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The role of regular physical activity on the prevention and alleviation of gastroesophageal reflux disease and chronic constipation in patients with sedentary lifestyle

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Abstract

Background. Gastroesophageal reflux disease (GERD) and chronic constipation represent two of the most common functional gastrointestinal disorders, with elevated prevalence among sedentary individuals. Prolonged sitting acts as a risk factor by increasing intraabdominal pressure, compromising lower esophageal sphincter integrity, delaying colonic transit, impairing pelvic floor strength and inducing adverse shifts in gut microbiota.

Aim. This study aimed to evaluate the impact of physical activity and sedentary behaviour on the development and management of GERD and chronic constipation

Material and methods. This narrative review analyzed recent publications, predominantly from 2024–2026, identified through manual searches in PubMed, Embase, and Scopus using keywords related to physical activity, sedentary behaviour, GERD, and chronic constipation.

Results. For chronic constipation, physical activity consistently accelerates intestinal transit, boosts colonic motility, promotes beneficial microbiota changes, and decreases risk by 30–34% at higher activity levels. Benefits are most pronounced with moderate aerobic modalities and are potentiated by concurrent dietary improvements.

Conclusions. Moderate-intensity physical activity is an effective, safe, and low-cost strategy for preventing and managing GERD and chronic constipation. It improves reflux symptoms and bowel function, while high-intensity exercise may aggravate GERD. Reducing sedentary behavior is essential alongside increasing activity levels. Combined lifestyle interventions, including diet, provide the greatest benefit. A “movement-first” approach should be integrated into routine care. Further randomized controlled trials are required to establish optimal exercise prescriptions and clarify diet–activity interactions.

Key words: constipation, sedentary behavior, physical exercise, gastrointestinal motility.

1. Introduction

Gastroesophageal reflux disease (GERD) and chronic constipation are among the most common gastrointestinal disorders in the general population and are associated with increased healthcare resource utilization and impairment in patients’ quality of life.

GERD is a chronic, relapsing condition characterized by the backward flow of gastric contents into the esophagus. The main symptoms include burning sensation, acidity, regurgitation, heartburn, chest pain, and chronic cough. In severe cases, the disease can result in complications, including erosive esophagitis, Barrett’s esophagus, and esophageal adenocarcinoma. GERD affects an estimated 10–20% of adults in Western countries, with prevalence rising alongside factors such as obesity, dietary shifts, sedentary lifestyle, and reduced physical activity [1,2].

Chronic constipation represents a widespread functional disorder of the gastrointestinal tract. It is defined as inefficient bowel movements causing incomplete, reduced frequency or painful defecation. The condition is diagnosed based on Rome criteria and patient reports. Among many risk factors (including poor eating habits, lack of fluid intake, overuse of certain medications, endocrine problems such as hypothyroidism, or emotional problems), reduced physical activity seems to have a significant impact on developing the disease [3,4].

According to the World Health Organization (WHO), sedentary behaviour is described as any waking behaviour characterized by an energy expenditure of ≤ 1.5 metabolic equivalents (METs) while in a sitting, reclining or lying posture. Common examples include prolonged desk-based work, driving, television viewing, and other screen-related activities. In modern

societies, this pattern has become highly prevalent owing to occupational demands, urbanization, and widespread digitalisation [4].

Prolonged sitting exerts a direct adverse impact on the gastrointestinal system. It provides to the pathogenesis and exacerbation of GERD through metabolic alterations, including increased body mass index and insulin resistance. These changes elevate intra-abdominal pressure, impair lower oesophageal sphincter competence, and increase the frequency of gastroesophageal reflux episodes [6,7].

Sedentary behaviour also involves a major role in the development of chronic constipation by impairing gastrointestinal motility. Prolonged sitting diminishes colonic peristalsis, weakens the abdominal and pelvic floor muscles required for effective defecation, and extends intestinal transit time [8]. Additional mechanisms include reduced activation of the gastrocolic reflex and alterations in gut microbiome diversity [9].

Collectively, these pathophysiological mechanisms establish sedentary behaviour as a key modifiable risk factor for GERD, chronic constipation, and other gastrointestinal diseases [9]. Replacing even modest periods of sedentary time with light-to-moderate physical activity can enhance gastrointestinal motility and reduce overall gastrointestinal disorders.

2. Research materials and methods

2.1. Literature search strategy.

A comprehensive literature search was conducted using the electronic databases PubMed, Embase, and Scopus to identify relevant studies on the relationship between physical activity, sedentary lifestyle, and gastrointestinal function, with a particular focus on constipation and gastroesophageal reflux disease (GERD). The following keywords were used individually and in combination: ‘physical activity’, ‘sedentary lifestyle’, ‘constipation’, ‘gastroesophageal reflux disease’, ‘intestinal motility’, ‘functional gastrointestinal disorders’, ‘bowel function’ and ‘gastrointestinal symptoms in athletes’.

Additional searches were performed through manual cross-referencing of reference lists to ensure broad coverage. The main search scope covered publications from 2006 to 2026, with particular emphasis on recent articles (primarily 2024–2026) reflecting the rapid development of research in this area, including new Mendelian randomization analyses and systematic reviews/meta-analyses. Additional search filters applied: studies limited to human subjects and adults (≥ 18 years), no animal studies were included. The literature search and selection process was performed manually by the reviewers.

2.2. Inclusion and exclusion criteria.

Studies were included if they investigated the impact of physical activity or sedentary behavior on gastrointestinal outcomes, specifically constipation, GERD, intestinal motility, functional gastrointestinal disorders, or bowel function.

Eligible designs included systematic reviews, meta-analyses, clinical trials, cohort studies, Mendelian randomization analyses, and relevant case studies that provided quantitative or qualitative data on these relationships. Only full-text articles published in English or with available English translation involving adult human participants were considered. Interventionary studies involving humans or animals, and other studies that require ethical approval, must list the authority that provided approval and the corresponding ethical approval code.

Studies were excluded if they focused exclusively on children/adolescents, animals, or unrelated gastrointestinal conditions, lacked clear methodology or outcome measures related to physical activity/sedentary lifestyle, or were opinion pieces, editorials, or conference abstracts without full data. The conducted research did not involve any new experiments with human or animal subjects.

2.3. Screening and selection process

The screening process followed the PRISMA guidelines and was conducted in three sequential phases. A total of 1.983.352 records were initially identified from the electronic databases PubMed, Embase, and Scopus using the predefined keywords. After automatic removal of duplicates, approximately 685.000 unique records remained

Title and abstract screening reduced this number to 12.856 potentially eligible articles. Following a detailed full-text review, during which relevance, methodological quality, data completeness, and strict adherence to the inclusion criteria were assessed, 30 publications were finally selected for inclusion in the review.

The selection process placed particular emphasis on high-quality sources that directly investigated the associations between physical activity levels or sedentary behaviour and their effects on constipation, gastroesophageal reflux disease (GERD), intestinal motility, and related gastrointestinal symptoms.

3. Research results

3.1. Prevalence of GERD and constipation.

Global estimates indicate that chronic constipation occurs in approximately 10–16% of people (Rome IV criteria), and GERD in 10–15%. In sedentary or physically inactive groups, the prevalence of GERD often reaches 20–35% in subgroups (34.12% in cohorts with low physical activity compared to 18.15% in groups with high physical activity; [10]), and evidence of causality obtained through Mendelian randomization indicates a 2–3-fold increased likelihood of prolonged television viewing (OR = 2.29–3.74; [2,11]). Similarly, the prevalence of chronic constipation increases significantly in physically inactive patients, reaching 15–25% or more in the case of multiple sedentary behaviors, and non-exercising adults score higher on symptom severity scales (5.56 compared to 4.28 in exercising groups).

3.2. Pathophysiological mechanisms through which physical activity affects the functioning of the upper and lower gastrointestinal tract.

For the upper GI regular PA confers benefits in terms of preventing reflux by enhancing the strength of the crural diaphragm, a critical element in anti-reflux mechanisms [12]. This mechanical improvement is amplified by anti-inflammatory actions, as PA lowers systemic markers like TNF- α and IL-6, mitigating pro-inflammatory states that weaken esophageal barriers. Regular PA lowers inflammatory markers, potentially preventing age-related pro-inflammatory conditions and PA is associated with a lower risk of developing depression and decreased levels of stress [12]. These psychological factors may play a role in reducing the prevalence of GERD through gut-brain peptides [12]. Moderate PA also accelerates gastric emptying, further limiting acid exposure.

For the lower GI tract PA can promote intestinal motility, the lack of which is a known cause of constipation, and can prolong colonic transit time and reduces gastrointestinal motility [13]. This leads to increased colonic contractions, faster bowel movements, and reduced risk (RR = 0.69 for high vs. low PA). Transit acceleration ties into beneficial gut microbiota modulation. PA can induce qualitative or quantitative changes in the intestinal microbial composition increasing butyrate concentration (negatively correlated with intestinal transit time) and individuals with higher PA levels tend to produce a greater variety of health-related faecal metabolites compared with those who are less active [13]. A sedentary lifestyle decreases the peristaltic action of the intestine leading to chronic intestinal obstruction and a

sedentary lifestyle may disrupt the activity of the autonomous nervous system, contributing to the development of constipation by reducing the activity of the parasympathetic nervous system [14, 8]. Moderate PA integrates these via enteric nervous system regulation, inflammation reduction, and microbiota shifts for overall motility support [9].

3.3. Effects of regular physical activity on GERD symptoms.

Regular physical activity has been consistently associated with a reduced risk of GERD symptoms in multiple studies. A meta-analysis of 33 studies involving over 240,000 participants demonstrated that higher levels of physical activity were linked to a 20-26% lower prevalence of symptomatic GER and GERD, with stronger protective effects observed in older adults and smokers [12]. Similarly, population-based research in Saudi Arabia showed that low physical activity increased GERD risk by 22%, highlighting its role as a modifiable factor through mechanisms like enhanced gastrointestinal motility and reduced intra-abdominal pressure [15]. In older adults, accumulating more than 4,000 daily steps (primarily via walking) was associated with a 56-83% lower hazard ratio for incident GERD, independent of body mass index, suggesting that even moderate activity volumes can mitigate symptom onset [16]. Protective associations have also been noted in large cohorts, where moderate to high physical activity levels reduced GERD odds by 29-31% compared to low activity [10]. A cross-sectional analysis in Iran further supported this, with average physical activity linked to an 12% lower odds of GERD [17]. Weight loss interventions incorporating physical activity have shown particular efficacy in symptom reduction. For instance, structured programs combining exercise with hypocaloric diets led to complete GERD symptom resolution in 65% of overweight/obese patients, with improvements correlating to the extent of weight loss ($\geq 10\%$ body weight) and reduced proton pump inhibitor use [18]. In contrast, sedentary behaviors like prolonged television watching causally increase GERD risk by up to 45%, underscoring the inverse benefits of activity [1].

3.4. Type and intensity of exercise in GERD management.

The type and intensity of exercise play critical roles in GERD management, with low-to-moderate intensity activities generally recommended to avoid exacerbation of symptoms. Aerobic exercises such as walking, cycling, swimming, yoga, and Tai Chi are protective, promoting gut motility, stress reduction, and diaphragm strengthening without significantly increasing intra-abdominal pressure [19,20]. Meeting at least 150 minutes per week of moderate-intensity activity, as per international guidelines, has been linked to a 72% reduced

GERD risk in dose-response analyses [4,12]. Specific techniques like diaphragmatic breathing and light postprandial walks shorten acid exposure time and improve lower esophageal sphincter function [21].

3.5. Exercise induced reflux and high-intensity training.

High-intensity or vigorous exercises, such as running, weightlifting, or high-impact activities (e.g., $\geq 70\%$ VO₂ max), can worsen symptoms by inducing transient reflux through splanchnic hypoperfusion and elevated abdominal pressure, particularly when performed post-meal [2, 19,22]. Recommendations emphasize avoiding high-intensity sessions within 2-3 hours post-meal, favoring non-vibratory options like stationary biking over running, and incorporating low-impact mind-body practices for stress-related GERD [21]. Reflux episodes correlate directly with exercise intensity and duration, with high-intensity efforts triggering symptoms in up to 60% of athletes and healthy individuals, and running inducing reflux in approximately 45% of cases—far more than lower-impact activities like cycling [22]. The underlying mechanisms include increased intra-abdominal pressure from muscle contractions, Valsalva maneuvers, and jarring movements that mechanically force gastric contents upward and overcome the lower esophageal sphincter (LES) barrier; more frequent transient lower esophageal sphincter relaxations (TLESRs) due to LES-diaphragm dissociation and reduced LES tone; substantial reduction in splanchnic blood flow (up to 70–80%) during intense effort, leading to delayed gastric emptying and impaired esophageal clearance; as well as neuroendocrine changes and mechanical factors such as constrained body positions and bouncing motions that further disrupt anti-reflux barriers [12,22]. These effects are especially pronounced in endurance disciplines and resistance training, where up to 70% of participants report upper gastrointestinal symptoms including reflux during or after sessions, often worsened postprandially or in hot conditions, potentially impairing performance and leading individuals to avoid intense training.

3.6. Effects of regular physical activity on bowel function and chronic constipation symptoms.

Regular physical activity demonstrates a statistically significant inverse association with chronic constipation risk and plays a significant therapeutic role by improving both symptom severity and quality of life [13,20,23,24] . Among modifiable lifestyle factors, physical activity emerged as the strongest constipation-related factor compared to fluid and fiber intake [25].

Mechanistically, physical activity alleviates constipation symptoms through multiple physiological pathways, including enhanced intestinal motility, reduced colonic transit time, attenuation of systemic inflammation and microbiome modulation – particularly through increased butyrate production [4,13,20,24]. Regular exercise reduces intestinal transit time, which is a key physiological mechanism in preventing constipation. Faster colonic transit reduces excessive water reabsorption, preventing hard stool formation [26]. Conversely, sedentary lifestyle significantly increases the risk of constipation-related symptoms, including straining and a sensation of incomplete evacuation [26].

Given these findings, physical activity should be considered a primary non-pharmacological intervention in both the prevention and management of chronic constipation [13,24, 26].

3.7. Interaction between physical activity and diet in chronic constipation.

Emerging evidence suggests a synergistic interaction between physical activity and dietary quality in reducing constipation risk [5]. Physical activity enhances the effectiveness of dietary interventions [23]. In sedentary individuals, improving diet alone may not be sufficient to significantly lower constipation risk. Notably, the protective effect of a high-quality diet is evident primarily in individuals who meet recommended physical activity levels. This suggests that physical activity appears to be a necessary co-factor enhancing the effectiveness of dietary measures [24]. Conversely, low levels of physical activity may attenuate or negate the positive effects of dietary modifications [23].

However, the available evidence does not consistently support the notion that physical activity alone is sufficient to alleviate constipation symptoms. In one study, high levels of moderate-to-vigorous physical activity (MVPA) were associated with reduced constipation likelihood only among individuals adhering to an “unhealthy” dietary pattern [8]. Other authors emphasize that the overall evidence base remains insufficient to establish definitive causal relationships [25]. These findings suggest that the protective effect of physical activity may be conditional and depend on interactions with diet and other lifestyle-related factors [8].

3.8. Type and intensity of exercise in chronic constipation management.

A dose-response relationship has been observed, with moderate and high levels of physical activity providing progressively stronger protective effects [13]. Activity levels of at least ≥ 500 MET-minutes per week appear necessary to maximize the synergistic benefits of

diet and exercise. Regular aerobic exercise has been shown to significantly improve chronic constipation symptoms [19,20].

Although physical activity generally benefits gastrointestinal function, exercise intensity may influence symptom profiles. Moderate-intensity aerobic activities – such as walking or cycling – are consistently associated with improved bowel function. In contrast, vigorous or endurance exercise may provoke upper gastrointestinal symptoms such as heartburn, potentially resembling GERD manifestations [26].

Therefore, moderate, regular physical activity should be recommended for individuals with sedentary lifestyles to prevent and alleviate chronic constipation, whereas excessive high-intensity activity should be approached cautiously, particularly in individuals prone to reflux symptoms.

3.9. Differential response to exercise intensity in GERD and chronic constipation.

Both chronic constipation and gastroesophageal reflux disease (GERD) demonstrate dose–response associations with physical activity; however, the nature and pattern of this relationship differs between conditions.

In GERD, moderate-intensity exercise appears protective, whereas high-intensity or high-impact exercise may exacerbate reflux. Gradual introduction of moderate aerobic activity (walking, cycling) is beneficial, while high-impact or bending activities should initially be avoided in symptomatic patients.

In contrast, constipation shows consistent benefit across multiple exercise types, particularly aerobic activities [19]. Moreover, increasing levels of physical activity—from moderate to high intensity—are linked to progressively greater protective effects [13]. Thus, while excessive intensity may aggravate reflux symptoms in susceptible individuals, higher activity levels appear beneficial in the context of constipation management.

3.10. Clinical implications for sedentary populations.

Sedentary behavior is associated with reduced gut mobility, increased obesity, slower colonic transit, weaker LES function and higher intra-abdominal pressure [19,20]. Sedentary lifestyle is an independent risk factor for both GERD and chronic constipation, separate from physical activity. This suggests that reducing sedentary exposure may be as important as increasing physical activity [8,27].

For sedentary individuals, gradual implementation of moderate aerobic exercise represents a low-cost, non-pharmacological strategy for: preventing GERD, alleviating chronic constipation and improving overall gastrointestinal function [19].

Although physical activity exerts an overall positive effect on gastrointestinal physiology, excessive or high-intensity endurance exercise may trigger upper gastrointestinal complaints, particularly in individuals susceptible to reflux. Therefore, clinical recommendations should emphasize regular moderate-intensity activity as the preferred strategy, while tailoring exercise prescriptions to individual tolerance and symptom profiles.

Further high-quality longitudinal and interventional studies are required to determine the optimal types, intensities and durations of exercise for gastrointestinal disorders and to clarify the mechanisms underlying the interaction between physical activity, diet and gastrointestinal function.

3.11. The combined effect of diet and physical activity on GERD.

The interplay between diet and physical activity offers a multifaceted approach to managing both constipation and GERD. For constipation, combining fiber rich diets with moderate exercise enhances motility and symptom relief, though expert guidelines often prioritize diet over activity due to conflicting evidence on exercise alone [28]. In GERD, integrated lifestyle interventions such as reducing spicy, fatty food intake while incorporating regular moderate physical activity can mitigate symptoms and prevent complications like esophagitis [9,29]. Public health strategies emphasizing these combined modifications, alongside weight management, could reduce GERD prevalence, as dietary habits and inactivity were major modifiable contributors [30].

Dose response relationships indicate that low to moderate intensity exercise paired with anti-inflammatory diets (e.g., high fiber, low processed foods) optimizes gastrointestinal health, reducing risks for both conditions [20]. However, high intensity regimens may counteract dietary benefits by worsening GERD, highlighting the need for personalized plans.

4. Discussion

Both GERD and constipation are prevalent diseases among the population, especially in highly developed countries since their main risk factors such as obesity, sedentary lifestyle, and reduced physical activity are the issues that those societies have to face [1,2].

As established before, prolonged sitting provides to the pathogenesis and exacerbation of GERD by an increased body mass index and insulin resistance, which in effect elevate intra-

abdominal pressure and impair lower esophageal sphincter competence [6,7]. Regarding the role of a sedentary lifestyle in the pathogenesis of chronic constipation, it impairs gastrointestinal motility by diminishing colonic peristalsis and weakening the abdominal and pelvic floor muscles [8] additionally it reduces activation of the gastrocolic reflex and modifies gut microbiome diversity. [4,8].

The positive influence of regular physical activity on reducing the symptoms and occurrence of GERD and chronic constipation compared to the population of individuals with prolonged sitting is unquestionable [2, 10, 11]. In upper GI tract it enhances the strength of the crural diaphragm and in lower GI tract, which holds a crucial role as an anti-reflux mechanism [12], where as in lower GI regular physical activity promotes intestinal motility, which contributes to increased colonic contractions and faster bowel movement [13].

Nevertheless, many studies indicate that depending on the intensity of physical exertion, it can exacerbate or reduce reflux symptoms. High-intensity exercise, such as running or weightlifting can induce transient reflux especially when performed post-meal. This is achieved through splanchnic hypoperfusion (up to 70–80%), elevated abdominal pressure and movements that facilitate gastric contents to overcome the lower esophageal sphincter (LES) barrier along with the simultaneously occurring transient lower esophageal sphincter relaxations (TLESRs) [12, 22]. Therefore the aforementioned strenuous exercise is not recommendable for people with diagnosed GERD. At the same time, aerobic exercises such as walking or cycling promote gut motility and strengthens the diaphragm without significantly increasing intra-abdominal pressure [19, 20]. The 150 minutes of moderate-intensity activity recommended by international guidelines is associated with 72% GERD risk and can significantly reduce the discomfort associated with reflux [4,12]

On the other hand, increasing levels of physical activity is associated with progressively greater protective effects on reducing chronic constipation symptoms [13]. Moderate physical activity regulates enteric nervous system, reduces inflammation and colonic transit time and modifies microbiota particularly by increasing butyrate productions [4, 13, 20, 24]. It is also connected to improving the outcomes of dietary interventions [23]. Nonetheless the available evidence does not fully endorse the notion that physical activity alone is sufficient to alleviate constipation symptoms and its preventive influence may be depended on interactions with diet and other lifestyle-related factors [8]

It is worth noting that sedentary lifestyle is an independent risk factor for both GERD and chronic constipation, therefore reducing prolonged sitting could be equally relevant as increasing the amount of physical activity [8,27].

These findings have direct clinical implications for gastroenterological practice. In sedentary patients with GERD, chronic constipation, or overlapping symptoms, a structured “movement-first” strategy — emphasizing gradual adoption of moderate aerobic exercise together with deliberate interruption of prolonged sitting — should form a fundamental element of non-pharmacological management. Such approaches are inexpensive, widely accessible, and may decrease dependence on long-term acid-suppressive therapy or laxatives while improving patient-reported outcomes and quality of life.

While causal evidence from MR studies and high-quality reviews (primarily from 2024–2026) strengthens these conclusions [2, 12, 13, 14, 27] limitations of this review still remain. They include heterogeneity in exposure definitions, reliance on self-reported measures in some analyses, and the need for more targeted interventional trials. Future research should prioritize well-designed interventional trials to define optimal exercise protocols (type, intensity, timing, and volume), elucidate diet–physical activity interactions, and develop personalized recommendations tailored to individual symptom profiles and physiological characteristics. Integration of these lifestyle measures into routine gastroenterological care holds substantial potential to alleviate symptom burden and lessen the socioeconomic impact of these prevalent conditions in aging, increasingly sedentary populations.

5. Conclusions

Regular moderate-intensity physical activity is an effective, safe, and low-cost non-pharmacological strategy for the prevention and management of both GERD and chronic constipation, which are highly prevalent in sedentary populations of developed countries.

Moderate aerobic exercise significantly reduces GERD symptoms and risk by strengthening the crural diaphragm and improving gastric emptying, whereas high-intensity exercise should be avoided in GERD patients due to the risk of inducing reflux. In chronic constipation, increasing levels of physical activity provide progressively greater benefits through enhanced intestinal motility, reduced colonic transit time, and favorable gut microbiota modulation.

Sedentary behavior is an independent risk factor for both disorders, therefore reducing prolonged sitting is as important as increasing physical activity. Synergistic effects are observed when moderate exercise is combined with appropriate dietary modifications.

Implementation of a “movement-first” approach should be routinely recommended in gastroenterological practice. Further randomized controlled trials are needed to define optimal exercise protocols and diet–activity interactions.

Disclosure

All authors have read and approved the final version of the manuscript for publication

Author Contributions

Conceptualization, M.D. and W.W.; methodology, J.O.; software, S.W.; validation K.W. and S.W.; formal analysis M.D.; investigation, W.W.; resources H.L.; data curation J.O.; writing—original draft preparation R.W.; writing—review and editing W.W. and M.D.; visualization W.W.; supervision K.W.; project administration, H.L.; funding acquisition M.D. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of the Use of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used ChatGPT for the purpose of language editing and grammar correction of the English text to improve readability and linguistic accuracy. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the substantive content of the publication.

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