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Intestinal microbiota and neuroinflammation in migraine: a new pathophysiological frontier

Fernanda Cunha Sampaio[1], Murilo dos Santos Silva[1], Matheus Cordeiro Benvenuto[1], Gabriel Oceliano Moreira[1], Ana Laura Rodrigues Costa[1], Maria Clara Moreira Coelho[1], Breno Aguiar Alvarenga[1], Rafael Ribaldo Rodrigues[1], Natália Ferreira Souza[1], Matheus de Carvalho Pita[2]

[1]FAMETRO University Center, Manaus, Amazonas, Brazil
[2]Amazonas State University, Manaus, Amazonas, Brazil

Murilo dos Santos Silva
murilosilva.med@gmail.com

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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