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Review

Integrated Approach to Migraine Management: A narrative review of the Pillars of Lifestyle Medicine

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Abstract

Introduction
Migraine is a debilitating neurological disorder characterized by recurrent episodes of severe headaches, often accompanied by nausea and other autonomic symptoms. It affects a significant portion of the global population, with estimates suggesting a prevalence of approximately 58.2%. Beyond the immediate pain and discomfort, migraine can have a substantial impact on quality of life and productivity. Lifestyle medicine, which emphasizes the power of modifiable lifestyle factors to prevent, manage, and potentially reverse chronic diseases, offers a promising approach to migraine management.

Objective
This narrative review aims to map recent findings on the potential of lifestyle medicine pillars as effective strategies for managing migraine.

Methods
A comprehensive narrative review was conducted using the PubMed database. Articles published within the past 10 years that investigate the intersection of migraine and lifestyle medicine were included.

Results
Interventions such as diet, physical exercise, stress management, sleep quality, healthy relationships, and cessation of alcohol and smoking can reduce the frequency and severity of attacks.

Conclusion
This review highlights the potential of lifestyle medicine strategies to improve the management of migraine. By integrating interventions focused on diet, physical activity, stress management, sleep hygiene, healthy relationships, and substance cessation, migraine sufferers may experience a significant reduction in attack frequency and severity, ultimately leading to an enhanced quality of life.

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Introduction

Migraine is a prevalent neurological disorder characterized by recurrent episodes of moderate-to-severe headache, typically unilateral and throbbing in nature. The pain often worsens with routine physical activity (1). Beyond the head pain, migraineurs may experience a constellation of autonomic symptoms, including nausea, photophobia (light sensitivity), phonophobia (sound sensitivity), and osmophobia (odor sensitivity) (1). Notably, migraine ranks among the top ten neurological conditions contributing to disability-adjusted life years (DALYs), affecting an estimated 58.2% of the global population (2).

Lifestyle medicine is an evidence-based approach that emphasizes the power of modifiable lifestyle factors in preventing, managing, and potentially reversing chronic diseases (3). This holistic approach goes beyond symptom management and focuses on addressing the root causes of illness by promoting healthy dietary patterns, regular physical activity, effective stress management techniques, quality sleep hygiene, positive social connections, and the cessation of harmful substances like tobacco and excessive alcohol (4). By targeting these modifiable factors, lifestyle medicine aims to improve not only the specific disease burden but also the overall health and well-being of individuals.

In the context of migraine, lifestyle medicine plays a crucial role, as factors like sleep and stress can significantly influence attack frequency and severity (5, 6). Therefore, the objective of this review is to explore recent discoveries on how the pillars of lifestyle medicine can be effectively utilized as strategies in migraine management.

Methods

Protocol and registration

A narrative review literature search was conducted using the PubMed database.

Eligibility Criteria

Articles that addressed the topic of lifestyle medicine as approaches to treating migraine (nutrition, regular physical exercise, smoking cessation and control of toxic substances, strategies for controlling stress, improving sleep and healthy relationships). There was a language restriction, and original articles in English published in the last 10 years were included. Study design: Systematic review articles, literature reviews, meta-analyses and clinical trials were included. Exclusion criteria: Editorials and case studies were excluded. Information sources and research strategy

The studies were acquired through research in the PUBMED database, taking into account the keyword combinations that are detailed in supplementary file (table 1).

Selection, screening of studies and data extraction

Both reviewers carried out their respective searches according to the pre-determined topics and carried out a synthesis of the findings according to the eligibility criteria.

Summary and Presentation of Results

The results section synthesizes key findings from the reviewed studies, presenting them thematically according to the pillars of lifestyle medicine (diet, exercise, stress management, etc.). Furthermore, supplementary material (table 2) provides a valuable guide with suggested questions that healthcare professionals can incorporate into their assessments of migraine sufferers.

Ethics and Disclosure

Ethical approval was not required for this scoping review as all data was obtained from publicly available sources. The results will be disseminated through various channels to maximize their reach and impact. A manuscript will be submitted to a specialized peer-reviewed journal, and the findings will be presented at relevant academic conferences. Additionally, key takeaways and infographics summarizing the research will be shared on social media platforms, aiming to engage a broader audience and promote knowledge translation.

Results

Each author was responsible for reviewing two of the six topics related to lifestyle, a descriptive analysis will be provided in the following topics, statistical analyzes were not performed.

This study explores the connection between migraine and various lifestyle factors, focusing on the established pillars of healthy living: sleep, diet, substance use, stress management, social connections, and physical activity. The analysis highlights how these aspects influence the frequency and severity of migraine attacks.

Sleep

A bidirectional relationship exists between sleep disorders and headaches, particularly migraines and tension-type headaches (6,7). Both conditions are chronic and prevalent, significantly impacting quality of life (6).

Sleep disorders can trigger migraines, worsen pain intensity, and contribute to chronicity. Conversely, migraines can disrupt sleep patterns (7-8). These sleep disorders are categorized into seven sections: insomnia, sleep-disordered breathing, sleep-related movement

disorders, central hypersomnolence disorders, circadian rhythm sleep-wake disorders, parasomnias, and other disorders (7).

Insomnia is a prevalent sleep disorder in migraine sufferers. Additionally, obstructive sleep apnea, characterized by interrupted breathing during sleep, is associated with migraine and may worsen neck pain (7-8). Individuals with sleep disorders often exhibit heightened pain sensitivity due to shared neurological pathways (7-8).

Migraine is also associated with Restless Legs Syndrome (RLS), linked to greater severity of migraine, photophobia, phonophobia, nausea, dizziness, anxiety, and depression (7). Clinicians should be vigilant for sleep-related breathing disorders in migraine patients, especially those with obesity, anatomical risk factors, neuromuscular disorders (NMDs), substance use, including alcohol, tobacco, and illicit drugs (7).

Treating co-existing sleep disorders can improve migraine management by promoting better sleep quality and potentially reducing pain frequency and severity (6). Sleep hygiene practices, relaxation techniques, and cognitive-behavioral therapy (CBT) have shown promise in managing migraine alongside sleep disorders (6-7).

Nutrition

Dietary factors potentially influence migraine pathophysiology through various mechanisms, including neuropeptide and neuroreceptor modulation, ion channel activity, and cerebral glucose metabolism (9,11). Studies explored the effects of diet on migraine, including potential triggers, dietary interventions, obesity's role, fasting as a trigger, and food allergies (9-11).

Certain food components have been identified as potential migraine triggers, such as caffeine, monosodium glutamate (MSG), artificial sweeteners, nitrites, gluten, and biogenic amines (11,13,14). While specific triggers vary, some commonly reported ones include chocolate, coffee, nuts, processed meats, alcohol, dairy, citrus fruits, and cheese (11,13).

The impact of dietary triggers depends on factors like dosage, timing of exposure, and individual genetics. Isolated triggers are unlikely to induce an attack; typically, multiple triggers contribute. A Brazilian study identified watermelon as a common trigger due to citrulline, which increases nitrite levels (13). Alcohol and caffeine were the most common dietary patterns linked to increased migraine frequency. Dietary triggers vary, and not all pro-migraine foods will trigger attacks in all patients (16,17).

Cravings for specific foods, such as chocolate, may occur during the migraine prodrome (pre-headache phase), leading to mistaken assumptions about the food causing the attack (14,16).

Despite popular belief, evidence for chocolate as a trigger remains inconclusive (11). Conversely, caffeine can trigger headaches both through ingestion and withdrawal after chronic exposure (12,13,18). While some studies suggest a link between food allergies and migraines, others lack supporting evidence. Currently, food allergies are not considered a direct cause of migraines (11).

Weight management interventions may be associated with reduced migraine severity, but a direct causal link between weight loss and lessened attacks remains unclear (18). Elimination diets, involving temporary exclusion and reintroduction of specific food groups, are under investigation to identify potential migraine triggers (16,18). Examples include gluten-free, immunoglobulin G exclusion, antihistamine, tyramine-restricted, low-fat, and low-glycemic index diets (13). While limited evidence suggests these elimination diets may decrease migraine frequency, further research is needed to confirm their efficacy (15-16). Nonetheless, increasing awareness of current evidence can optimize dietary interventions for individual migraine management (16).

Emerging dietary approaches, such as those rich in omega-3 fatty acids and the ketogenic diet, show promise in reducing severe headaches or migraines (13). However, adherence challenges and potential weight loss effects as confounding factors need to be addressed (13). Low-fat vegan diets also warrant further investigation for their potential benefits in migraine patients (11,13). Maintaining stable blood sugar levels through frequent, smaller meals may be another strategy for migraine management, although further research is needed (11-12).

Tobacco and alcohol

Several studies have identified a positive association between specific dietary patterns and increased migraine frequency (11-12). Notably, alcohol consumption is a well-established trigger for migraine, as highlighted by a systematic review demonstrating frequent patient self-reporting of alcohol as a risk factor (32). Among alcoholic beverages, red wine appears to be the most commonly reported trigger, although evidence suggests that other types of alcoholic beverages, such as white or sparkling wine, spirits, and beer, may also play a role (11-12,32). The exact mechanism underlying alcohol-induced migraines remains unclear, but it is likely multifactorial and may involve various vasoactive substances such as histamine, tyramine, sulfites, phenylethylamine, and flavonoid phenols (32).

The association between smoking and migraine onset is less conclusive. While one study suggests a potential link between adolescent migraine and the initiation of

smoking in adulthood, the evidence is currently limited and requires further investigation (31). Some researchers hypothesize that the vasoconstrictive properties of nicotine might contribute to migraine headaches, potentially leading to increased migraine severity and frequency (32).

Considering the potential benefits of smoking cessation for migraineurs, including reduced attack frequency and severity, this intervention is highly recommended (12). A comprehensive lifestyle approach that incorporates a balanced diet, regular physical activity, and effective stress management strategies, alongside smoking cessation, can significantly improve migraine management outcomes (12). Individuals struggling with smoking cessation may benefit from seeking professional counseling or participating in smoking cessation programs to provide additional support (12).

Stress control

The concept of stress, originating in biology, has evolved with expanding literature and applications across disciplines like psychology, physiology, sociology, and even environmental science (19). In this review, we define stress as an organism's perception and response to a perceived stressful stimulus, manifesting in both physiological and psychological ways (19-20).

When we relate stress to migraine, we observe that it can trigger the appearance of new attacks, being frequently reported as one of the most common triggers (18,22). Furthermore, stress can act as a risk factor for headache attacks, increasing the likelihood of their occurrence (22). It can also amplify the disability associated with headaches and the psychosocial burden attributed to them (18,23). Furthermore, stress can contribute to the development of chronic daily headache (23-24).

Managing stress is recommended as an integral part of treatment for people with headaches. Fortunately, many evidence-based techniques used to treat stress can be applied to headache management, including cognitive behavioral therapy, biofeedback, mindfulness, and relaxation techniques (25).

Healthy relationships

Migraine is a severe neurological disorder with a substantial societal burden. It significantly disrupts various aspects of an individual's social life, leading to work absenteeism, difficulties in marital and family relationships, social isolation, and compromised psychological well-being (26-27). Individuals with migraine may experience cognitive changes beyond memory and concentration deficits, potentially impacting executive function and processing speed (27-28).

The invisibility of migraine can contribute to a lack of understanding and support within the work environment, further isolating individuals (27). Social network theory emphasizes the importance of strong social ties, and studies suggest that migraineurs who perceive disbelief from others when explaining their condition experience a significant detriment to their social support. This lack of social support negatively impacts participation in leisure activities, vacations, work productivity, childcare responsibilities, and even sexual relations (27-29).

Migraine can directly affect intrapersonal emotions, triggering feelings of frustration, despair, irritability, mood swings, hopelessness, and guilt (27-28). It can also exacerbate or even trigger comorbid mental health conditions, such as major depressive disorder and generalized anxiety disorder, according to established diagnostic criteria (26, 28).

These comorbidities can have a cumulative negative impact on quality of life and health, potentially increasing the likelihood of suicidal behavior, migraine-related disability, and sleep disorders (26). Insomnia, or disturbances in sleep patterns, are frequently observed among migraine patients (23). A more comprehensive treatment approach that addresses depression, anxiety, sleep quality, and fosters strong social support networks through education and intervention strategies is crucial to improve migraine outcomes and break the negative cycle of sleep deprivation and worsening mental health (28, 30, 31).

Physical exercise

Physical inactivity is a recognized risk factor for migraine chronicity, highlighting the potential benefits of physical activity and exercise as therapeutic strategies (15). The American College of Sports Medicine provides clear definitions to distinguish between physical activity and exercise. Physical activity encompasses any bodily movement that expends energy above resting levels. In contrast, physical exercise is a planned, structured, and repetitive form of physical activity designed to improve or maintain physical fitness (33).

Studies suggest that individuals with migraine may benefit from incorporating strength training exercises followed by high-intensity aerobic exercise into their routines (34). However, it's crucial to acknowledge the potential for exercise to act as both a trigger for migraine attacks and a form of preventive treatment. Currently, no research directly investigates the effectiveness of physical activity as an acute treatment during migraine attacks.

A systematic review analyzing 21 clinical trials and involving over 1,195 migraine patients identified strength training as the most effective exercise regimen in reducing migraine burden, followed by high-intensity aerobic exercise (34). Conversely, another review found moderate-

quality evidence suggesting that aerobic exercise therapy can decrease migraine frequency (35).

A third review analyzing 10 articles and 508 patients concluded that aerobic exercise offers low to moderate-quality evidence for reducing pain intensity, frequency, and duration of migraines, while potentially improving quality of life (36).

Based on the available evidence, recommendations for physical activity and migraine management emphasize a balanced and personalized approach (34-37). Regularly engaging in moderate-intensity aerobic exercise, such as walking, swimming, cycling, or running, for at least 150 minutes per week spread throughout the week is recommended (37,39-40). Additionally, incorporating activities that promote muscle strengthening and flexibility, like resistance training and stretching, is advisable (39).

It is prudent to avoid strenuous physical activity during migraine attacks, as it may worsen headache intensity and associated symptoms (18,37). Opting for gentler activities like yoga, tai chi, or Pilates during these periods may help alleviate stress and muscle tension (37). Crucially, exercise programs should be individualized based on each patient's physical capabilities, preferences, activity tolerance, and any existing medical conditions (37).

Promoting an active and healthy lifestyle through strategic exercise choices can minimize potential migraine triggers, provide symptom relief, and contribute to overall well-being. However, anyone considering starting an exercise program must consult their doctor or healthcare professional to ensure it is safe and suited to their individual needs.

Discussion

This review aimed to explore recent findings on how the pillars of lifestyle medicine can be employed as management strategies for migraine. The results emphasize the growing recognition of these pillars as crucial components in controlling migraine burden.

The bidirectional relationship between sleep disorders and migraine highlights the relevance of therapeutic strategies aimed at sleep, such as sleep hygiene and cognitive-behavioral therapy. Additionally, smoking cessation and adoption of a healthy lifestyle, encompassing a balanced diet and regular physical exercise, are recommended to reduce migraine frequency and severity. These approaches, combined with specific interventions and maintenance of healthy relationships provide an integrated and effective way to manage this debilitating condition, highlighting the importance of a personalized approach guided by qualified healthcare professionals.

While the review offers a well-rounded perspective on migraine management through lifestyle medicine, some limitations require consideration. The absence of a systematic quality assessment of the included studies could potentially impact the reliability of the results, as studies with lower methodological rigor could introduce bias. Furthermore, the possibility exists that relevant studies were inadvertently excluded during the selection process, potentially leading to an incomplete picture of the existing evidence.

On the other hand, the review boasts notable strengths. Its transparent methodology provides a clear understanding of the eligibility criteria and research strategies employed. Moreover, the review's comprehensive nature, encompassing aspects like sleep, nutrition, stress management, social relationships, substance use cessation, and physical exercise, offers a complete overview of the diverse strategies applicable to migraine treatment. This focus on a multifaceted approach to lifestyle modifications makes this review a valuable resource for healthcare professionals when discussing these interventions with migraine patients.

Conclusion

Based on the findings presented in this review, a compelling argument emerges for further investigation into the implementation and reinforcement of lifestyle medicine strategies for migraine management. The review highlights the potential of these pillars – proper nutrition, regular exercise, stress management, quality sleep, healthy relationships, and smoking and alcohol cessation – to reduce migraine frequency, severity, and improve patients' quality of life.

Future research should focus on optimizing the integration of these strategies into clinical practice. This requires studies that: investigate strategies for tailoring lifestyle medicine interventions to address the unique needs and preferences of patients with migraine, evaluate effective methods for implementing and reinforcing lifestyle modifications in a clinical setting, assess the impact of educational initiatives designed to raise awareness among healthcare professionals about the role of lifestyle medicine in migraine management.

By addressing these research gaps, we can develop evidence-based protocols for integrating lifestyle medicine into standard treatment regimens for migraine. This comprehensive approach holds promise for significantly improving the care and quality of life for individuals suffering from migraine.

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