retrospective study involving 80 patients, 65% achieved a ≥50% reduction in MMD, while 66% showed a ≥6-point reduction in HIT-6 scores after 52 weeks of treatment, in addition to significant improvements in quality of life and high treatment satisfaction. In a Swiss multicenter study with 24 months of follow-up, mean reductions of 8.1 points in HIT-6 (Headache Impact Test), 16.6 points in MIDAS (Migraine Disability Assessment), and 8.8 monthly migraine days were observed, accompanied by sustained improvements in functionality and family-related disease burden. The studies also demonstrated high treatment adherence, good tolerability, and low rates of serious adverse events, reinforcing the effectiveness of anti-CGRP therapies in real-world clinical practice. Similar outcomes were reported with Erenumab, Fremanezumab, Galcanezumab, and Eptinezumab, including among patients with multiple previous therapeutic failures.

Conclusion
Anti-CGRP monoclonal antibodies demonstrated a significant impact on reducing migraine-related disability, with marked improvements in MIDAS and HIT-6 scores, as well as reductions in attack frequency. The studies also showed sustained improvements in quality of life, patient functionality, and treatment satisfaction, associated with good tolerability and high adherence rates, reinforcing the potential of these agents in the preventive management of migraine, especially in resistant cases.

Keywords:
Migraine
Anti-CGRP monoclonal antibodies
Quality of life

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Anti-CGRP monoclonal antibodies for the prevention of chronic or refractory migraine in adults: efficacy and safety

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Introduction
Chronic and refractory migraine is a major cause of disability, significantly impairing quality of life and imposing a substantial socioeconomic burden. Given the limitations of conventional preventive therapies, anti-calcitonin gene-related peptide (CGRP) monoclonal antibodies have emerged as a promising therapeutic alternative.

Objective
This study aimed to evaluate the efficacy and safety of these agents in adults with chronic or refractory migraine.

Methods
This systematic review followed PRISMA guidelines and was registered in PROSPERO (CRD420261406575). PubMed and Cochrane were searched for studies published between 2017 and 2026. Inclusion criteria comprised English-language randomized controlled trials enrolling adults (≥18 years) with chronic or refractory migraine and evaluating anti-calcitonin gene-related peptide (anti-CGRP) monoclonal antibodies. Eligible studies were required to report at least one efficacy or safety outcome, including monthly migraine days, responder rates, functional outcomes, acute medication use, or treatment-related adverse events. Two reviewers independently screened titles, abstracts, and full texts, with disagreements resolved by a third reviewer. Data on population characteristics, efficacy outcomes, and adverse events were extracted and analyzed. Risk of bias was assessed using the Cochrane RoB 2 tool, and all included studies were judged to have a low overall risk of bias.

Results
The search identified 367 records, of which 20 duplicates were removed. After screening, 11 randomized controlled trials involving more than 8,000 participants were included. The studies evaluated eptinezumab, fremanezumab, galcanezumab, and erenumab in episodic and chronic migraine. Compared with placebo, anti-CGRP therapies reduced monthly migraine days by 1.6–3.7 additional days and increased ≥50% responder rates from 9–44% to 27–64% and ≥75% responder rates from 2–24% to 7–43%. In patients with 2–4 prior preventive treatment failures, reductions in monthly migraine days ranged from 1.6–3.7 days, with ≥50% responder rates of 30–49% versus 9–14% with placebo. Acute medication use decreased by up to 3.4 days/month, HIT-6 scores improved by up to 8.5 points, and MIDAS scores by up to 17.8 points. Sustained efficacy was demonstrated for up to 24 weeks, with monthly migraine day reductions of 8.2–8.8 days versus 6.2 days with placebo during weeks 13–24. Adverse events were mostly mild to moderate, occurring in 41–61% of treated patients, while serious adverse events were uncommon (≤2%) and showed no consistent cardiovascular, hepatic, or treatment-related safety signals.

Conclusion
Anti-CGRP monoclonal antibodies demonstrated consistent efficacy and favorable tolerability in chronic or refractory migraine. They reduced monthly migraine days, increased responder rates, and improved disability outcomes, including in patients with prior treatment failures, supporting their use as an effective preventive therapy.

Keywords:
Migraine
Anti-CGRP monoclonal antibodies
Chronic migraine
Refractory migraine
Efficacy

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Acupuncture for migraine prophylaxis: evidence on reducing attack frequency

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Introduction
Migraine is a highly prevalent and disabling neurological disorder associated with reduced quality of life and substantial socioeconomic burden. Although pharmacological prophylaxis is the standard treatment, adverse effects and poor adherence have increased interest in complementary therapies such as acupuncture. However, its effectiveness in migraine prevention remains under discussion.

Objective
To analyze the evidence regarding the effectiveness of acupuncture in reducing migraine attack frequency compared with conventional treatment, placebo, or no prophylactic intervention.

Methods
This literature review was developed based on the following PICO question: "In patients with migraine, does acupuncture, compared with conventional treatment or no treatment, reduce the frequency of migraine attacks?" The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A search was conducted in the PubMed database using the descriptors ("Migraine Disorders" OR "Migraine") AND ("Acupuncture Therapy" OR "Acupuncture") AND ("Prevention and Control" OR "Prophylaxis"). Initially, 158 studies were identified. Filters were then applied to include publications from the last 10 years, studies involving humans, articles published in English, and study designs classified as clinical trials, meta-analyses, or observational studies. After title and abstract screening, duplicate studies, articles not directly related to migraine prophylaxis, and publications that did not address the research question were excluded. The remaining studies underwent full-text review. A total of seven articles were selected for qualitative synthesis

Results
The selected studies showed that acupuncture significantly reduced migraine attack frequency compared with usual care and no prophylactic treatment. Randomized trials demonstrated fewer headache days and sustained long-term benefits. Improvements in quality of life and reduced use of rescue medications were also reported. Meta-analyses found acupuncture to be as effective as, or superior to, some pharmacological prophylactic therapies, with fewer adverse effects. Recent evidence suggests outcomes comparable to topiramate in chronic migraine prevention.

Conclusion
Current evidence supports acupuncture as an effective and safe option for migraine prophylaxis, reducing attack frequency and improving clinical outcomes. Its favorable safety profile makes it a valuable complementary therapy. However, variations in study designs and acupuncture protocols limit direct comparisons. Further standardized studies are needed to strengthen clinical recommendations.

Keywords:
Migraine
Headache
Prophylaxis
Acupuncture

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Bibliometric analysis of oral preventive treatments for chronic migraine: focusing on topiramate, amitriptyline, and propranolol

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Introduction
Chronic migraine is a highly debilitating neurological condition that imposes a substantial socioeconomic and personal burden. Although oral preventive medications remain the primary therapeutic strategy, a comprehensive mapping of their recent scientific production, clinical efficacy, and safety profile is essential to guide evidence-based clinical decisions.

Objective
To analyze the scientific evidence on the effectiveness and safety of topiramate, amitriptyline, and propranolol in chronic migraine prevention through a bibliometric analysis of recent scientific publications.

Methods
This is a bibliometric study conducted in the PubMed and Cochrane databases, using the descriptors "Migraine", "Topiramate", "Amitriptyline" and "Propranolol", combined by the Boolean operators AND and OR. Articles published between 2021 and 2026, in English and Portuguese, available in full text, involving clinical studies, randomized controlled trials, and meta-analyses related to these preventive treatments were included. Duplicate studies, letters to the editor, and papers outside the theme were excluded. In the bibliometric stage, variables such as the annual number of publications, predominant methodological types, and thematic trends related to pharmacological prevention were analyzed.

Results
A total of 78 articles were initially identified, of which 24 met the eligibility criteria. The bibliometric analysis showed a stable annual publication volume, with randomized controlled trials and observational studies emerging as the predominant methodological types. Regarding clinical evidence, topiramate demonstrated robust efficacy in reducing monthly headache days (MHD) but was associated with the highest rate of adverse event-related discontinuation (ranging from 20% to 25% across the analyzed data), primarily driven by paresthesia and cognitive complaints. Amitriptyline and propranolol showed comparable effectiveness in reducing migraine frequency but featured significantly lower discontinuation rates, with side effects predominantly characterized by weight gain/somnolence and fatigue, respectively.

Conclusion
Oral preventive treatments with topiramate, amitriptyline, and propranolol demonstrate established therapeutic value in managing chronic migraine. The steady scientific production observed in the bibliometric analysis reinforces the ongoing clinical relevance of these classic pharmacological options. Despite favorable efficacy results, significant differences in tolerability profiles persist, making individual tailoring essential to optimize long-term treatment adherence and minimize adverse event-related withdrawals.

Keywords:
Chronic migraine
Preventive treatment
Bibliometric analysis
Data mapping
Tolerability

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Analysis of the efficacy and safety of botulinum toxin type A (OnabotulinumtoxinA) in the prophylactic treatment of chronic migraine

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Introduction
Chronic Migraine is a disabling neurological disorder frequently associated with nausea, photophobia, and phonophobia. In addition to its high prevalence, it has a substantial impact on patients' quality of life and daily functioning. In this context, OnabotulinumtoxinA has emerged as a promising prophylactic therapy due to its ability to reduce the frequency and intensity of migraine attacks.

Objective
To evaluate the efficacy and safety of botulinum toxin type A in the prophylaxis of chronic migraine, analyzing attack reduction, improvement in quality of life, and treatment-related adverse effects.

Methods
This study is a systematic literature review, with studies selected from the MEDLINE/PubMed, Cochrane Library, and LILACS databases using the descriptors "Migraine Disorders and Treatment and Botulinum Toxins, Type A". Original articles published in English, freely available, and published within the last five years (2021–2026) were included. The PICO strategy considered: population (adults with chronic migraine), exposure (treatment with botulinum toxin type A), comparison (conventional treatment/placebo), and outcomes (disease progression). Duplicate articles and studies with low relevance to the proposed topic were excluded. Initially, 37 studies were identified, of which 10 met the eligibility criteria and were included in the review.

Results
The analyzed studies demonstrated that OnabotulinumtoxinA provides significant efficacy in the prophylaxis of Chronic Migraine, reducing attack frequency, headache days, and the need for analgesic medications. Randomized clinical trials and meta-analyses showed consistent improvement in clinical outcomes, particularly in patients with medication-overuse headache. Compared with placebo, treatment resulted in an average reduction of 2–3 headache days per month. When compared with topiramate and anti-CGRP monoclonal antibodies, botulinum toxin type A showed similar efficacy in some studies, although anti-CGRP antibodies demonstrated superior outcomes in certain analyses. Nevertheless, botulinum toxin type A stood out for its favorable tolerability profile and lower treatment discontinuation rates. The most commonly reported adverse effects included injection-site pain, neck pain, muscle stiffness, and eyelid ptosis, which were generally mild and transient, with no significant increase in serious adverse events compared with placebo.

Conclusion
OnabotulinumtoxinA demonstrated efficacy and safety in the prophylaxis of Chronic Migraine, reducing attack frequency and improving patients' quality of life and disability associated with the disease. Although newer therapies, such as anti-CGRP monoclonal antibodies, have shown superior outcomes in some measures, botulinum toxin type A remains a relevant therapeutic option due to its clinical effectiveness and good tolerability, especially in patients refractory to conventional therapies.

Keywords:
Chronic migraine
OnabotulinumtoxinA
Prophylactic treatment

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Efficacy of fremanezumab in patients with migraine and comorbid depression: a systematic review and meta-analysis

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Introduction
Migraine is the leading cause of disability among individuals under 50 years of age. Population-based studies indicate that depression is a common comorbidity in individuals living with migraine, with a bidirectional relationship in which each condition increases the risk of onset of the other. Despite the availability of preventive and acute treatments, a substantial proportion of patients remain inadequately controlled, particularly those with comorbid psychiatric conditions. Fremanezumab, a fully humanized monoclonal antibody targeting calcitonin gene-related peptide (CGRP), has emerged as a potential therapeutic strategy and has been associated with reductions in headache and migraine days.

Objective
To evaluate the efficacy of Fremanezumab in patients with migraine and depression.

Methods
We conducted a systematic review and meta-analysis following Cochrane guidelines. PubMed, Embase, and Cochrane databases were searched for randomized controlled trials (RCTs) or observational studies. Eligible studies included adult patients with chronic or episodic migraine and comorbid depression. Depressive symptoms were defined using validated diagnostic criteria or standardized assessment tools, including a Patient Health Questionnaire-9 (PHQ-9) score ≥10. The primary outcome was the change in monthly migraine days (MMD) from baseline. As a secondary outcome, changes in depressive symptom severity were assessed using the PHQ-9 score.

Results
Three randomized studies comprising 608 patients were included after screening 253 records; of these, 69 (11.3%) were male, with a median age of 42 years. Pooled analysis showed that fremanezumab significantly reduced monthly migraine days (MMD) compared with control (MD −2.68; 95% CI −3.77 to −1.59; $p < 0.0001$; $I^2=0\%$). Depressive symptom severity, assessed using the PHQ-9, showed a consistent trend toward improvement across the included studies. In the HALO CM trial, fremanezumab was associated with numerically greater reductions in PHQ-9 scores with quarterly (−10.9±1.01) and monthly dosing (−9.8±0.93) compared with placebo (−9.2). Similar findings were observed in the UNITE study, in which monthly fremanezumab also demonstrated a trend toward greater improvement in PHQ-9 scores versus placebo.

Conclusion
Fremanezumab is associated with a clinically meaningful reduction in MMD in patients with migraine and depression, with consistent trends toward improvement in depressive symptom severity as assessed by PHQ-9 scores. Further high-quality studies are warranted to better define its impact, particularly in specific subpopulations and clinical contexts.

Keywords:
Migraine
Depression
Fremanezumab
Meta-analysis

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Anti-CGRP monoclonal antibodies in migraine prevention: a systematic review

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Introduction
Migraine is a disabling neurological condition with a significant impact on quality of life. Preventive treatment is essential for patients with frequent attacks or greater disability, although traditional therapies may be limited by insufficient response, poor tolerability, and low adherence. In this context, anti-CGRP monoclonal antibodies have emerged as specific therapeutic alternatives. Among them, erenumab, fremanezumab, galcanezumab, and eptinezumab stand out.

Objective
To evaluate the efficacy and safety of anti-CGRP monoclonal antibodies in the prevention of episodic and chronic migraine.

Methods
This is a systematic review conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, aiming to gather evidence on anti-CGRP monoclonal antibodies in migraine prevention. The search was performed in PubMed/MEDLINE, Embase, Cochrane Central Register of Controlled Trials (CENTRAL), Scopus, and Web of Science. Controlled descriptors, free terms, and Boolean operators were used, including "migraine", "prevention", "CGRP", "monoclonal antibodies", "erenumab", "fremanezumab", "galcanezumab", and "eptinezumab". Studies published in English between 2017 and 2024 were included, prioritizing systematic reviews, meta-analyses, and phase 3 randomized clinical trials. The outcomes considered were reduction in monthly migraine days, clinical response of at least 50%, use of acute medication, and adverse events.

Results
The systematic review and network meta-analysis included 19 phase 3 randomized clinical trials on CGRP-targeted therapies. Erenumab, fremanezumab, galcanezumab, and eptinezumab reduced monthly migraine days compared with placebo. From a pathophysiological perspective, erenumab blocks the CGRP receptor, while fremanezumab, galcanezumab, and eptinezumab bind to CGRP itself, reducing trigeminovascular activation related to migraine pain. Fremanezumab showed consistent efficacy, with a reduction of 2.36 days in the quarterly 675 mg regimen and 2.06 days in the monthly 225 mg regimen, in addition to a higher probability of achieving a clinical response of at least 50%. In a phase 3 clinical trial involving 1,130 patients with chronic migraine, fremanezumab was also superior to placebo. The mean reduction in monthly headache days was 4.3 days in the quarterly regimen, 4.6 days in the monthly regimen, and 2.5 days in the placebo group. A response of at least 50% occurred in 38%, 41%, and 18% of patients, respectively. There was also a reduction in monthly migraine days, lower use of acute medication, and functional improvement. Adverse events were generally mild to moderate, with injection-site reactions predominating.

Conclusion
Anti-CGRP monoclonal antibodies represent an effective and well-tolerated strategy for migraine prevention. Fremanezumab stands out as a relevant alternative, as it reduces attack frequency, decreases the use of acute medication, and supports individualized preventive management.

Keywords:
Migraine
Fremanezumab
Monoclonal antibodies
CGRP
Prevention

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Therapeutic profile and functional response to anti-CGRP monoclonal antibodies in patients with resistant migraine: a systematic literature review

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Introduction
Migraine is one of the leading causes of neurological disability worldwide, with a significant functional and socioeconomic impact. Resistant migraine is characterized by the persistence of symptoms after multiple failures of conventional therapies, which increases chronicity and disease burden. Monoclonal antibodies (mAbs) targeting Calcitonin Gene-Related Peptide (CGRP) promote direct modulation of this pathway. Assessment using patient-reported outcome instruments (PROMs), such as MIDAS and HIT-6, allows for the measurement of functional response and quality of life not exclusively identified by the reduction in monthly migraine days (MMDs).

Objective
To investigate the therapeutic profile and safety of anti-CGRP monoclonal antibodies in patients with resistant migraine.

Methods
This is a systematic review following the PRISMA guidelines. The search encompassed the PubMed, Cochrane Library, and Web of Science databases (2015-2026) using the descriptors "Monoclonal Antibodies," "Refractory Migraine," and "Quality of Life," analyzing the variables mean reduction in monthly migraine days (MMDs), functional disability (MIDAS and HIT-6 scores), quality of life (MSQ and EQ-5D-5L scores), and safety profile (incidence of adverse events and discontinuation rates). Statistical analysis was performed using R software, considering a significance level of $p<0.05$.

Results
124 articles were identified, with 22 eligible, of which 9 were included. Statistically significant reductions were observed in MMDs, with average drops between 8.2 and 12.1 days ($p<0.001$) and response rates (≥50% in MMDs) between 36.4% and 71%, demonstrating sustained benefits for up to 12 months. MIDAS scores showed drops above 60 points, with functional response (≥50% score) reaching 89.5%–100%. The HIT-6 scale also registered significant reductions ($p<0.001$), with drops of up to 12.1 points and clinically relevant improvements (≥6 points) in up to 66% of patients. mAbs demonstrated a greater magnitude of effect than botulinum toxin in outcomes such as MHD (-11.9 vs. -7.6) and MIDAS (-62.3 vs. -43.1). An improvement in quality of life (MSQ and EQ-5D-5L) was noted, with the health index rising from 0.61 to 0.72 after one year ($p<0.001$). The safety profile was favorable, with mostly mild adverse events such as administration reactions, constipation, fatigue, and nausea. Discontinuation rates due to ineffectiveness ranged from 7.3% to 11.6%, and discontinuations due to intolerance ranged from 1.5% to 3.3%.

Conclusion
Anti-CGRP mAbs demonstrate efficacy and safety in the prophylaxis of resistant migraine, promoting a sustained reduction in MMDs and improved quality of life. The MIDAS and HIT-6 scales demonstrate the recovery of functionality and patient satisfaction that isolated attack counting may underestimate. Furthermore, they show a greater magnitude of effect compared to botulinum toxin, a favorable safety profile, and low discontinuation rates.

Keywords:
Quality of life
Calcitonin gene-related peptide
Monoclonal antibodies
Refractory migraine

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Efficacy of anti-CGRP monoclonal antibodies in the prevention of chronic migraine: a systematic review of randomized clinical trials

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Introduction
Chronic migraine is a highly disabling neurological condition characterized by recurrent headache attacks associated with symptoms such as photophobia, phonophobia, and nausea, significantly impacting patients' quality of life and daily functioning. Despite the use of conventional preventive therapies, many individuals experience inadequate response or poor tolerability to available treatments. In this context, monoclonal antibodies targeting the calcitonin gene-related peptide (CGRP) pathway have emerged as a therapeutic alternative directed at migraine pathophysiology, demonstrating potential efficacy in reducing attack frequency and improving clinical outcomes.

Objective
To evaluate the efficacy and safety of anti-CGRP monoclonal antibodies in the prevention of chronic migraine in adult patients, with a focus on reducing monthly migraine days compared with placebo.

Methods
A systematic review was conducted using the PubMed, SciELO, and Cochrane Library databases. The search strategy included the descriptors "chronic migraine", "CGRP monoclonal antibodies," "erenumab," "fremanezumab," "galcanezumab," and "eptinezumab" combined with the terms "prevention" and "prophylaxis" using the Boolean operators AND and OR. Randomized, double-blind clinical trials published in English between 2020 and 2026 were included. Pediatric studies and articles without a placebo control group were excluded. A total of seven studies met the eligibility criteria.

Results
Seven randomized, double-blind, placebo-controlled clinical trials were included, comprising more than 4,500 participants with chronic migraine. The studies primarily evaluated eptinezumab, fremanezumab, and erenumab, with a predominance of Asian populations. Most studies demonstrated a significant reduction in monthly migraine days compared with placebo, as well as higher ≥50% response rates and improvements in quality of life. Eptinezumab showed an early therapeutic benefit, observable from the first day after administration, with efficacy maintained for up to 12 weeks. Fremanezumab demonstrated consistent efficacy among Japanese and Korean patients, whereas erenumab exhibited a favorable efficacy and safety profile. Overall, anti-CGRP therapies were well tolerated and showed a safety profile comparable to placebo.

Conclusion
Anti-CGRP monoclonal antibodies demonstrated favorable efficacy and safety in the prevention of chronic migraine in adults, promoting significant reductions in monthly migraine days and improvements in quality of life compared with placebo. However, the predominance of studies conducted in Asian populations may limit the generalizability of the findings, highlighting the need for further multicenter trials involving more diverse populations.

Keywords:
Anti-CGRP monoclonal antibodies
Chronic migraine
Migraine prevention

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Pain perception during cranial nerve blocks for chronic migraine: local anesthetic injection produces greater pain than needle penetration

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Introduction
Peripheral nerve blocks and sphenopalatine ganglion blocks are widely used in the treatment of chronic migraine. Although generally considered minimally invasive, procedural discomfort may affect patient acceptance and adherence. The relative contribution of needle penetration and local anesthetic injection to pain perception remains poorly characterized.

Objective
To compare pain associated with needle penetration and local anesthetic injection during a standardized 360-degree headache block protocol in patients with chronic migraine.

Methods
Eight women (mean age 46±17 years) diagnosed with chronic migraine according to ICHD-3 criteria underwent bilateral greater occipital, lesser occipital, auriculotemporal, and supraorbital nerve blocks using 1 mL of 2% lidocaine per site administered through a 30-gauge insulin needle. Bilateral transnasal sphenopalatine ganglion blocks were also performed. Pain intensity was rated on a 0–10 numerical scale immediately after needle penetration and again after anesthetic injection. At the end of the procedure, patients rated overall procedural discomfort.

Results
A total of 64 nerve block sites were evaluated. Mean pain scores were significantly higher during anesthetic injection than during needle penetration (5.5±3.2 vs. 3.7±3.0; p<0.001). Pain scores between 8 and 10 were reported in 31.3% of injections compared with 14.1% of needle penetrations. The supraorbital region showed the highest pain scores for both needle penetration and anesthetic injection. Nasal discomfort associated with the sphenopalatine ganglion block was generally mild (mean 1.3±1.8). Overall procedural discomfort was rated as 6.4±2.1.

Conclusion
In patients with chronic migraine undergoing a 360-degree headache block protocol, pain related to local anesthetic injection exceeded that associated with needle penetration. The supraorbital region appeared particularly sensitive. Strategies aimed at reducing injection-related pain may improve patient tolerance and acceptance of repeated interventional headache procedures.

Keywords:
Migraine disorders
Anesthetics
Sphenopalatine ganglion block
Peripheral nerves
Pain perception

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Billing profile and standardization of clinical procedures in headache admissions in the Brazilian Public Health System

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Introduction
The decision to hospitalize a patient for primary headache aims to interrupt the refractory pain cycle. In the Brazilian Public Health System (SUS), each admission generates a Hospital Admission Authorization (AIH) that describes the billed procedures. Because these pathologies do not require high-technology interventions, bed occupancy typically comes down to maintaining venous access for polytherapy. Thus, mapping the effectively billed codes is essential to audit the true complexity of the service provided and understand what the public system finances when approving these admissions.

Objective
To identify and quantify the main clinical and diagnostic procedures billed in the admissions of patients with a primary diagnosis of headache and migraine (ICD-10 G43 and G44) within the SUS, in the period from 2019 to 2023.

Methods
This is an epidemiological, retrospective, descriptive, and national-based study, built exclusively from official microdata of the Hospital Information System (SIH/DATASUS). The patient cohort was extracted, consolidated, and analyzed in the RStudio environment using the microdatasus package, encompassing the 2019-2023 quinquennium. The sample considered all valid AIHs in the national territory under diagnoses G43 and G44. The primary dependent variable focused on the Performed Procedure column, which records the SIGTAP code of the main therapeutic act billed by the hospital.

Results
The database audit, composed of the definitive universe of 51,214 admissions in the quinquennium, demonstrated structural monotony in the therapeutic support offered by health units. There was an overwhelming and absolute predominance regarding the "Clinical Treatment of Migraine/Headache", which was present in 33,050 records (approximately 64.5% of the entire national sample). The subsequent most frequent procedures were concentrated on generic urgent clinical support and observational care, with scarce representation of advanced imaging exams or high-complexity interventions billed directly as the main procedure in the AIH. This profile evidences that hospitalization is purely based on keeping the patient resting under sequential infusion of fluid therapy, corticosteroids, antiemetics, and conventional intravenous analgesics.

Conclusion
The concentration of billing on a single basic procedure demonstrates that the hospital acts primarily as a hydration and analgesia hub. Prolonged hospitalization does not reflect the need for advanced technology, but rather the structural lack of outpatient support for pain control. This highlights a critical allocative inefficiency: the SUS finances the high operational costs of a complete AIH to offer a treatment that could be executed much more efficiently and less expensively in infusion centers, day hospitals, or in the Emergency Care Units (UPAs) themselves.

Keywords:
Resource allocation
Clinical coding
Healthcare costs

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Occipital nerve stimulation for migraine prophylaxis: emerging evidence from randomized controlled trials

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Introduction

Migraine is a highly disabling neurological disorder characterized by recurrent episodes of moderate-to-severe headache and substantial impairment in quality of life and daily functioning. Patients are frequently exposed to excessive use of acute analgesic medications, which may further exacerbate headache burden. Moreover, therapeutic options remain limited for individuals who fail to respond adequately to conventional pharmacological treatments. In this context, occipital nerve stimulation (ONS), a neuromodulatory intervention delivered through subcutaneous or transcutaneous electrodes positioned over the cervico-occipital region, has emerged as a promising therapeutic strategy.

Objective

To evaluate the therapeutic efficacy of occipital nerve stimulation compared with sham or inactive stimulation in patients with migraine.

Methods

This systematic review was conducted according to PRISMA guidelines and the PICO framework. PubMed, Embase, Cochrane Library, and Web of Science were searched using terms related to migraine and occipital nerve stimulation (ONS). Randomized controlled trials involving patients diagnosed with migraine according to ICHD criteria and comparing ONS with sham or inactive stimulation were included. Study selection and data extraction were performed independently by two reviewers. Outcomes included headache frequency, pain intensity, quality of life, functional disability, medication use, and adverse events.

Results

Of 2,690 records identified, 1,348 remained after deduplication and six randomized controlled trials were included (N=398). ONS significantly increased the likelihood of achieving a ≥50% reduction in pain intensity compared with sham stimulation (RR=4.06; 95% CI: 1.61–10.25; p=0.003; I^2=40%). A significant reduction in pain intensity was also observed (SMD=−0.88; 95% CI: −1.29 to −0.47; p<0.0001; I^2=43%). No significant difference was found in monthly headache days (MD=−4.52; 95% CI: −10.14 to 1.10; p=0.12; I^2=74%). Improvements in functional disability and quality of life were consistently reported, including reductions in MIDAS scores and favorable changes in SF-36 and HIT-6 measures. Adverse events were generally mild and self-limiting with transcutaneous ONS, whereas subcutaneous ONS was associated with electrode migration, local pain, and infections. Statistical analyses were performed using R software, with pooled estimates calculated as Mean Differences (MDs) or Risk Ratios (RRs), both reported with 95% CI.

Conclusion

ONS appears to be an effective intervention for reducing pain intensity and improving functional outcomes and quality of life in patients with chronic migraine. These findings support ONS as a relevant therapeutic option, particularly for individuals with treatment-refractory disease. Nevertheless, further large-scale, standardized randomized controlled trials are warranted to strengthen the current evidence base and better define its long-term efficacy and safety profile.

Keywords:
Occipital nerve stimulation
Migraine
Prophylactic treatment
Meta-analysis

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Duloxetine versus amitriptyline in the preventive treatment of chronic migraine: a comparative study

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Introduction
Migraine is a prevalent and disabling neurological disorder with a negative impact on quality of life and productivity. Diagnosis follows the ICHD-3 criteria, and management includes abortive and preventive treatments—prophylaxis being indicated when the patient presents four or more headache days per month or when attacks significantly impact personal and professional life. Among non-specific drugs used in prevention, amitriptyline (AMI), a tricyclic with action on serotonin and norepinephrine reuptake, has moderate support in current guidelines, while duloxetine (DUL), a selective serotonin and norepinephrine reuptake inhibitor with a better tolerability profile, represents an increasingly used alternative in clinical practice. Direct comparative studies between both are still scarce, justifying the present study.

Objective
To compare the clinical efficacy and therapeutic response speed of duloxetine versus amitriptyline in the preventive treatment of chronic migraine during outpatient follow-up.

Methods
A longitudinal prospective observational pilot study involving 13 chronic migraine patients (ICHD-3). Patients provided informed consent and were followed for ≥6 months at the Oswaldo Cruz University Hospital Headache Clinic. Patients taking AMI 25 mg or DUL 30 mg were allocated in a 1:1 ratio. Variables included demographics, monthly pain days, response time, comorbidities, and baseline HIT-6. Statistical analysis was performed using Epi Info 7.2.7, with calculation of frequencies, means, standard deviations, and 95% CI. Normality was assessed by the Shapiro-Wilk test, comparison between groups by the Mann-Whitney test, and the significance level was adjusted by Bonferroni correction (α=0,025).

Results
Thirteen female patients (mean age 45.8 ± 14.5 years) were analyzed. The AMI group (n=7) showed a mean response time of 3.0 ± 2.5 months (95% CI: 0.67–5.33) and a 76.4% reduction in monthly pain days. The DUL group (n=6) showed a response time of 1.3 ± 0.8 months (95% CI: 0.48–2.19) and a 71.7% reduction. Responder rates (≥50% reduction) were 83.3% for AMI and 80.0% for DUL. The response time difference did not reach statistical significance (U=30.0; p=0.165; α=0.025), though the 95% CIs did not overlap. Mean baseline HIT-6 was 59.6 ± 7.6. Comorbidities included anxiety (76.9%), hypertension (53.8%), and depression (38.5%). One AMI patient switched to DUL due to adverse effects (drowsiness/weight gain), maintaining attack control.

Conclusion
Both medications demonstrated efficacy in chronic migraine prophylaxis. Duloxetine showed a trend toward a faster therapeutic response compared to amitriptyline. Although lacking statistical significance—likely due to the small sample size—the non-overlapping 95% CIs provide relevant clinical evidence of this difference. The high prevalence of anxiety and depression aligns with the epidemiological profile of chronic migraine. Switching from AMI to DUL successfully illustrates the importance of tolerability in individualized treatment.

Keywords:
Migraine
Chronic migraine
Migraine prevention

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Efficacy and safety of oral gepants for acute and preventive treatment of migraine: a systematic review of randomized placebo-controlled clinical trials

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Introduction
Migraine is a disabling neurological disorder affecting approximately 15% of the global population. Calcitonin gene-related peptide (CGRP) receptor antagonists (gepants) represent a novel oral therapeutic class developed specifically for migraine, offering efficacy without vasoconstrictive effects and with a potentially lower risk of medication-overuse headache. Despite growing evidence, a comprehensive synthesis of randomized placebo-controlled trials evaluating oral gepants for both acute and preventive treatment remains necessary.

Objective
To systematically evaluate the efficacy and safety of oral gepants in the acute and preventive treatment of migraine through randomized placebo-controlled clinical trials.

Methods
A systematic review was conducted following PRISMA guidelines. Databases including PubMed, Embase, Scopus, and Cochrane Library were searched for studies published between 2021 and 2025. Inclusion criteria were randomized placebo-controlled trials, adults with migraine diagnosis according to ICHD-3 criteria, oral gepant intervention (rimegepant or atogepant), and reporting of efficacy and/or safety outcomes. Filters applied included Clinical Trial and Randomized Controlled Trial. Two independent reviewers screened titles, abstracts, and full texts. Disagreements were resolved by consensus. A total of 758 records were identified; after removing 428 duplicates, 330 were screened. Following title and abstract screening, 307 were excluded, leaving 23 for full-text assessment, of which 17 were excluded, resulting in 6 studies included in the final analysis.

Results
Six randomized placebo-controlled trials were included, encompassing rimegepant for acute and preventive treatment and atogepant for preventive treatment. For preventive treatment, atogepant demonstrated significant reductions in monthly migraine days compared to placebo across all doses evaluated, accompanied by improvements in migraine-specific quality-of-life and activity-impairment measures. Rimegepant administered every other day also showed superior reduction in monthly migraine days versus placebo in Japanese adults, with consistent findings across subgroups. For acute treatment, rimegepant achieved significantly higher rates of pain freedom and freedom from the most bothersome symptom at two hours post-dose across distinct populations, including Japanese, Chinese, and triptan-unsuitable adults. Adverse events were mild to moderate across all trials, with no relevant hepatotoxicity signal reported in the included studies. Constipation was the most frequently reported adverse event with atogepant, while nasopharyngitis was most common with rimegepant.

Conclusion
Oral gepants, rimegepant and atogepant, demonstrated consistent efficacy and favorable safety profiles in both acute and preventive migraine treatment across diverse populations. These agents represent an important therapeutic option, particularly for patients unsuitable for triptans or conventional preventive therapies.

Keywords:
Migraine
Rimegepant
CGRP receptor antagonist
Gepants
Atogepant

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Efficacy and safety of melatonin for migraine prophylaxis in adults: an umbrella review of network meta-analyses

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Introduction
Migraine is a prevalent and disabling neurological disorder. Although several preventive therapies are currently recommended, their use is often limited by adverse effects and poor adherence. Melatonin has emerged as an accepted prophylactic option due to its favorable safety profile and its role in circadian rhythm regulation and CGRP modulation. This umbrella review synthesized the highest level of evidence regarding the efficacy and safety of oral melatonin for migraine prevention in adults.

Objective
To evaluate the efficacy and safety of oral melatonin for migraine prophylaxis in adults.

Methods
An umbrella review was conducted according to PRISMA guidelines and registered in PROSPERO (CRD420263847 91). Searches were performed in PubMed, Embase, Web of Science, Cochrane Library, and SciELO using the terms ("Migraine Disorders" OR migraine) AND melatonin AND ("systematic review" OR "meta-analysis"). Systematic reviews, conventional meta-analyses, and network meta-analyses involving adults aged 18–65 years with episodic or chronic migraine receiving oral melatonin were included. The main formulations analyzed were immediate-release (IR) melatonin 3 mg and prolonged-release (PR) melatonin 2 mg. Comparators included placebo, topiramate, valproate, propranolol, amitriptyline, valsartan, and cinnarizine. Outcomes comprised monthly migraine frequency, ≥50% responder rate, pain intensity, attack duration, safety, and treatment discontinuation. Methodological quality was assessed using AMSTAR 2 and risk of bias using the Cochrane Risk of Bias tool.

Results
Thirty-six studies were identified, and 16 reviews met the eligibility criteria. The proportion of primary studies with low risk of bias ranged from 41% to 57.2%. Melatonin was superior to placebo in reducing monthly migraine frequency (MR 0.65; 95% CI 0.54–0.80; I^2=0%). Melatonin 3 mg IR reduced headache days by 1.71 days/month (95% CI −3.27 to −0.14; p<0.05). Although valsartan (MR 0.35; 95% CI 0.23–0.53) and topiramate (MR 0.45; 95% CI 0.35–0.57) demonstrated greater efficacy, they showed poorer tolerability. For the ≥50% responder rate, melatonin 3 mg IR achieved OR 4.19 (95% CI 1.46–12.00;I^2=72.7%), outperforming topiramate (OR 2.50). Sensitivity analyses reduced heterogeneity to I^2=50.7% after excluding studies with follow-up shorter than 16 weeks. Melatonin also reduced attack duration (MD −4.98 h; 95% CI −9.30 to −0.67; p=0.02) and pain intensity (MR 0.66). Safety outcomes favored melatonin, with adverse-event rates comparable to placebo (RR≈1.0), whereas topiramate (RR 1.43), valproate (RR 2.09), amitriptyline (RR 2.12), and cinnarizine (RR 2.27) were associated with more adverse events and treatment discontinuation. In SUCRA multicriteria analysis, melatonin 3 mg IR showed the best efficacy–tolerability balance (Value Preference score 0.102).

Conclusion
Melatonin 3 mg IR showed efficacy, tolerability and safety in migraine prevention, representing a valuable alternative or adjunct to conventional prophylactic therapies overall.

Keywords:
Migraine prevention
Calcitonin gene-related peptide (CGRP)
Melatonin
Network meta-analysis

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Low-dose duloxetine for migraine prophylaxis: analysis of a case series demonstrating early clinical response

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Introduction
Migraine is a complex neurological disorder with a substantial serotonergic and noradrenergic component and is associated with significant functional disability. Serotonin–norepinephrine reuptake inhibitors (SNRIs) act on descending pain modulatory pathways, representing a pathophysiologically grounded option for migraine prevention. Duloxetine, an SNRI with a favorable tolerability profile, is particularly relevant for patients with migraine and neuropsychiatric comorbidities. Furthermore, it is included in Brazil's public healthcare system essential medicines list, ensuring broad accessibility nationwide.

Objective
To evaluate the efficacy and tolerability of duloxetine 30 mg/day for migraine prophylaxis in a case series of patients followed at a specialized headache outpatient clinic.

Methods
This prospective case series included six patients receiving care at a specialized headache clinic who were treated with duloxetine 30 mg/day as preventive therapy for migraine between 2025 and 2026. Time to response, clinical response rate, and tolerability profile were assessed. The Shapiro–Wilk test was applied to evaluate the distribution of continuous variables.

Results
The study population consisted of six female patients with a mean age of 49.5 ± 17.7 years (median: 57.0 years; range: 18–66 years). All patients received duloxetine 30 mg/day without the need for dose escalation. A clinical response was observed in all patients, with a marked reduction in migraine attack frequency. Mean time to response was 1.3 ± 0.8 months (95% CI: 0.48–2.19 months; median: 1.0 month; range: 1–3 months). The distribution of time to response was non-normal (Shapiro–Wilk test: $W = 0.496$; $p < 0.001$). Tolerability was favorable, and no adverse events resulted in treatment discontinuation.

Conclusion
Duloxetine 30 mg/day demonstrated favorable efficacy and tolerability in this case series, with an early therapeutic response (median time to response of 1.0 month). The observed clinical benefit at a dose lower than that commonly recommended may have important practical implications, particularly in the Brazilian setting, where the medication is available through the public healthcare system and its lower cost may facilitate long-term treatment adherence. Larger controlled studies are warranted to determine the optimal dose and identify predictors of therapeutic response in migraine prophylaxis.

Keywords:
Migraine
Prophylaxis
Duloxetine
Serotonin–norepinephrine reuptake inhibitors

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Is occipital cortex neuromodulation with tDCS efficient for migraine prophylaxis? A meta-analysis of randomized controlled trials

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Introduction

Migraine is a neurological condition characterized by recurrent episodes of unilateral, pulsating pain, typically of moderate to severe intensity, being the second leading cause of disability worldwide, surpassed only by lower back pain, especially in young women. Transcranial direct current stimulation (tDCS) is considered an effective and well-tolerated non-pharmacological option for treating several neuropsychiatric diseases, with increasing evidence for management of migraines. In this context, the occipital cortex (visual cortex) has been used as a stimulation target for prophylactic treatment of migraine, with initial studies of efficacy for both excitatory and inhibitory stimulation protocols.

Objective

To investigate, through a systematic review and meta-analysis, the efficacy of tDCS targeting occipital cortex in patients for preventing migraines attacks.

Methods

Following PRISMA guidelines and PICO, a search was conducted in PubMed, Embase, Cochrane, Web of Science, PsycInfo, and Scopus databases using the descriptors "tDCS" and "Migraine" to identify studies investigating the effects of therapy in adults with migraine. Randomized controlled trials (RCTs) of migraine patients undergoing tDCS targeting the occipital cortex and reporting outcomes of frequency, intensity, duration, or medication use were included. Data screening was performed on the Rayyan platform by two independent authors, and data extraction was carried out using Excel by two other authors. Statistical analysis was performed using R software, and data were combined using the standardized mean difference (95% CI).

Results

A total of 2,600 records were imported from the databases. After removing duplicates, 1,160 records were screened, and 10 (N = 322) were included with an average follow-up of 80 days. A significant reduction was found in the number of migraine days (SMD -0.41; 95% CI: -0.72 to -0.10; p=0.0094; I2=24.4%), pain intensity (SMD -0.98; 95% CI: -1.87 to -0.09; p=0.0307; I2=84.4%), and pain duration (SMD -0.83; 95% CI: -1.40 to -0.27; p=0.0038; I2=60.9%). However, no significant difference was observed in abortive medication use (SMD -0.73; 95% CI: -1.47 to 0.01; p = 0.0519; I2=84.1%). Two studies reported reduction in migraine frequency after tDCS, and one study reported reduction in overall headache days.Combined stimulation of M1 and the occipital cortex resulted in reduced migraine parameters. Occipital stimulation does not demonstrate significant superiority over sham in reducing disability or improving patients' overall quality of life. No serious adverse events due to the stimulation were reported.

Conclusion

tDCS is effective in the treatment of prophylactic migraine in patients. Although no significant reduction in abortive medication use was observed, the favorable results in key clinical outcomes reinforce tDCS as a promising and safe non-pharmacological therapeutic alternative for migraine management.

Keywords:
Neuromodulation
Migraine
Headache
Noninvasive brain stimulation
Prophylaxis

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Other related topics

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Refractory persistent idiopathic facial pain: diagnostic and therapeutic challenge in a case report

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Introduction

Persistent idiopathic facial pain (PIFP), also known as atypical facial pain, is a chronic orofacial pain syndrome characterized by daily, continuous, poorly localized facial pain without correlation to a specific trigeminal nerve anatomical territory. It is a rare condition, frequently underdiagnosed and associated with a significant functional and emotional burden. Management is challenging and usually requires a multimodal and interdisciplinary approach.

Case presentation

A 64-year-old male patient with hypertension, type 2 diabetes mellitus, dyslipidemia, and a history of acute myocardial infarction presented with continuous bilateral facial pain for five years, described as diffuse burning and paresthesias involving the eyes, nose, malar regions, and chin, with an intensity of 9/10 on the visual analog scale. There were no paroxysmal episodes or typical triggers. He had been evaluated by several specialists and had used amitriptyline, gabapentin, pregabalin, carbamazepine, and oxcarbazepine, without significant benefit. The condition caused marked psychological distress, including previous suicidal ideation. Neurological examination and brain MRI showed no relevant abnormalities. Laboratory tests revealed vitamin B12 deficiency, vitamin D deficiency, and mild hypomagnesemia. After excluding structural and neuropathic causes, the diagnosis of persistent idiopathic facial pain was established. Multimodal management was initiated with duloxetine, gabapentin, vitamin B12 supplementation, acupuncture, psychotherapy, nutritional counseling, and physical activity. Methadone was used temporarily due to the severity of pain. On reassessment, there was an approximately 50% improvement in emotional symptoms and a mild reduction in pain intensity.

Discussion

This case illustrates the diagnostic complexity of persistent idiopathic facial pain, which is often mistaken for sinus disease, trigeminal neuralgia, or dental conditions. The absence of structural abnormalities and refractoriness to multiple therapies reinforces the importance of clinical recognition of this syndrome. Psychiatric comorbidities and nutritional deficiencies may contribute to the perpetuation of the pain condition. The partial response to treatment is consistent with the typically prolonged and challenging evolution of this disorder.

Conclusion

This case highlights the diagnostic and therapeutic complexity of PIFP and underscores the importance of early recognition to avoid unnecessary tests and interventions. A multimodal and interdisciplinary approach, with attention to emotional and metabolic comorbidities, can reduce suffering and improve the quality of life of these patients.

Keywords:
Persistent idiopathic facial pain
Orofacial pain
Chronic pain
Central sensitization
Case report

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Benign intracranial hypertension after doxycycline use: a forgotten association

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Introduction

Tetracyclines are broad-spectrum bacteriostatic antibiotics effective against gram-positive and gram-negative bacteria. Doxycycline has been widely used in the treatment of acne vulgaris, hidradenitis suppurativa, and rosacea, although its use has declined in recent years. Common adverse effects include gastrointestinal symptoms and dental alterations, while Benign Intracranial Hypertension (BIH) is a rare complication. BIH presents with increased intracranial pressure, headache, and visual disturbances, potentially progressing to blindness if not promptly treated. This study reports a case of BIH secondary to doxycycline use, emphasizing the importance of recognizing this adverse reaction.

Case presentation

A 15-year-old male patient was admitted to the emergency department after referral by an ophthalmologist. He reported holocranial headache, described as alternating between pressure-like and pulsatile, without associated photo or phonophobia, nausea, or vomiting, with an intensity of 8/10, and unresponsive to analgesics. Two days prior to admission, he developed bilateral blurred vision and binocular diplopia. His past medical history was significant for hidradenitis suppurativa, with initiation of doxycycline therapy one month earlier. He denied other symptoms or relevant medical history. Neurological examination revealed bilateral papilledema and bilateral sixth cranial nerve palsy, more pronounced on the left side. No sensory, motor, or coordination deficits were observed. Cranial computed tomography demonstrated bilateral tortuosity of the optic nerves, without changes in brain parenchymal attenuation or other relevant findings. Lumbar puncture was performed, resulting in significant headache relief. Cerebrospinal fluid analysis showed: red blood cells 16/mm^3, absence of leukocytes, protein level of 21 mg/dL, glucose level of 59 mg/dL, negative India ink staining, nonreactive VDRL, negative bacterioscopy and cultures, nonreactive ADA, and absence of BAAR. Further investigation with brain magnetic resonance imaging and magnetic resonance angiography revealed no significant abnormalities. Given the suspicion of benign intracranial hypertension secondary to doxycycline use, the antibiotic was discontinued and acetazolamide was initiated.

Discussion

Drug-induced BIH is a rare condition, more frequently observed in young obese women, commonly presenting with headache and transient visual loss secondary to papilledema. In the present case, the temporal relationship between symptom onset and doxycycline introduction, along with complementary tests excluding other causes of intracranial hypertension, supported the diagnosis. Early recognition and treatment are essential to prevent significant visual impairment, considering the potential reversibility of the condition when promptly managed.

Conclusion

This report highlights BIH as a rare adverse effect of doxycycline. Early diagnosis and prompt specialist evaluation are essential to prevent permanent visual impairment and improve outcomes.

Keywords:
Secondary headache disorders
Doxycycline
Intracranial hypertension

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Impacts of acupuncture on migraine management: a systematic review

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Introduction
Acupuncture, a cornerstone of Traditional Chinese Medicine for over 4,500 years, has gained global prominence due to its therapeutic benefits and favorable safety profile. It has emerged as a key intervention for migraine patients who show poor tolerance to conventional pharmacological treatments. Given this shifting perspective, the last decade of clinical research has been instrumental in clarifying its role in modern neurology.

Objective
To evaluate the efficacy, safety, and neurophysiological mechanisms of acupuncture in both prophylactic and acute migraine management, specifically focusing on patients with limited tolerance to standard drug therapies.

Methods
This systematic review followed the PRISMA protocol. A comprehensive search was conducted across PubMed, Embase, and LILACS databases for studies published between 2014 and 2024. Mesh terms and keywords included "Acupuncture," "Migraine Disorders," "Prevention," and "Therapeutics." Inclusion criteria prioritized randomized controlled trials (RCTs), systematic reviews, and functional neuroimaging studies assessing acupuncture's impact on adult migraine management in English and Portuguese. Evidence quality was appraised based on seizure frequency reduction and symptomatic improvement.

Results
The evidence indicates that acupuncture outperforms both sham acupuncture and standard care in reducing monthly migraine frequency. Notably, Xu et al. (2020) demonstrated a sustained decrease in attack frequency between weeks 13 and 20 post-treatment in a cohort of 150 patients, with no serious adverse events reported. Functional neuroimaging (PET-CT and fMRI) revealed that acupuncture modulates glucose metabolism and functional connectivity within the "pain matrix," specifically targeting the middle frontal gyrus, cerebellum, and middle cingulate cortex. Biologically, these effects are linked to the mechanical stimulation of acupoints, which triggers mast cell degranulation and modulates electrical signaling at the neuroimmune interface, thereby mitigating peripheral and central sensitization. Regarding safety, the technique showed excellent tolerability; adverse effects were rare and self-limiting (e.g., localized pain or minor bruising), establishing acupuncture as a viable alternative for patients with contraindications to conventional prophylaxis.

Conclusion
Acupuncture is a safe, evidence-based therapeutic modality for migraine control, effectively reducing both pain intensity and attack frequency. Its integration into clinical practice is recommended as a prophylactic and adjuvant strategy, helping to decrease disease burden and enhance patient quality of life.

Keywords:
Migraine
Headache
Neuroimaging
Acupuncture
Adjuvant therapeutics

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Predictors of short-term response to multimodal treatment in individuals with temporomandibular disorders

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Introduction
Physiotherapy is a safe, simple, and potentially beneficial intervention for individuals with temporomandibular disorders (TMD). Nevertheless, understanding the characteristics of patients who respond best to this treatment is crucial. Exploring these predictive factors allows for more targeted, effective interventions for each individual, with significant implications for clinical outcomes and cost-effectiveness in practice.

Objective
To identify predictive factors of short-term response for craniofacial disability to multimodal treatment including manual therapy, therapeutic exercise and pain education for individuals with TMD.

Methods
A prospective cohort of 105 participants with TMD assessed at baseline and after 6 weeks. Treatment response was defined as a reduction >-5.3 points in the Craniofacial Pain and Disability Inventory (CF-PDI). Predictors were analyzed using elastic net regression followed by multivariable logistic regression. Its performance was assessed considering the explained variance, calibration, and discrimination. Internal validation of the prediction models was further evaluated in 500 bootstrapped samples.

Results
Fifty-two (49.5%) of the participants were classified as responders to treatment. The model incorporated the following predictors: age (OR = 1.01; 95% CI: 0.99– 1.03); maximum jaw opening (OR = 0.99; 95% CI: 0.98 – 1.00); neck disability (OR = 1.00; 95% CI: 0.99 – 1.02); and pressure pain threshold in the neck muscles (OR = 0.99; 95% CI: 0.97 – 1.01). Although individual confidence intervals included 1, the combined variables demonstrated predictive value. The model showed moderate discrimination (AUC = 0.70) and acceptable calibration.

Conclusion
A combination of age, jaw mobility, neck disability, and cervical pressure pain threshold can moderately predict short-term clinical response to multimodal treatment in patients with TMD. While individual clinical factors may not be strong standalone predictors, their collective assessment provides a useful tool for screening potential responders, supporting more personalized therapeutic planning in clinical practice.

Keywords:
Temporomandibular joint disorders
Physical therapy modalities
Prognosis
Treatment outcome

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Exploring lifestyle behavior variations among responders and non-responders to multimodal TMD treatment: a qualitative study

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Introduction
Individuals with TMD often require multidisciplinary healthcare to manage their symptoms. Physiotherapy treatment in managing TMD has demonstrated to be effective on improving pain and functional variables in those patients. However, it would be important to know the profile of patients who are most likely to respond to this type of treatment.

Objective
To explore the lifestyle behavior of those who respond and those who do not respond to a multimodal treatment for TMD.

Methods
A qualitative, descriptive, and exploratory study was conducted, with approval from the Institutional Research Ethics Committee. Twenty-five individuals diagnosed with TMD according to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) criteria — all of whom had completed a multimodal treatment protocol — participated in semi-structured interviews. Data were subsequently analyzed using thematic analysis and intuitive coding.

Results
Three main themes emerged: perceptions of sleep quality, physical activity patterns, and understanding of lifestyle behavior. Regarding sleep, responders reported varied perceptions, whereas all non-responders consistently reported poor sleep quality. In terms of physical activity, most responders maintained an exercise routine, despite some reports of interruption; conversely, non-responders were predominantly sedentary. Finally, regarding lifestyle behavior, responders reported a spectrum of experiences ranging from healthy to unhealthy habits, including parafunctional habits. In contrast, non-responders focused almost exclusively on unregulated, unhealthy, and parafunctional habits.

Conclusion
Distinct lifestyle profiles differentiate responders from non-responders in multimodal TMD treatment. The predominance of poor sleep, physical inactivity, and unhealthy habits among non-responders suggests that clinical success may depend on addressing these behavioral factors. Consequently, incorporating targeted habit-reversal and lifestyle-modification strategies may be essential for improving outcomes in patients resistant to conventional treatment.

Keywords:
Temporomandibular joint disorders
Treatment outcome
Life style
Qualitative research

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Postmortem human dura mater mast cells: an experimental study of cellular viability

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Introduction
Dura mater mast cells play an important role in the neuroinflammatory mechanisms associated with primary headaches. However, human experimental models for studying these cells remain limited. Evaluating their postmortem viability and functionality under ex vivo conditions may expand opportunities to investigate the pathophysiological mechanisms underlying headache disorders.

Objective
To evaluate the preservation of cellular viability and the granulation/degranulation capacity of mast cells from postmortem human dura mater maintained in culture medium during the experimental postmortem period.

Methods
This quantitative study was conducted at the Death Verification Service of the Federal University of Pernambuco (UFPE), Brazil. Dura mater samples were collected near the left middle meningeal artery from two female cadavers at 9 and 12 hours postmortem, respectively. Twelve tissue samples measuring 1 × 1 cm were obtained from each dura mater specimen and incubated in Dulbecco's Modified Eagle Medium (DMEM). Samples were allocated into six experimental groups (0 h, 5 min, 30 min, 1 h, 2 h, and 24 h), with two samples per group. Samples from the 0 h group were not incubated; they were washed twice in synthetic interstitial fluid (SIF) for 5 min and then fixed in 10% buffered formalin. The remaining samples underwent the same SIF washing procedure, followed by incubation in DMEM for the respective experimental periods, a further SIF wash, and fixation in 10% buffered formalin. Subsequently, tissues were processed using standard histological procedures, sectioned at 4 µm, mounted on histological slides, stained with 0.1% toluidine blue, and analyzed under light microscopy at 400× magnification for quantification of granulated and degranulated mast cells.

Results
Granulated and degranulated mast cells were observed at all experimental time points, with a predominance of degranulated cells. At baseline (0 h), 29.23% (n=19/65) of mast cells were granulated, and 70.77% (n=46/65) were degranulated. At 5 min, 30 min, and 1 h, the proportion of granulated mast cells decreased to 11.30% (n=26/230), 11.28% (n=15/133), and 8.62% (n=5/58), respectively, whereas the proportion of degranulated mast cells increased to 88.70% (n=204/230), 88.72% (n=118/133), and 91.38% (n=53/58), respectively. After 2 h of DMEM exposure, 24.60% (n=31/126) of mast cells remained granulated, and 75.40% (n=95/126) were degranulated. After 24 h, the granulation rate decreased again to 9.84% (n=31/315), while the degranulation rate increased to 90.16% (n=284/315).

Conclusion
The findings demonstrate preservation of the morphological characteristics and granulation/degranulation capacity of human dura mater mast cells for up to 24 hours following incubation, supporting the potential of this model for ex vivo experimental studies. Further investigations, including a larger number of samples and specific cellular viability markers, are necessary to confirm these findings.

Keywords:
Neuroinflammation
Dura mater
Mast cells
Cellular degranulation

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Repercussions of headache on the global functioning of low-risk pregnant women: preliminary analysis of a cross-sectional study

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Introduction
Headache is among the most prevalent neurological complaints in pregnancy, impacting maternal functioning and quality of life. Migraine, the most common disorder in this period, is influenced by gestational hormonal fluctuations and associated with obstetric complications such as preeclampsia and preterm birth. Its effects on global functioning remain insufficiently investigated in low-risk prenatal care.

Objective
To investigate the repercussions of headache on the global functioning of low-risk pregnant women.

Methods
Cross-sectional study conducted at the Department of Physical Therapy, Universidade Federal do Rio Grande do Norte, approved by the Ethics Committee (CAAE: 38147020.3.0000.5537). Low-risk pregnant women ≥18 years, with gestational age between 12–30 weeks, were included. Sociodemographic, obstetric, and clinical data were collected via virtual form during physical therapy assessment. Variables included headache presence, musculoskeletal symptoms, and global functioning by WHODAS 2.0. Pain intensity was measured using the Visual Analogue Scale (VAS). Descriptive analysis used absolute and relative frequencies.

Results
Preliminary analysis included 5 pregnant women. Three (60%) presented migraine, of whom 2 (40%) were classified as chronic migraine; 1 (20%) had tension-type headache and 1 (20%) had undetermined headache with onset during current pregnancy. Two participants (40%) required pharmacotherapy (cyclobenzaprine, meclizine dihydrochloride, metoclopramide hydrochloride) and 2 (40%) reported severe pain episodes (VAS 7–8). Most prevalent concomitant symptoms: muscle fatigue and psychomotor slowing (60%), followed by drowsiness, nausea/vomiting, upper limb numbness, and emotional lability (40% each). Lumbopelvic pain (VAS 4–8) was reported by 2 participants (40%), predominantly nocturnal and moderate (VAS 5–6). Moderate-to-severe difficulty in concentration and memory was identified in 2 participants (40%) on WHODAS 2.0 cognitive domains. Self-reported quality of life worsened from pre-gestational period to current pregnancy in 3 participants (60%).

Conclusion
Preliminary data indicate headache in pregnancy compromises multiple functional dimensions, with cognitive, emotional, musculoskeletal, and quality-of-life repercussions. An interdisciplinary approach and standardized tools such as WHODAS 2.0 are essential for comprehensive assessment. Sample expansion will enable more robust analyses to support physical therapy intervention protocols for pregnant women with headache.

Keywords:
Headache
Quality of life
Pregnancy
Functioning

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Comparison of therapeutic modalities in the management of menstrual migraine: a systematic review

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Introduction
Menstrual migraine (MM) is a subtype of migraine associated with the menstrual cycle, related to the decline in estrogen levels during the late luteal phase. This hormonal alteration contributes to the triggering of migraine attacks through neurotransmitter modulation and neurogenic inflammation. Due to its significant impact on quality of life, different therapeutic modalities have been investigated. However, uncertainties remain regarding the efficacy of these interventions.

Objective
To evaluate the efficacy of different therapeutic modalities in reducing the frequency and intensity of attacks in women with menstrual migraine, compared with placebo or other treatments.

Methods
A systematic review was conducted according to PRISMA criteria to answer the following question: "In women with menstrual migraine, are different therapeutic modalities effective in reducing the frequency and intensity of attacks compared with placebo or other treatments?" Searches were performed in the PubMed and LILACS databases using the descriptors "Menstrual Migraine," "Migraine Disorders," and "Treatment" combined with AND. Randomized clinical trials and meta-analyses published within the last ten years were included. Studies that did not primarily address treatments for menstrual migraine were excluded. Study selection was independently conducted by two reviewers, resulting in the final inclusion of eight articles.

Results
Different therapeutic modalities demonstrated efficacy in the management of MM, reducing the frequency, intensity, and duration of attacks. Triptans outperformed placebo in both acute and preventive treatment, with sumatriptan 100 mg showing greater pain relief at 2 hours (OR: 4.32–4.62) and 24 hours (OR: 4.81). Frovatriptan (2.5 mg twice daily) showed greater short-term prophylactic efficacy (OR: 1.87), reducing recurrence of attacks. Anti-CGRP monoclonal antibodies, such as erenumab and galcanezumab, demonstrated greater preventive benefit, with erenumab reducing monthly migraine days by up to −2.1 days and increasing the likelihood of a ≥50% reduction in attacks by up to 2.8-fold versus placebo. Hormonal therapies, including contraceptives containing drospirenone, desogestrel 75 mcg/day, transdermal estradiol, and GnRH agonists, reduced attacks and analgesic use. Among non-pharmacological approaches, auricular therapy showed greater effectiveness than flunarizine (93.5% vs. 77.4%), while acupuncture and acupressure reduced migraine days without serious adverse events. Resveratrol did not demonstrate significant benefit.

Conclusion
Different therapeutic modalities are effective in the management of MM, reducing the frequency, intensity, and recurrence of attacks. Triptans stood out in acute and prophylactic treatment, while anti-CGRP therapies showed greater preventive benefit. Hormonal therapies and non-pharmacological approaches, such as acupuncture and auricular therapy, also demonstrated promising results, reinforcing the importance of individualized treatment.

Keywords:
Treatment outcome
Migraine disorders
Therapeutics
Menstrual migraine

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Ethnoracial disparities and social vulnerability in headache hospitalizations in Brazil

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Introduction
Social determinants of health exert a profound impact on the pathogenesis and prognosis of chronic diseases in Brazil. In the context of primary pain syndromes, such as migraines, it is known that access to specialized outpatient care and continuous medication prophylaxis is unequal. Factors associated with structural racism, such as precarious working conditions, lower labor flexibility, and barriers to accessing private specialists, act as triggers for crisis chronification. Consequently, historically vulnerable populations are frequently pushed into the hospital emergency network as their sole avenue for relief and therapeutic rescue.

Objective
To analyze the ethnoracial profile of patients admitted with a primary diagnosis of headache and migraine in the Brazilian Public Health System (SUS) between 2019 and 2023, seeking to highlight potential disparities in the access and utilization of neurological emergency beds.

Methods
This is an epidemiological, retrospective, descriptive, national-based study built from the microdata of the Hospital Information System (SIH/DATASUS). Cohort processing occurred in R language (microdatasus package), filtering all Hospital Admission Authorizations (AIHs) in Brazil from 2019-2023 under ICD-10 codes G43 and G44. The main stratification variable was self-declared race/color, categorized according to the Brazilian Institute of Geography and Statistics (IBGE) standards.

Results
Out of the 51,214 admissions mapped in the period, 6,389 records (12.4%) had no data for the race/color field, evidencing a persistent flaw in hospital notification. Among the 44,825 patients with valid information, the mapping revealed a significant predominance of the self-declared Brown (Parda) population, leading the records with 22,628 admissions. This was followed by the White population (n=19,326), the Black population (n=1,538), the Asian population (n=1,285), and the Indigenous population (n=48). When grouping the Brown and Black categories, it is observed that the Black population represents the vast absolute majority of admissions with known racial data (n=24,166), consolidating itself as the demographic group most dependent on hospital beds for pain control.

Conclusion
The predominance of admissions among brown and black patients exposes the face of socioeconomic vulnerability in accessing preventive neurological healthcare. The high volume of admissions from this population stratum indicates that the emergency room is acting as a safety net for structural failures in primary and secondary care. Public policies aimed at managing primary headache syndromes must incorporate racial literacy, ensuring that screening, prophylactic treatment, and pain education effectively reach the most vulnerable populations before the condition progresses to the need for bed occupancy.

Keywords:
Social determinants of health
Healthcare disparities
Social vulnerability

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Impact of transdermal estrogen therapy on migraine control in postmenopausal women: a systematic review

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Introduction
Estrogen fluctuations during menopause are known risk factors for the worsening of migraine. Although hormone therapy controls climacteric symptoms, the oral route of administration frequently aggravates the painful condition due to first-pass hepatic metabolism, which generates serum fluctuations. In contrast, the transdermal route offers continuous systemic absorption and greater hormonal stability, preventing new triggers.

Objective
To investigate the effects of transdermal estrogen hormone replacement therapy on migraine in postmenopausal women compared to oral therapy.

Methods
A systematic review conducted in accordance with the PRISMA 2020 guidelines. The literature search was performed in the PubMed database. Clinical trials and observational studies evaluating the effects of hormone administration routes on headache/migraine were included. Data extraction was conducted individually using standardized forms. The following information was extracted: characteristics of the studied populations, type and route of hormone therapy administration, association with progestogens, frequency and intensity of headaches, migraine worsening, and the occurrence of adverse events. The methodological risk of bias assessment was performed independently by two reviewers, using the standardized tools of the Cochrane Collaboration: RoB 2 for randomized clinical trials and ROBINS-I for observational and non-randomized studies.

Results
Out of the 30 articles identified, 7 comprised the final synthesis after analysis (4 clinical trials and 3 observational studies), which presented a risk of bias ranging from "Low/Some concerns" (RoB 2) to "Serious" (ROBINS-I). The impact of hormone therapy varied according to the primary diagnosis: patients with episodic tension-type headache showed no significant changes, whereas those with migraine without aura demonstrated high sensitivity to the route of administration. Oral therapy significantly worsened the migraine profile, with a substantial increase in the frequency, duration of attacks, and analgesic consumption in the 1st and 3rd months of treatment. In contrast, the transdermal route kept migraine parameters stable. Observational studies reinforced the transdermal potential, showing a reduction in nonspecific climacteric headache attacks in 95.7% of cases after 6 months. Pharmacokinetically, the transdermal route avoids first-pass hepatic metabolism, ensuring continuous serum concentrations that prevent the exogenous triggers and cerebral vascular hyperreactivity observed during the acute fluctuations of the oral route.

Conclusion
The transdermal route of estrogen administration is a clinically superior and safer alternative to the oral route for postmenopausal women with migraine. By preserving hormonal stability and avoiding the hepatic first-pass effect, it maintains attacks stabilized and attenuates climacteric headaches, serving as the primary clinical recommendation.

Keywords:
Migraine
Postmenopause
Cutaneous
Transdermal

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The profile of headache hospitalizations in border regions and remote areas

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Introduction
Access to the neurology network in Brazil is profoundly unequal, worsening in border zones and remote regions. In these localities, the absence of specialized centers imposes a critical dependence on elective and urgent medical transport. Hospital admission for headaches in these areas often reflects not only clinical severity but the impossibility of outpatient management due to geographic isolation. Analyzing the profile of these admissions is fundamental to understand how access vulnerability transforms the territory into a direct determinant of length of stay and healthcare costs in the SUS.

Objective
To investigate the clinical characteristics and hospital length of stay of patients admitted for headache syndromes (G43-G44) in municipalities classified as "border" or "remote" (according to IBGE criteria), comparing the outcomes with the national average.

Methods
A retrospective ecological study using SIH/DATASUS microdata (2019-2023). The sample (n=51,306) was segmented between municipalities in the "Legal Amazon" and border strips versus consolidated urban centers. Using RStudio, the average length of stay, average cost per AIH, and the proportion of admissions by municipality size were calculated. The statistical analysis sought to identify whether remote location acts as a predictive factor for increased hospitalization time, controlling for age and hospital type.

Results
Border municipalities and remote areas accounted for 4,890 admissions (9.5% of the national sample). The average hospital length of stay in these locations was 5.4 days, significantly exceeding the national average of 3.9 days. It was identified that patients residing in remote areas are, on average, 4.2 years older than patients from metropolitan areas when admitted for headaches. The average admission cost in these regions was 18% higher than the rest of the country's average, evidencing the impact of the logistical costs of maintaining beds in hard-to-reach areas and the lower turnover rate of hospital beds.

Conclusion
Residence in remote and border areas acts as a risk factor for prolonged hospitalization. The average time of 5.4 days reflects a scenario where transportation difficulties and a shortage of back-up beds force extended hospitalizations, since hospital discharge is delayed by the logistical viability of returning home. These data demonstrate that, in peripheral regions, headache hospitalization fulfills a social and logistical function in addition to a clinical one. In this sense, creating regional neurological care hubs, equipped with teleconsultation for low-complexity case triage, presents itself as the most promising strategy to decentralize care, reduce the pressure on reference hospitals, and optimize the use of public resources in geographically vulnerable regions.

Keywords:
Length of stay
Geographic isolation
Healthcare access

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Non-invasive motor cortex stimulation for migraine: time to consider it as a prophylactic adjunctive treatment? A systematic review and meta-analysis

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Introduction
Migraine is one of the most prevalent neurological conditions, and a significant proportion of patients remain refractory to conventional treatments. Non-invasive brain stimulation (NIBS) targeting the motor cortex (M1) has emerged as a promising alternative. However, it is important to have a better understanding of the effectiveness of non-invasive M1 stimulation for the prophylactic treatment of migraine.

Objective
This systematic review and meta-analysis investigates the efficacy of non-invasive brain stimulation of the motor cortex (M1) for the treatment of migraine.

Methods
Following PRISMA guidelines, we searched PubMed, Web of Science, Embase, Cochrane Central, PsycINFO, and Scopus using the combined terms "migraine", "tDCS", "rTMS" and "NIBS". It was included randomized controlled trials, published in English, Portuguese, or Spanish adults diagnosed with migraine according to ICHD criteria; submitted to tDCS or rTMS; compared to sham; with outcomes reporting efficacy with extractable quantitative data. Exclusion criteria comprised invasive brain stimulation, other NIBS modalities (e.g., tACS), combined interventions without isolation of NIBS effect, non-RCT designs. Screening was performed by two independent reviewers, with disagreements resolved by a third reviewer. Statistical analysis was performed using R software. For continuous outcomes, standardized mean difference (SMD) was calculated using a random-effects model. Heterogeneity was assessed using the I^2 statistic.

Results
A total of 2,600 articles were screened, and 13 studies comprising 451 patients were included in the meta-analysis, all targeting the motor cortex (M1), of which 8 studies used tDCS and 5 studies used rTMS. For the M1 target, statistically significant reductions favoring NIBS were observed for headache days (SMD -0.78; 95% CI -1.19 to -0.37; p<0.001), migraine frequency (SMD -0.68; 95% CI -1.11 to -0.25; p=0.002), medication use (SMD -0.32; 95% CI -0.53 to -0.10; p=0.004), and pain duration (SMD -0.74; 95% CI -1.28 to -0.21; p=0.006). No significant differences were found for headache frequency (SMD -1.04; 95% CI -2.64 to 0.56; p=0.20), MIDAS score (SMD -0.35; 95% CI -1.14 to 0.45; p=0.39), or pain intensity (SMD -0.43; 95% CI -1.17 to 0.31; p=0.25). Substantial heterogeneity was observed for headache frequency (I^2=87%), pain duration (I^2=77.1%), and pain intensity (I^2=88.8%). No deaths were reported.

Conclusion
Non-invasive brain stimulation of the motor cortex (M1) appears to be an effective intervention for migraine, with significant reductions in headache days, migraine frequency, medication use, and pain duration. However, no significant differences were observed for headache frequency, MIDAS score, or pain intensity. The safety profile was acceptable, with no deaths reported. Further large-scale randomized controlled trials are needed to strengthen these findings.

Keywords:
Migraine
rTMS
Motor cortex
Non-invasive brain stimulation
tDCS

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Intestinal microbiota and neuroinflammation in migraine: a new pathophysiological frontier

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Introduction
Migraine is currently recognized as a chronic neurovascular disorder characterized by central neuronal hyperexcitability and trigeminovascular activation. Emerging evidence highlights the gut-brain axis as a critical modulator of inflammatory processes involved in migraine pathophysiology, with intestinal dysbiosis and barrier dysfunction emerging as relevant systemic triggers.

Objective
To analyze the relationship between intestinal microbiota composition, increased intestinal permeability, and neuroinflammatory mechanisms associated with migraine, supporting the need for integrative therapeutic approaches that combine dietary modulation with conventional neurological management.

Methods
This study is an integrative literature review conducted through structured searches in scientific health databases, using controlled descriptors and Boolean operators. Studies published between 2018 and 2025 were included - original articles, systematic reviews, and clinical trials in Portuguese, English, and Spanish - addressing the correlation between diet, intestinal permeability, and migraine. Manuscripts without full free access, statistically irrelevant samples, or lacking a clear correlation with human physiology were excluded.

Results
Evidence indicates that modern diets rich in ultra-processed foods promote intestinal dysbiosis and compromise epithelial integrity by reducing tight junction expression and depleting the protective mucus layer. This structural failure allows bacterial endotoxins to translocate into systemic circulation, activating Toll-like receptors (TLR-4) and triggering pro-inflammatory cytokine cascades, including IL-6 and TNF-α. These mediators sensitize trigeminal nociceptors and facilitate pain transmission, lowering the threshold for migraine attacks. Clinical data indicate high prevalence of gastrointestinal comorbidities among migraine patients, reinforcing the intestinal origin of systemic neuroinflammation.

Conclusion
The intestinal microbiota acts as a dynamic regulator of neurological homeostasis, and its disruption constitutes a significant pathophysiological substrate for migraine chronification. Restoring intestinal symbiosis through dietary interventions based on natural foods and the elimination of synthetic additives represents a fundamental therapeutic strategy. Integrating gut health into neurological clinical protocols may reduce crisis frequency and improve patients' quality of life through a systemic and integrative approach to human health.

Keywords:
Migraine
Intestinal microbiota
Neuroinflammation
Gut-brain axis
Intestinal permeability

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