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High-Intensity vs. Low-Intensity Exercise in the Management of Irritable Bowel Syndrome

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ABSTRACT

Background. Irritable bowel syndrome (IBS) is a prevalent functional gastrointestinal disorder characterized by chronic abdominal pain, altered bowel habits, and significant impairment in quality of life. Exercise has emerged as an effective non-pharmacological intervention for reducing IBS symptoms.

Aim. This review aims to explore the current evidence on the effects of different exercise intensities: low- to moderate-intensity and high-intensity on symptomatic aspects of IBS.

Material and Methods. A review of relevant literature was conducted using sources retrieved from PubMed and Google Scholar.

Results. Regular low- and moderate-intensity exercise consistently helps reduce symptoms, improve quality of life, and support psychological well-being, with minimal risk of side effects. Higher-intensity workouts, including high-intensity interval training (HIIT), show more mixed results. When performed with appropriate frequency, intensity and recovery, they can enhance mental health and reduce systemic inflammation; however, they may also trigger temporary gastrointestinal discomfort in some individuals. Current evidence suggests that different exercise intensities can influence gut motility, the gut-brain axis and even the composition of the gut microbiome in distinct ways.

Conclusion. Current evidence supports low- to moderate-intensity exercise as the most effective and safe strategy for managing IBS. High-intensity exercise may introduce additional long-term systemic benefits when introduced progressively and monitored carefully, but its effects on gastrointestinal symptoms remain inconsistent and require further study.

Keywords: IBS, irritable bowel syndrome, abdominal pain, physical activity, exercise, HIIT, chronic gastrointestinal disorder

INTRODUCTION

Irritable bowel syndrome (IBS) affects an estimated 11.2% [1] of the global population and remains one of the most common disorders of gut-brain interaction. Although the etiology is multifactorial (including visceral hypersensitivity, immune activation, psychosocial stress, dysbiosis, and altered motility), non-pharmacological strategies play a critical role in symptom management. Among these interventions, physical activity has received growing attention. [2] Guidelines from major gastroenterology societies increasingly recommend exercise as part of a comprehensive management plan for IBS. These recommendations are supported by evidence that physical activity modulates stress reactivity, improves mood, influences gastrointestinal transit [3], and affects microbiota composition [4], which are pathways known to be relevant to IBS pathogenesis.

However, while the benefits of general or moderate physical activity are well established, the effects of exercise intensity are considerably less understood. Low-intensity activities (e.g., walking, yoga, light cycling) appear consistently beneficial. In contrast, high-intensity exercise may yield both positive and negative effects depending on patient characteristics, exercise modality, and physiological response.

PATOPHYSIOLOGICAL RATIONALE FOR EXERCISE IN IBS

Microbiome-Gut-Brain Axis Modulation

Exercise is increasingly recognized as a significant modulator of the microbiome-gut-brain axis, acting through many of the same pathways by which the gut microbiota influences neural and gastrointestinal function. By enhancing vagal tone, physical activity may strengthen gut-brain communication and support more adaptive autonomic responses, while also contributing to tighter regulation of the HPA axis, whose hyperreactivity is characteristic of IBS and stress-related disorders. Exercise further influences serotonin regulation, which benefits not only mood regulation but is also a crucial signaling molecule that modulates gut motility and intestinal secretion. [5] Moderate physical activity is associated with reduced circulating cortisol and improved autonomic balance, whereas higher-intensity training can transiently elevate cortisol but ultimately enhances long-term stress resilience.

Microbiota Composition

Regular physical exercise exerts a significant modulatory influence on the gut microbiota, affecting its composition and diversity, with low- to moderate-intensity activity shown to particularly enhance microbial richness. These exercise-induced alterations promote the relative abundance of taxa involved in lactic acid and short-chain fatty acids (SCFAs) production. SCFAs, among other functions, contribute to intestinal barrier integrity, modulating both local and systemic immune responses, and attenuating low-grade inflammatory processes. High-intensity exercise has shown mixed results. Certain studies indicate that professional athletes exhibit greater microbial diversity, whereas others describe patterns that resemble dysbiosis. These less favorable profiles are often linked to increased gut permeability and mild endotoxemia, which may result from reduced blood flow in individuals experiencing overtraining. This contrasting effect is highly relevant to IBS patients with pre-existing dysbiosis, as high-intensity exercise may either improve microbial diversity or exacerbate gut barrier dysfunction depending on training load and recovery. [2] Furthermore, increased microbial richness and SCFA production stimulated by regular exercise may elevate gut serotonin synthesis and influence gut-brain signaling, potentially contributing to improved mood, motility, and systemic homeostasis. [5]

Gastrointestinal Motility

Altered gastrointestinal motility is a central physiological characteristic of IBS, underlying symptoms such as bloating, abdominal discomfort, and irregular bowel habits. Physical exercise exerts regulatory effects on autonomic nervous system balance, enhancing parasympathetic activity and modulating sympathetic tone, which collectively promote more effective peristalsis and facilitate the passage of stool and gas. [6] Additionally, body movement in itself can stimulate local reflexes due to mechanical oscillations, further supporting gastrointestinal transit. [7] Low-intensity exercise has been shown to accelerate colonic transit in healthy individuals and reduce symptoms of constipation-predominant IBS. High-intensity exercise, on the other hand, can transiently cause inhibition in gastric emptying and reduce splanchnic blood flow. Splanchnic hypoperfusion is associated with impaired motility, delayed gastric emptying, and transient increases in intestinal permeability, which can contribute to exercise-induced gastrointestinal symptoms such as cramping, nausea, and diarrhea. [8,9] Quantifiable markers of enterocyte injury and elevated permeability have been documented following moderate to high-intensity cycling, indicating that reduced blood flow and ischemia contribute to functional motility disturbances. [23]

Immune and Inflammatory Pathways

Regular low- to moderate-intensity exercise generally exerts anti-inflammatory cascade effects. Due to the physical activity, the transcriptional rate and release of the IL-6 gene, upregulated in skeletal muscles, rise significantly. Subsequently, it promotes the release of anti-inflammatory mediators such as Interleukin-10 (IL-10) and Interleukin-1 receptor antagonist (IL-1ra), whereas IL-6 inhibits the production of a pro-inflammatory cytokine, Tumor Necrosis Factor alpha (TNF-α). [10] Conversely, acute high-intensity or prolonged exercise may transiently increase pro-inflammatory mediators such as TNF-α and IL-1β, reflecting a temporary systemic stress response. Nonetheless, chronic engagement in high-intensity training with appropriate recovery intervals has been shown to recalibrate immune function, promoting a long-term anti-inflammatory phenotype. Evidence from recent studies indicates that trained individuals engaging in sustained vigorous exercise exhibit reduced basal levels of TNF-α and enhanced anti-inflammatory cytokine activity compared with sedentary controls, highlighting the adaptive immunomodulatory potential of structured high-intensity exercise over time. [11]

STRESS MANAGEMENT

Psychological stress exerts a strong and pervasive influence on the course of IBS. Acute and chronic stress have been shown to disrupt intestinal barrier integrity, increase visceral hypersensitivity, and alter motility and secretory patterns, collectively exacerbating symptoms such as abdominal pain, bloating, and irregular bowel habits. Stress-induced activation of the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system further amplifies gut dysfunction by increasing cortisol release and promoting low-grade inflammation within the intestinal mucosa.[12] Interventions targeting stress reduction and lowering anxiety, including structured physical activity, mindfulness, and consistent engagement in mind-body practices, can mitigate these maladaptive responses, enhancing both gastrointestinal symptom burden and psychological well-being, as reflected in improved emotional regulation and overall quality of life.

CONSIDERATION OF IBS SUBTYPES

IBS is a heterogeneous disorder encompassing constipation-predominant (IBS-C), diarrhea-predominant (IBS-D), and mixed-type (IBS-M) presentations, each with distinct pathophysiological features. Differential responses to exercise intensity may be mediated by baseline motility patterns and visceral sensitivity. For instance, the acceleration of colonic transit associated with low- to moderate-intensity exercise may be particularly beneficial for patients with

IBS-C, reducing stool stagnation and bloating. Conversely, in IBS-D, where accelerated transit and hypersensitivity are already prominent, high-intensity exertion may transiently exacerbate urgency or discomfort in susceptible individuals. IBS-M, by definition, displays variable symptom dominance over time, which may necessitate a personalised exercise plan, that shifts emphasis according to predominant symptomatology and patient tolerance. Identifying the IBS subtype in a patient should be a key consideration when selecting the most suitable exercise-based intervention and tailoring the specific training program. Conscious patient education regarding their condition, together with a dynamic and appropriate response by the patient, may be pivotal for the effective administration of therapeutic interventions.

LOW-INTENSITY EXERCISE IN IBS

A randomized controlled trial [13] demonstrated that physical activity, typically low- to moderate-intensity, such as brisk walking, significantly improved IBS symptoms compared with standard care. Fewer participants in the exercise group experienced symptom deterioration, indicating that modest increases in routine physical activity can meaningfully improve symptom severity and overall symptom trajectory in IBS. Recent evidence [14] indicates that introducing mild- to moderate-intensity exercise into daily routines can substantially improve symptom burden in individuals with IBS. For instance, programs delivering roughly 180 minutes per week of moderate exercise have demonstrated improvements across key symptom domains, including reductions in abdominal pain, bloating, and dissatisfaction with bowel habits, offering meaningful relief for many patients with relatively low risk and high accessibility. Notably, some trials report nearly 40-50% reductions in pain and bloating severity after 8-12 weeks of consistent activity. These benefits appear to persist beyond the intervention period, with follow-up data showing that patients who maintain higher activity levels continue to experience better symptom control and enhanced quality of life. Some reviews note that physically active adults reported fewer IBS symptoms than sedentary individuals. Furthermore, it appeared to be particularly beneficial for patients with constipation-predominant IBS. Importantly, these benefits appear with gentle, sustainable exercise rather than strenuous workouts. [15] Mind-body activities such as yoga and Pilates may represent valuable non-pharmacological adjuncts in the management of IBS, particularly for patients seeking low-intensity movement-based therapies. Several trials have reported improvements in abdominal pain, stress, and quality of life among individuals participating in structured programs that incorporate yoga or Pilates. [16,17,24] Because stress contributes significantly to IBS symptomatology, these forms of exercise may offer unique advantages over purely physical training. [12] Clinical and observational

evidence indicate that regular exercise reduces symptoms of anxiety and depressive symptomatology, while simultaneously enhancing emotional regulation and overall health-related quality of life. [2] Low- to moderate-intensity exercise is highly accessible for individuals with IBS, requiring minimal equipment and easily adaptable to varying fitness levels. These activities, including walking, yoga, or light cycling, are safe and carry a low risk of adverse events. Their feasibility and mild exertion characteristics support sustained engagement, making them a practical component of routine IBS management.

HIGH-INTENSITY EXERCISE IN IBS

A significant limitation of the current literature is the paucity of randomized controlled trials directly evaluating high-intensity exercise interventions in individuals diagnosed solely with irritable bowel syndrome. The majority of studies examining vigorous exercise have been conducted in healthy athletes or in populations experiencing exercise-induced gastrointestinal disturbances, which limits the direct applicability of the findings to IBS cohorts. Nevertheless, mechanistic and observational evidence provide valuable indirect insights. Acute high-intensity interval exercise has been shown to induce biochemical markers of gastrointestinal mucosal injury, increase intestinal permeability, and disrupt proper gut function, collectively described as “exercise-induced gastrointestinal syndrome” (Ex-GIS). Notably, although overt gastrointestinal symptoms are not consistently reported, the presence of subclinical alterations in gut barrier integrity raises important concerns when extrapolating these findings to individuals with IBS, a population in whom baseline visceral hypersensitivity and barrier dysfunction may already be present. [8] While immediate symptom exacerbation is not uniformly observed, the potential for delayed or cumulative adverse effects remains clinically relevant, particularly in patients with pre-existing functional gastrointestinal disorders such as IBS. [9] Vigorous physical activity, particularly during periods of symptom exacerbation, may precipitate worsening gastrointestinal manifestations, including abdominal distension, cramping, fecal urgency, and diarrhea. Importantly, individual responses exhibit substantial interindividual variability and are modulated by factors such as cardiorespiratory fitness, hydration, and nutritional status, pre-exercise meal timing, as well as the current severity of underlying gastrointestinal symptoms. [19,8] High-intensity or prolonged exercise (e.g., endurance sports, high-intensity interval training - HIIT, and marathon running) has been shown to significantly reduce splanchnic blood flow, leading to relative intestinal ischemia and compromised gastrointestinal perfusion. These hemodynamic alterations may increase intestinal permeability, thereby facilitating the translocation of luminal bacteria and endotoxins and potentially eliciting

local and systemic inflammatory responses. Although HIIT may not be universally suitable, it can confer gastrointestinal benefits when performed at appropriate intensities and volumes. HIIT is characterized by brief bouts of vigorous activity interspersed with recovery periods. When implemented at individualized intensities, with a gradual and conscious approach, may support gastrointestinal motility, facilitate reductions in abdominal fat mass, and improve digestive efficiency. [3,21] Furthermore, Hoseini et al. [20] collected the evidence on how individual variability substantially modulates exercise-microbiota interactions. Individuals with higher levels of cardiorespiratory fitness exhibited greater gut microbial diversity, independent of exercise intensity, suggesting that chronic physiological adaptations may attenuate the risk of acute dysbiotic changes associated with strenuous exercise. Additionally, dietary patterns and hydration status have a significant influence on gastrointestinal responses to exercise. Adequate dietary fiber intake appears to enhance favorable microbiota-related adaptations, whereas dehydration is associated with increased intestinal permeability and microbial imbalance during periods of high-intensity physical exertion. Evidence indicates that structured high-intensity training can enhance central pain modulation, improve autonomic nervous system regulation, and attenuate stress-related neuroendocrine activation. With repeated and appropriately dosed exposure, high-intensity exercise also promotes anti-inflammatory, antioxidant, and metabolic adaptations that may contribute to improved intestinal homeostasis and more stable symptom control over time. In physically conditioned individuals, sustained participation in structured high-intensity training has been associated with adaptive improvements in epithelial stress tolerance and microbial functional capacity, contributing to enhanced gastrointestinal resilience. Although single high-intensity sessions may temporarily worsen gastrointestinal symptoms in susceptible individuals, particularly when recovery, hydration, or nutritional intake are inadequate, the longer-term adaptive responses observed with carefully implemented training suggest that high-intensity exercise can, for selected patients, serve as a potentially beneficial adjunct within a comprehensive and individualized IBS management strategy.[20]

PRACTICAL IMPLEMENTATION OF EXERCISE IN IBS

While exercise is increasingly recognized as a valuable component of IBS management, ensuring sustained patient engagement remains a considerable challenge. Symptom fluctuations, fatigue, and apprehension about triggering gastrointestinal discomfort frequently undermine adherence, while additional barriers, such as unpredictability of bowel habits, previous negative exercise experiences, and psychosocial factors like embarrassment, complicate further participation. Effective

implementation requires clinicians to prioritize interventions that are accessible, enjoyable, and feasible, including activities such as walking, cycling, or gentle mind-body practices. Individualized guidance on monitoring symptom responses and modifying exercise parameters, alongside careful attention to hydration, meal timing, and incremental progression of intensity or duration, is essential for optimizing both tolerance and therapeutic outcomes.

CONCLUSION

The current evidence supports structured physical activity as a valuable non-pharmacological strategy in the management of irritable bowel syndrome. For the vast majority of patients, low- to moderate-intensity exercise demonstrates the most consistent and clinically meaningful benefits. Importantly, such forms of exercise are generally well-tolerated, carry a very low risk of adverse effects, and are achievable for most patients, including individuals with limited prior experience or functional limitations. High-intensity exercise is associated with more heterogeneous gastrointestinal responses, reflecting genuine interindividual variability in physiological stress tolerance, visceral sensitivity, and disease expression. Nevertheless, when thoughtfully individualized and appropriately dosed, higher-intensity modalities can confer meaningful additional systemic and psychological advantages. Such effects may encompass more pronounced anti-inflammatory adaptations, improved autonomic nervous system regulation, and enhanced modulation of mood and stress, likely mediated through neuroendocrine mechanisms. Accordingly, high-intensity exercise should not be considered inherently unsafe for all individuals with IBS; rather, it may be cautiously considered as a potential adjunctive intervention in selected patients, contingent upon gradual implementation, close monitoring, and individualization based on symptom response, hydration, and nutritional status, as well as recovery capacity. Beyond physiological mechanisms, many IBS patients face persistent challenges in sustaining regular physical activity. Effective clinical integration is strongly dependent on proper patient education and shared decision-making. Studies consistently report that fear of symptom exacerbation, unpredictability of bowel habits, and prior negative experiences with exercise represent major barriers to adherence. Addressing these concerns through anticipatory guidance, symptom tracking, and reassurance regarding flexible modification of exercise parameters can substantially improve long-term engagement. Therefore, prioritizing low-intensity, realistically achievable activities as a first-line approach is essential, while higher-intensity exercise may be introduced gradually for motivated patients under careful supervision. Emphasizing consistency and regularity over sheer intensity further supports long-term adherence and enhances the likelihood of meaningful clinical

improvement. An individualized, patient-centred approach to physical activity, one that balances safety, efficacy, and personal preference, is considered to provide the greatest potential to improve both gastrointestinal and psychological outcomes in IBS. Future research should focus on high-quality, long-term trials aimed at refining intensity-specific recommendations, identifying biological and clinical predictors of response, along with developing evidence-based strategies that facilitate adherence, thereby enabling more precise, humane, and effective exercise prescriptions for this complex condition.

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