Review Article

Association between Migraine and Irritable Bowel Syndrome (IBS): Systematic Review

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ABSTRACT

This study aims to assess the available evidence regarding the association between migraine and irritable bowel syndrome (IBS). A comprehensive search of four databases led to the discovery of 611 relevant publications. After eliminating duplicates and assessing each article for relevance, 301 full-text articles were examined, and ultimately, 7 studies were selected based on the inclusion criteria. Seven studies were included, with a total of 721,176 patients with migraine and 318,498 (44.2%) with comorbid gastrointestinal (GI) disorders (e.g., IBS, peptic ulcers). Across the included studies, IBS prevalence ranged from 2.7% to 87.7%, with higher rates found in studies using Rome IV criteria. Migraine was consistently associated with increased odds of having IBS. The association remained significant after adjusting for confounders. Mendelian randomization suggested a potential causal direction from IBS to migraine. There is strong evidence of a significant association between migraine and IBS. Clinicians should consider screening for both conditions in affected patients. Further research is needed to clarify causality and develop integrated treatment approaches.

Keywords: IBS, Migraine, Headaches, irritable bowel disease, gut health

Introduction

Migraine and IBS are two prevalent yet often misunderstood disorders that affect millions of people worldwide. While they may seem unrelated at first glance, research has increasingly revealed a significant connection between the two conditions, including shared risk factors, overlapping symptoms, and potential underlying mechanisms [1].

Frequent headache episodes, ranging in intensity from moderate to severe, are the hallmark of migraine, a neurological condition. These headaches usually affect only one side of the head and are frequently pulsing [2]. Light and sound sensitivity, nausea, and vomiting are possible accompanying symptoms. A person's quality of life can be greatly impacted by

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migraines, which can last anywhere from a few hours to several days. Migraines are thought to be caused by intricate interplay between genetic, environmental, and neurovascular variables, while the precise aetiology is yet unknown [3]. While IBS affects the big intestine, it is a functional gastrointestinal condition. A number of symptoms, including bloating, diarrhoea, constipation, or a combination of the two, are known to be associated with it. IBS is believed to be caused by changes in gut flora, food triggers, and disruptions in gut-brain communication, while the precise aetiology is still unknown, similar to migraines [4]. Recent studies indicate a significant overlap between migraine and IBS, with many individuals suffering from both conditions simultaneously. According to some research, up to 50% of patients with migraines may also experience IBS, making it crucial to explore shared pathophysiological pathways and potential triggers that may drive both disorders [5]. One major link appears to be the influence of stress and psychological factors. Both disorders are known to be exacerbated by stress, anxiety, and depression. One important factor in how stress might show up physically is the gut-brain axis, a two-way communication link between the neurological system and the gastrointestinal tract. The dysregulation of this system can lead to gastrointestinal symptoms in IBS and trigger migraine attacks [6]. Additionally, certain dietary components and lifestyle factors that worsen IBS symptoms—such as caffeine, alcohol, and certain foods—can also trigger migraines in susceptible individuals. Identifying these common triggers can be essential for managing both conditions [7]. The overlapping nature of migraine and IBS suggests that integrated treatment approaches may be beneficial. For instance, lifestyle adjustments such as stress management, dietary modifications, and regular exercise can have a positive impact on both conditions. Cognitive-behavioral therapy (CBT) and mindfulness-based stress reduction are increasingly being recognized for their roles in alleviating symptoms associated with both migraines and IBS by helping patients develop coping strategies to manage stress [8]. Pharmacological interventions can also be tailored to address both conditions simultaneously. Medications that target migraines, such as certain antidepressants and anti-seizure medications, have been found beneficial for IBS patients as well. It is essential for healthcare providers to take a holistic approach in order to address the complexities of coexisting migraine and IBS, ensuring that patients receive comprehensive care [9]. Recent epidemiological studies suggest a potential correlation between migraine and gastrointestinal disorders, particularly IBS. Both conditions share overlapping pathophysiological mechanisms, such as neurogenic inflammation and altered gut-brain interactions. The aim of this systematic review is to assess the available evidence regarding the association between migraine and IBS, elucidating the nature and strength of this relationship through critical analysis of existing literature.

Methods

To maintain scientific rigour and openness, this systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards [10]. By looking at possible epidemiological connections, similar pathophysiological mechanisms, and clinical consequences, the study sought to assess the body of data regarding the relationship between migraine and IBS.

Search Strategy: To find pertinent English-language papers, a thorough electronic search was conducted across several databases, including PubMed, Web of Science, Scopus, and Embase. The search strategy included Medical Subject Headings (MeSH) terms and keywords associated with migraine (e.g., "migraine disorders," "headache," "chronic migraine"), irritable bowel syndrome (e.g., "irritable bowel syndrome," "IBS," "functional gastrointestinal disorders"), and their associations (e.g., "comorbidity," "bidirectional relationship," "gut-brain axis"). Manual searches of reference lists from pertinent reviews and featured papers turned up additional studies.

Study Selection and Eligibility Criteria: After determining the eligibility of the titles and abstracts, two independent reviewers evaluated the entire texts of any possibly pertinent articles. A third reviewer was consulted or discussed in order to address any discrepancies. Studies that examined human participants (adults or adolescents) with a diagnosis of either migraine or IBS and detailed their comorbid associations were included. Cross-sectional, case-control, and cohort observational studies as well as, if available, randomised controlled trials (RCTs) looking at therapies aimed at both diseases were considered eligible study designs. Included were studies released in the previous five years (2021–2025). Exclusion criteria consisted of studies without a control or comparison group (for observational studies), case reports or series with fewer than 10 participants, animal or in vitro studies, review articles, editorials, and conference abstracts lacking full data. Studies that examined migraine or IBS in isolation without assessing their association were also excluded.

Data Extraction: To guarantee uniformity, a standardised data extraction form was created and

tested. From the included papers, two reviewers separately retrieved the following data:

• Features of the study: Author, year, nation, sample size, study design, and length of follow-up (if any).

• Participant demographics: Age, sex, diagnostic criteria for migraine and IBS, and comorbidities.

• Exposure/outcome measures: Method of migraine and IBS assessment (e.g., questionnaires, clinical diagnosis), frequency/severity of symptoms, and any reported effect measures (e.g., odds ratios, hazard ratios).

• Key findings: Strength and direction of association, subgroup analyses (e.g., by migraine subtype or IBS phenotype), and potential confounding factors adjusted for in analyses.

Risk of Bias Assessment: Since bias resulting from omitted factors is frequent in studies in this field, we used the ROBINS-I technique to assess the likelihood of bias since it enables a thorough examination of confounding. The ROBINS-I tool can be used for cohort designs where individuals exposed to different staffing levels are tracked over time and is designed to assess non-randomized studies. Each paper's risk of bias was evaluated independently by two reviewers, and any differences were settled by group discussion [11].

Results

The search process initially identified 611 publications (Figure 1). After removing 310 duplicates, 301 trials were screened based on their titles and abstracts. Of these, 244 did not meet the eligibility criteria, leaving 55 full-text articles for in-depth evaluation. In the end, 7 studies met the inclusion criteria and were selected for evidence synthesis and analysis. Seven studies were included, with a total of 721,176 patients with migraine and 318,498 (44.2) with comorbid gastrointestinal (GI) disorders (e.g., IBS, peptic ulcers). The study designs consisted of five cross-sectional studies [12, 13, 15, 16], one was a retrospective cohort [14], and two were Mendelian randomization study [17]. Three studies were conducted in Saudi Arabia [13, 15, 16], two in Korea [14, 18], one in Sweden [12], one in the UK [17] (Table 1). (Table 2) shows that IBS prevalence varied widely across studies, ranging from 2.7% to 87.7%. Higher rates were observed in studies using the Rome IV criteria, especially in Saudi Arabia [13,15,16], while lower rates appeared in broader population-based or retrospective analyses [12,14,17,18]. After adjusting for confounding factors, IBS and peptic ulcers were notably associated with migraine, suggesting a strong and independent relationship between these conditions [12]. In particular, individuals with migraines were found to have a substantially higher likelihood of being diagnosed with IBS compared to those without migraines. The odds ratio of 4.127 (95% CI: 3.325–5.121) underscores the strength of this association, which was statistically significant ($p < 0.001$) [13]. The comorbidity between migraine and GI disorders was further confirmed in large pediatric and adolescent cohorts, where the prevalence of GI diseases—including IBS—was higher among migraine sufferers, even after controlling for demographic variables [14]. A similar trend was observed among university students, where both medical and non-medical participants exhibited high rates of migraine and IBS. Interestingly, no significant difference was found between the two groups, challenging the assumption that medical school stress alone contributes to these conditions. Instead, other risk factors such as age, gender, family history, and psychiatric disorders were identified as more influential [15, 16]. Additionally, Mendelian randomization analysis suggested a possible causal direction, where IBS may act as an upstream factor leading to migraine. This finding points to the importance of early identification and intervention for IBS in order to prevent or mitigate migraine symptoms [17]. The strength of the association was particularly evident among patients with multiple GI conditions, especially those receiving both preventive and acute treatments for migraine, indicating a cumulative effect of GI comorbidities on migraine prevalence and severity [18].

Discussion

This systematic review provides a comprehensive analysis of the association between migraine and IBS, consolidating evidence from various global studies. Across different populations and study designs, a consistent and significant relationship was found between the two conditions. Notably, patients with migraines were significantly more likely to have IBS, with some studies reporting odds ratios exceeding four. The findings suggest a potential bidirectional or shared pathophysiological mechanism, likely involving the gut-brain axis, neuroinflammation, and altered serotonin pathways. Interestingly, stress alone, especially in medical students, did not appear to be a sole contributor to IBS or migraine, suggesting that multiple biological and psychosocial factors interplay in the manifestation of these disorders. A review by Kim et al. also stated a statistically significant relationship was observed between the prevalence of GI diseases and migraine, with the strength of this

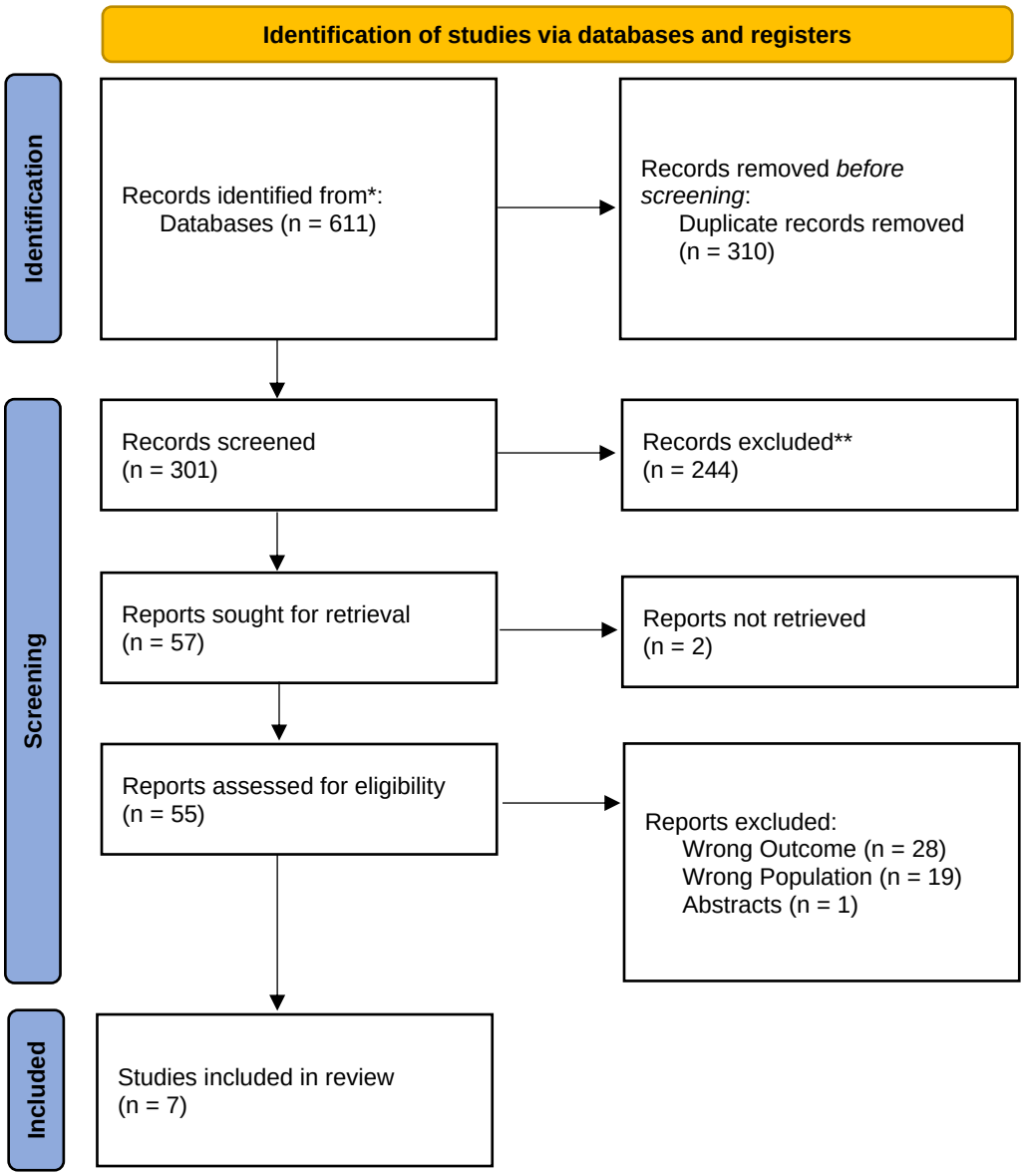

Figure 1: Search summary illustrated in PRISMA flowchart.

Table 1: Summary of demographic and clinical data from the included studies.

Study ID	Country	Study design	Sociodemographic	IBS diagnosis	IBS (%)	Main outcomes
Welander et al., 2021 [12]	Sweden	Cross-sectional	Cases: 14,180 Age range: 37-69 Females: 11,100 (78.3%)	Retrospectively retrieved data	878 (6.2%)	After adjusting for confounding factors, both IBS and peptic ulcers showed a significant association with migraine.
Bin Abdulrahman et al., 2022 [13]	Saudi Arabia	Cross-sectional	Cases: 767 Age range: 15 to >50 Females: 500 (65.2%)	Rome IV	254 (33.1%)	The likelihood of having IBS was significantly higher among individuals with migraines compared to those without (odds ratio [OR] 4.127; 95% confidence interval [CI] 3.325–5.121), and this association was statistically significant ($p < 0.001$). In conclusion, there is a strong association between migraine and IBS in Saudi Arabia.
Rhew, 2023 [14]	Korea	Retrospective cohort	Cases: 695, 584 Females: 300,299 (43.2%)	Retrospectively retrieved data	94,080 (13.5%)	The association between migraine and GI diseases remains clear even after adjusting for patient characteristics in pediatric and adolescent populations. Moreover, the prevalence of the IBS was found to be higher among individuals with migraine.
Alhammadi et al., 2023 [15]	Saudi Arabia	Cross-sectional	Cases: 683 Females: 584 (85.5%)	Rome IV	148 (54.2%)	This study highlights a high prevalence of both migraine and IBS, emphasizing the strong link between them. Major risk factors identified include age, gender, family history, and the presence of psychiatric disorders.
Agwa et al., 2023 [16]	Saudi Arabia	Cross-sectional	Cases: 452 Mean age: 21.6 Females: 167 (36.9%)	Rome IV	12 (2.7%)	Contrary to our initial hypothesis, no significant difference in prevalence was observed between the two groups. This suggests that stress associated with medical education alone is not a primary risk factor for developing IBS or migraine, and that other contributing factors are involved.

Chen et al., 2021 [17]	UK	Mendelian randomization analysis	Cases: 1072 Females: 712 (66.4%)	Retrospectively retrieved data	42 (3.9%)	Mendelian randomization analysis suggests that migraine may be a downstream consequence of IBS. These findings highlight the need for clinical practitioners to prioritize migraine prevention when managing patients diagnosed with IBS.
Kim et al., 2022 [18]	Korea	Cross-sectional	Cases: 8438 Females: 5136 (60.7%)	Retrospectively retrieved data	7396 (87.7%)	A statistically significant link was found between the prevalence of GI diseases and migraines, with the strength of this association increasing as the number of coexisting GI conditions rose—particularly among patients receiving both preventive and acute migraine treatments.

Table 2: Risk of bias assessment using ROBINS-I.

Study ID	Bias due to	Bias in the selecti	Bias in the classif	Bias due to	Bias due to missing	Bias in the measu	Bias in the selecti	Overall bias
Welander et al., 2021 [12]	Low	Low	Mod	Low	Low	Low	Mod	Low
Bin Abdulrahman et al., 2022 [13]	Mod	Low	Low	Low	Low	Mod	Low	Low
Rhew, 2023 [14]	Low	Low	Mod	Low	Low	Low	Mod	Low
Alhammadi et al., 2023 [15]	Mod	Mod	Low	Low	Low	Mod	Mod	
Agwa et al., 2023 [16]	Mod	Mod	Low	Low	Low	Mod	Mod	Moderate
Chen et al., 2021 [17]	Mod	Mod	Low	Low	Low	Mod	Low	Moderate
Kim et al., 2022 [18]	Crit	Mod	Low	Mod	Mod	Mod	Loe	Critical

association increasing in patients who had multiple GI conditions and were receiving both preventive and acute migraine treatments [19]. Another systematic review and meta-analysis by Wongtrakul et al. demonstrated that individuals with migraines had a notably higher prevalence of IBS compared to those without migraines, with a pooled odds ratio of 2.49 (P<0.001) [20]. A study conducted among middle-aged individuals in the United Kingdom found that the prevalence of migraine was significantly higher in those with IBS or peptic ulcer disease (PUD). However, this increase was not statistically significant in patients with inflammatory bowel diseases (IBD), such as Crohn's disease or ulcerative colitis [21]. In contrast, other studies have reported a higher prevalence of migraine in IBD patients compared to controls [22,23]. Conditions like gastroesophageal reflux disease (GERD), dyspepsia, IBS, and PUD, all of which showed a significant link to migraine, are known to be strongly affected by stress and environmental factors. Furthermore, there is considerable overlap among gastroesophageal diseases, dyspepsia, and IBS within the spectrum of gastrointestinal disorders [21]. From a clinical perspective, these findings underscore the need for an integrated approach in managing patients presenting with either IBS or migraine. Health professionals should be aware of the high likelihood of comorbidity, and screen for symptoms of both conditions during diagnosis and follow-up. Early identification of IBS in migraine patients, or vice versa, could enable more comprehensive and effective treatment strategies. Furthermore, given the suggested causal link from IBS to migraine in Mendelian randomization analyses, preventive strategies targeting gastrointestinal health may have downstream benefits in reducing migraine incidence or severity. Lifestyle interventions, particularly those promoting physical activity and mental well-being, should be emphasized in patient management plans.

Strengths: A major strength of this review is its methodological rigor, adhering to PRISMA guidelines and incorporating a broad search strategy across multiple databases. The inclusion of studies from diverse geographic and demographic backgrounds enhances the generalizability of findings. Moreover, the review includes various study designs—cross-sectional, cohort, and genetic analyses—offering a multidimensional understanding of the migraine–IBS relationship.

Limitations: Despite its strengths, the review has some limitations. The heterogeneity in diagnostic criteria, particularly between studies using retrospective data and those employing Rome IV, complicates direct comparison of prevalence rates. The reliance on self-reported or retrospective data in several studies introduces potential recall and selection biases. Additionally, the cross-sectional nature of many included studies limits causal inference. Few studies explored the temporal sequence or biological mechanisms in depth, and there was a general underrepresentation of interventional trials.

Conclusion

This systematic review confirms a strong and consistent association between migraine and IBS across varied populations. The presence of one condition significantly increases the likelihood of the other, reinforcing the importance of comprehensive patient assessments in clinical practice. While the exact mechanisms remain to be fully elucidated, emerging genetic and epidemiological evidence suggests a possible causal link. Future research should focus on longitudinal studies and interventional trials to further clarify the direction and mechanisms of this association, with the aim of developing targeted prevention and treatment strategies.

Conflict of Interest

None

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