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Effect of physical activity on the severity of irritable bowel syndrome (IBS) symptoms

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Abstract:

Irritable bowel syndrome is a chronic gastrointestinal disease whose symptoms affect patients' daily lives. Exacerbation of symptoms can worsen patients' quality of life and lead to depressive-anxiety and somatoform disorders. The associated costs burden not only the patients, but also those around them. The etiology of IBS is multifactorial and not fully understood. The brain-gut axis remains a subject of research, which may involve the development of new, effective therapies for the treatment of IBS in the future. Pharmacological and non-pharmacological methods are used to treat IBS. In order to provide the patient with the best possible treatment results in the absence of significant side effects, research is being conducted on the possibilities of non-pharmacological patient management. Currently, there are numerous studies on the effect of physical activity on the severity of symptoms in IBS patients. The results show that the introduction of moderate-intensity physical activity has positive effects in terms of alleviating gastrointestinal symptoms,

reducing the severity of psychological and somatoform symptoms, and improving patients' well-being as well as quality of life. Appropriate physical activity is acceptable to patients and rated by them as positive and having a beneficial effect on IBS symptoms. The lack of patient-reported significant side effects is important. Given the results of the study, it seems beneficial to recommend that IBS patients perform moderate physical activity to alleviate and control symptoms. It is necessary to educate patients and individualize physical activity recommendations to match the type of activity to patients' abilities and needs.

Keywords: IBS, IBS management, IBS treatment, irritable bowel syndrome, physical activity

Introduction

Irritable bowel syndrome (IBS) is a chronic functional bowel disorder characterized by abdominal discomfort or pain associated with excretion -change in the rhythm of excretion or the degree of stool formation. [1]

The criteria for the diagnosis of IBS are currently defined by the Rome IV Criteria, published in 2016. Criteria for diagnosis include symptoms that occurred at least 6 months prior to diagnosis and have been present for the past 3 months: recurrent abdominal pain occurring a minimum of 1 time per week in the past 3 months associated with at least 2 of the 3 criteria: relationship to excretion, relationship to change in the degree of stool formation, relationship to change in stool passing frequency. These criteria distinguish 4 forms of IBS: IBS with predominant constipation (IBS-C), IBS with predominant diarrhea (IBS-D), IBS mixed form (IBS-M) and IBS unspecified form (IBS-U). [2] Depending on the criteria used, the total prevalence of IBS in the world population varies. Using Rome III Criteria, it is 9.2 %, and for Rome IV Criteria it is 3.8 %. IBS symptoms are more common in women than in men. The most common form of IBS according to the Rome IV Criteria is IBS with predominant diarrhea (IBS-D). [3] IBS symptoms have an impact on the deterioration of IBS patients' quality of life. [4] Patients experiencing IBS have a three times greater risk of developing anxiety or depressive disorders than healthy individuals. [5] IBS symptoms have been linked to higher levels of somatization. [6] IBS affects the daily lives of patients - the severity of IBS symptoms is associated with the occurrence of occupational difficulties, which can affect more frequent absenteeism from work and reduce the effectiveness of the work performed by

patients experiencing IBS symptoms. [7] The costs associated with IBS generate a financial burden for patients, society, the healthcare system and the state economy. [8-10] The exact causes of irritable bowel syndrome are still unknown. The etiology of the syndrome is believed to be multifactorial. [11] Now it is suspected among other genetic factors that IBS is more common in people with a positive family history of IBS. [12-15] The influence of gene polymorphisms on the occurrence of IBS symptoms remains a subject of research and genetically determined reduced production of the anti-inflammatory cytokine interleukin 10 has been noted in some patients with IBS symptoms. [16] A study by Barkhordari et al. found that polymorphisms in the pro-inflammatory cytokine genes IL-6 and TNF-alpha may increase the risk of IBS. [17] The effect of polymorphisms of genes encoding TGF b1, serotonergic, alpha- adrenergic and G protein receptors on a patient's risk of developing IBS remains a subject of research. [18] Other suspected etiological factors include visceral hypersensitivity [19, 20], disorders of serotonergic transmission [21, 22], and immune system disorders. [23] Currently, the influence of the intestinal microflora and disorders of its composition on the occurrence of IBS symptoms is being intensively studied. [24, 25] A study by Mujagic et al. linked the role of intestinal microflora to serotonin metabolism pathways and the negative impact of stress factors on gastrointestinal-related symptoms. The study proved the relationship of the gut-brain axis to the pathogenesis of IBS. [26] There are also reports of IBS symptoms in patients who have previously undergone a viral, bacterial or parasitic infection of the gastrointestinal tract. [27] A diagnosis of IBS is associated with a good prognosis [28], but coexistence of psychiatric disorders worsen it and affects the clinical course of the disease. [29, 30] Ongoing studies are evaluating the impact of stress severity on the occurrence and severity of IBS symptoms. The results indicate that there is a relationship between the severity of stress and the IBS symptoms experienced. [31, 32]. According to the clinical recommendations of the American College of Gastroenterology, in the diagnosis of patients with IBS and diarrhea, differential diagnosis with celiac disease should be taken into account and serological tests are recommended; the disease should also be differentiated with inflammatory bowel disease and in patients without alarm symptoms, determination of calprotectin or lactoferrin in the stool and blood CRP levels is recommended. It is not recommended to routinely test stools for the presence of intestinal pathogens and to perform colonoscopy in patients under 45 years of age without alarm symptoms present. Pharmacological and non-pharmacological methods are used to treat IBS. Probiotics and herbal preparations are a separate group. Non-pharmacological methods include dietary modification - the impact of dietary changes on IBS symptoms remains a matter of research,

and the following are currently being studied: low FODMAP diet, gluten-free diet, elimination diet and intake of increased fibre; exercise, the impact of which will be discussed in this article; cognitive-behavioral psychotherapy; hypnosis; biofeedback therapy. Pharmacological approaches include: muscle relaxing drugs, peppermint oil, antidepressants - tricyclics are preferred in the treatment of IBS-D, while SSRIs are preferred in IBS-C; anti-diarrheal drugs such as loperamide, diphenoxylate and eluxadoline; in the treatment of IBS-D, serotonin 5-HT3 receptor agonists such as alosetron, and in IBS-C therapy serotonin 5-HT4 receptor agonists such as tegaserod; antibiotics - rifaximin, and in constipation therapy lubiprostone and linaclotide. New drug treatment options are also currently being explored. [34, 35] The guidelines suggest identifying the form of IBS based on the patient's predominant symptoms and selecting the appropriate therapy for the patient to achieve better treatment outcomes. [33]

This review article will discuss the impact of physical activity on the severity of IBS symptoms.

In order to create a review article, a comparative analysis of articles available in the Pubmed database and Google Scholar was performed using the following keywords: "IBS", "irritable bowel syndrome", "IBS exercise", "IBS physical activity", "IBS yoga".

Discussion

The WHO guidelines recommend that all adults including those with chronic diseases perform at least 150-300 minutes of moderate-intensity aerobic physical activity or at least 75-150 minutes of high-intensity aerobic physical activity, as well as additional muscle-strengthening workouts a minimum of 2 days a week. Regular physical activity has a positive impact on a person's health and well-being. [36] Research is currently underway on the impact of lifestyle changes, including increased physical activity on the incidence of IBS symptoms. [37] A randomized study by E. Johannesson et al. noted a reduction in the severity of IBS symptoms after patients took up an increased physical activity. Increased physical activity reduced gastrointestinal symptoms of IBS. Those who were physically active had a lower risk of exacerbating IBS symptoms than those who were not active in that area. [38] A follow-up study observed a positive long-term effect of increasing physical activity and maintaining it at a moderate level on the severity of IBS symptoms, quality of life of IBS patients and psychological symptoms in these patients. [39] Patients with IBS report positive experiences with physical activity - they use it to reduce gastrointestinal symptoms, and

physical activity also has a positive effect on extraintestinal symptoms including patients' well-being. Patients used physical activity to distract from IBS symptoms, reduce the severity of abdominal pain and perceived bloating and to normalize bowel movements. [40] Currently, the exact mechanism for the effect of physical activity on IBS symptoms is unknown. In a study by R. Dainese et al. it has been shown that moderate physical activity accelerates the passage of intestinal gases and can prevent their excessive accumulation in the lumen of the gastrointestinal tract, so it has a prokinetic effect, which can reduce the bloating experienced. [41] Similar observations were reported by participants in the study by E. Johannesson et al. claiming that physical activity accelerates the passage of gases accumulated in the intestines. [40] Physical activity has multidirectional effects on the central nervous system through neurotransmitters and synaptic plasticity. It can affect brain plasticity, stimulating neurogenerative, neuroadaptive and neuroprotective processes. [42] The influence of the gut-brain axis on the occurrence of IBS symptoms remains of interest to researchers. [26] The existence of an association of the gut-brain axis on the occurrence of IBS symptoms is confirmed by a study by T. Koseki et al., in which improvements in IBS symptoms were observed after mindfulness therapy was combined with physical activity, with better results from the combination of therapy and activity than from the introduction of mindfulness therapy alone. [43] The type of physical activity performed must be tailored to the patient's needs and capabilities. [44] Patients often report that walking is their preferred physical activity due to its ease of execution. [38, 39] A study by L. Shahabi et al. compared the effects of physical activity in the form of yoga practice and walking by dividing the study patients into 2 groups - the first group was included in yoga practice, while the second group was included in walking training. The results showed a positive effect of physical activity on the severity of IBS symptoms in both study groups, but patients in the walking training group were significantly more likely to maintain regular physical activity after 6 months than those training yoga, which may be more effective long-term. [45] The study by A. Bianco et al. conducted on a group of 40 patients from southern Italy investigated the effect of performing physical activity on physical capacity (fitness) and the alleviation of IBS symptoms. Patients were subjected to moderate-intensity aerobic training. Patients performed the recommended physical activity of walking workouts for a minimum of 180 minutes per week for 12 weeks. After 3 months, the effects of the intervention were evaluated, and an increase in physical performance was observed, which was associated with an alleviation of the severity of IBS symptoms. The study's authors suggest recommending that IBS patients take up physical activity as one of the primary therapeutic interventions. [46] The positive effect of exercise in

the form of yoga on relieving IBS symptoms remains an object of interest to researchers. [47] A randomized controlled clinical trial conducted by V. Kavuri et al. investigated the possibility of using yoga exercises as one form of intervention for patients with IBS. Patients in the experimental group were to perform yoga exercises consisting of breathing exercises, adopting specific body positions and meditation under the supervision of a professional trainer for 1 hour 3 times a week for 12 weeks. The results of the study included an alleviation of patient-reported IBS symptoms, an improvement in quality of life (QOL), a reduction in perceived anxiety, and an alleviation of depressive symptoms. Patients reported enjoyment of the exercises, resulting in a better sense of well-being, and reported no serious side effects. Some patients were observed to reduce their intake of medications and dietary supplements on their own. [48] In a randomized controlled clinical trial, I. Taneja et al. compared the effectiveness of drug treatment with loperamide and with yoga practice on symptom occurrence in IBS patients with predominant diarrhea (IBS-D). The patients, after being assigned to two groups, underwent a 2-month study. The drug treatment group took symptomatic loperamide at a dose of 2-6 mg/day for 2 months, while the other group performed physical activity, which consisted of yoga training in the form of adopting specific body positions and breathing exercises twice a day. A reduction in the severity of IBS symptoms was obtained in the results of both groups. Yoga trainees showed increased parasympathetic system activity and reduced autonomic symptoms compared to the loperamide group. The authors of the study estimated that the use of yoga had better effects than loperamide therapy. [49] In a randomized controlled clinical trial, S. Evans et al. studied a group of adolescents aged 14-17 and young adults aged 18-26. Individuals in the study group were advised to perform yoga exercises twice a week for 6 weeks. The results of the study showed an improvement in the reported symptoms of those in the yoga group. The use of yoga in IBS therapy can be applied with good results regardless of the patient's age. [50] Similar results in the 11-18 age group were obtained in a randomized study by L. Kuttner et al. in which the study group was subjected to 4 weeks of daily yoga exercises lasting about 10 minutes. Teenagers in the study group reported less severe gastrointestinal symptoms, lower levels of the drug, and feelings of calmness. The yoga exercises were described by respondents as helpful, enjoyable and easy to do. [51] The practice of yoga nowadays is facilitated by new technologies. A randomized clinical trial by A. D'Silva et al. investigated the efficacy of using yoga practice in combination with virtually guided meditation in patients with IBS. Patients in the study group were subjected to eight weekly yoga classes conducted online. The study demonstrated the safety of yoga practice in patients with IBS, and

improvements were achieved in perceived fatigue, stress intensity and quality of life. [52] In a study by K. R. Weaver-Toedtman et al, the feasibility and acceptability of a 6-week virtual yoga program by IBS patients was evaluated. At the end of the study, most of the participants said that participating in the virtual training was easily doable and brought them tangible benefits. Good acceptance has been obtained for this type of intervention. [53] Physical activity is viewed positively by IBS patients, but it can be challenging and related with negative associations. Patients with IBS report the occurrence of abdominal pain, too-frequent bowel movements, feelings of fatigue associated with gastrointestinal symptoms, the possibility of gastrointestinal symptoms during physical activity and associated anxiety and embarrassment as reasons for giving up physical activity. Some patients report an exacerbation of IBS symptoms that they associate with exercise - especially high-intensity exercise; for some patients, exercises that include jumping and running are inappropriate. [54] Increased physical activity may alleviate IBS symptoms, but additional good-quality studies are needed to determine the true impact of physical activity on the severity of IBS symptoms and to identify possible side effects of such an intervention. [55]

Conclusions

The results of the study noted the positive effect of doing physical activity on IBS symptoms. The likely reason for the improvement is the prokinetic effect of exercise and the effect of physical activity on nervous system function. The introduction of physical activity in IBS patients resulted in reduced severity of gastrointestinal symptoms, lower risk of IBS exacerbations, reduced severity of psychological symptoms, improved quality of life and patient well-being. Patients who performed physical activity reported lower levels of anxiety and depressive disorders. Performing physical activity can be a form of attempting to gain control over IBS symptoms by using its prokinetic properties to regulate the rhythm of bowel movements and the severity of the bloating experienced, which can help patients plan daily activities that would have been hampered by the unexpected onset of IBS symptoms. Patients surveyed reported satisfaction and enjoyment associated with physical activity. Physical exercise was acceptable to them and rated as positive. It is important to note that no significant side effects have been reported. Self-reductions of pharmaceutical intake were noted in some subjects, which would reduce costs for IBS patients. Physical activities of moderate intensity were studied, particularly walking workouts and yoga practice. The patients' preferred physical activity was walking due to its ease of execution. When

recommending physical activity to patients, it is important to learn about the patient's abilities and needs, so that the activity undertaken is associated with a positive perception, and is performed regularly by the patient over a long period of time. Too much intensity in the exercises performed may discourage the patient from trying to increase his/her activity. Subjects showed improvement in the severity of IBS symptoms regardless of age. The results of the study indicate a positive effect of physical activity on symptoms' severity, which may provide patients with an opportunity for low-cost, effective therapy without significant side effects. Physical activity, by influencing disease symptoms, mood and physical performance, can help improve patients' overall health in the long term. Using the existing knowledge of the brain-gut axis and taking into account the results of research to date, it seems beneficial to recommend that patients with IBS perform tailored, individualized physical activity of moderate intensity. Such an intervention could be carried out as soon as the diagnosis is made, which could reduce the use of medications to control and reduce the severity of symptoms, resulting in lower costs for the patient. Patient education about the benefits of physical activity and support in developing individualized exercise plans can help improve the quality of life for IBS sufferers. Additional research is needed to determine the most optimal, effective recommendations for the type, frequency and duration of physical activity.

Disclosure

Author's contribution

Conceptualization: Ewelina Machała-Ćwikła; methodology: Piotr Zdziebło; software: Piotr Ćwikła; check: Kamila Machała, Kacper Szeląg; formal analysis: Dominika Machała, Antoni Kujawski; investigation: Katarzyna Zdziebło, Andrzej Paweł Zuzak; resources: Kacper Szeląg; data curation: Urszula Łapińska; writing - rough preparation: Urszula Łapińska, Kamila Machała, Antoni Kujawski; writing - review and editing: Katarzyna Zdziebło, Andrzej Paweł Zuzak; visualization: Piotr Ćwikła; supervision: Ewelina Machała-Ćwikła; project administration: Piotr Zdziebło, Dominika Machała; receiving funding- not applicable
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