

WOŹNIACKA, Agnieszka, PULANECKI, Tomasz, KRZESZOWIAK, Jerzy, OŹGA, Aleksandra, PODOLSKA, Alicja, KOLANO, Patrycja, WĄTOR, Julia, BOBA, Barbara, CHOJNACKA, Barbara and BRYKSY, Sylwia. The Role of a Healthy Lifestyle in Enhancing Quality of Life: Effects of Flaxseed on Gastrointestinal Symptom Severity in Patients with Irritable Bowel Syndrome. Quality in Sport. 2025;42:61126. eISSN 2450-3118.

<https://doi.org/10.12775/QS.2025.42.61126>

<https://apcz.umk.pl/QS/article/view/61126>

The journal has been awarded 20 points in the parametric evaluation by the Ministry of Higher Education and Science of Poland. This is according to the Annex to the announcement of the Minister of Higher Education and Science dated 05.01.2024, No. 32553. The journal has a Unique Identifier: 201398. Scientific disciplines assigned: Economics and Finance (Field of Social Sciences); Management and Quality Sciences (Field of Social Sciences).

Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). © The Authors 2025.

This article is published with open access under the License Open Journal Systems of Nicolaus Copernicus University in Torun, Poland. Open Access: This article is distributed under the terms of the Creative Commons Attribution Noncommercial License, which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non-commercial Share Alike License (<http://creativecommons.org/licenses/by-nc-sa/4.0/>), which permits unrestricted, non-commercial use, distribution, and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interest regarding the publication of this paper.

Received: 18.05.2025. Revised: 25.06.2025. Accepted: 25.06.2025. Published: 26.06.2025.

## **The Role of a Healthy Lifestyle in Enhancing Quality of Life: Effects of Flaxseed on Gastrointestinal Symptom Severity in Patients with Irritable Bowel Syndrome**

WOŹNIACKA, Agnieszka, PODOLSKA Alicja, BOBA, Barbara, CHOJNACKA, Barbara, WĄTOR, Julia, KRZESZOWIAK Jakub, OŹGA Aleksandra, KOLANO, Patrycja, BRYKSY, Sylwia, PULANECKI, Tomasz

1. Agnieszka Woźniacka (AW)

Hospital of Santa Anne in Miechów, Szpitalna 3 Street, 32-200 Miechów, Poland

<https://orcid.org/0009-0009-7840-499X>

[agnieszka.wozniacka@proton.me](mailto:agnieszka.wozniacka@proton.me)

2. Tomasz Pulanecki (TP)

The University Hospital in Cracow, Jakubowskiego 2 Street, 30-688 Cracow, Poland

<https://orcid.org/0009-0005-5662-2268>

[tomaszpilanecki@gmail.com](mailto:tomaszpilanecki@gmail.com)

3. Jerzy Krzeszowiak (JK)

Jagiellonian University Medical College in Cracow, Santa Anne 12 Street, 31-008 Cracow, Poland

<https://orcid.org/0000-0002-8831-6565>

[jerzykrzeszowiak2206@gmail.com](mailto:jerzykrzeszowiak2206@gmail.com)

4. Aleksandra Ożga (AO)

Warsaw South Hospital, Rotmistrza Witolda Pileckiego Street 99, 02-781 Warsaw, Poland

<https://orcid.org/0009-0002-1279-543X>

[ola.ozgao@gmail.com](mailto:ola.ozgao@gmail.com)

5. Alicja Podolska (AP)

The University Hospital in Krakow, Jakubowskiego 2 Street, 30-688 Cracow, Poland

<https://orcid.org/0009-0002-7690-1406>

[apodolska1@gmail.com](mailto:apodolska1@gmail.com)

6. Patrycja Kolano (PK)

Medical Center in Łańcut, Ignacego Paderewskiego 5 Street, 37-100 Łańcut, Poland

<https://orcid.org/0009-0009-1706-5752>

[patrycja.kolano97@gmail.com](mailto:patrycja.kolano97@gmail.com)

7. Julia Wątor (JW)

Silesian Medical University in Katowice, Poniatowskiego 15 Street, 40-055 Katowice, Poland

<https://orcid.org/0009-0003-0120-5198>

[julia.katarzyna.wator@gmail.com](mailto:julia.katarzyna.wator@gmail.com)

8. Barbara Boba (BB)

5 th Military Clinical Hospital with Policlinic (SPZOZ) in Cracow, Wrocławska Street 1-3, 30-901 Cracow, Poland

<https://orcid.org/0009-0004-7939-8783>

[basia.b44@gmail.com](mailto:basia.b44@gmail.com)

9. Barbara Chojnacka (BC)

5 th Military Clinical Hospital with Policlinic (SPZOZ) in Cracow, Wrocławska Street 1-3, 30-901 Cracow, Poland

<https://orcid.org/0009-0009-2978-9993>

[basia.chojnacka34@gmail.com](mailto:basia.chojnacka34@gmail.com)

10. Sylwia Bryksy (SB)

5 th Military Clinical Hospital with Policlinic (SPZOZ) in Cracow, Wrocławska Street 1-3, 30-901 Cracow, Poland

<https://orcid.org/0009-0007-7877-1541>

[bryksy.syl@gmail.com](mailto:bryksy.syl@gmail.com)

## **Abstract**

### **Introduction and purpose of the work:**

Irritable bowel syndrome (IBS) is a chronic, relapsing and often life-long disorder. It is characterised by the presence of abdominal pain or discomfort, which may be associated with defaecation and/or accompanied by a change in bowel habit (Irritable Bowel Syndrome in Adults: Diagnosis and Management Clinical Guideline, 2008). The treatment options for IBS have included pharmacological symptomatic relief of symptoms such as pain, diarrhoea or constipation. Alternative therapies, such as cognitive behavioural therapy and gut-directed hypnotherapy, have been used with good results. Flaxseed or linseed (*Linum usitatissimum* L.) comes from the flax plant, an annual herb. The main importance of flaxseed is in the human nutrition sector because it is emerging as an important functional food ingredient thanks to the content of active compounds, pointed to provide health benefits (El-Salhy, 2012). This narrative review aims to assess the impact of the therapeutic benefits of linseed for people with IBS.

**Materials and methods:** A comprehensive literature search was conducted in the Google Scholar data base up to 1995. The review included an investigator-blinded trial, pilot

randomized controlled studies and animal experiments focused on the impact of flaxseed on symptoms of the Irritable Bowel Syndrome.

**Summary:** The evidence indicates that ground linseeds reduce overall symptoms in IBS and ease stool passage. The impact of linseed on Irritable Bowel Syndrome is not yet conclusively documented, and further research is needed.

**Keywords:** Healthy lifestyle, Quality of life, Irritable bowel syndrome, Linseed, Flaxseed, Dietary Fiber

## **1. Introduction:**

Irritable bowel syndrome (IBS) is a chronic, relapsing and often life-long disorder. It is characterised by the presence of abdominal pain or discomfort, which may be associated with defaecation and/or accompanied by a change in bowel habit. Symptoms may include disordered defaecation (constipation or diarrhoea or both) and abdominal distension, usually referred to as bloating. Symptoms sometimes overlap with other gastrointestinal disorders such as non-ulcer dyspepsia or coeliac disease. People with IBS present to primary care with a wide range of symptoms, some of which may be reluctant to be disclosed without sensitive questioning (Irritable Bowel Syndrome in Adults: Diagnosis and Management Clinical Guideline, 2008).

## **2. Epidemiology:**

The irritable bowel syndrome is the commonest functional gastrointestinal disorder seen in both primary and secondary care and studies have shown that symptom complexes compatible with the clinical diagnosis of irritable bowel syndrome may be present in up to 30% of the general population. 6 Up to 33% of patients with IBS had a family history of IBS compared to 2% of the control group. In a subset of IBS patients GI symptoms appear following gastroenteritis, with about 25% of patients showing IBS-D symptoms 6 month post-infection and approximately 10% developing persistent symptoms. Post-infectious (PI)-IBS has been reported after viral, bacterial, protozoa and nematode infections, with the incidence of PI-IBS

varying between 7% and 31%, although the largest studies suggest this number is about 10% (El-Salhy, 2012).

There is a compelling evidence that inflammation of the enteric mucosa or neural plexuses initiates or contributes to symptoms associated with irritable bowel syndrome. Mucosal inflammatory cytokines may activate peripheral sensitization or hypermotility (He et al., 2001a).

### **3. Pathophysiology:**

The physiological mechanisms responsible for abdominal pain and altered bowel habits occur in healthy control subjects and in persons with IBS. Symptoms can occur in response to a disruption of functioning of the GI tract from an infection, dietary indiscretions (e.g., increased fat or alcohol intake), lifestyle changes (e.g., traveling or vigorous physical activity), or psychologic stress. Research on the psychosocial aspects of patients with IBS has yielded 4 general observations:

1. Psychologic stress exacerbates GI symptoms. Although stressful experiences produce GI symptoms in most individuals, patients with IBS are particularly susceptible.
2. Psychological and psychiatric comorbidity is common among patients with IBS. A large proportion of patients with IBS and other functional bowel disorders have concurrent psychological disturbances.
3. Psychosocial factors affect health status and clinical outcome. Psychological and sociocultural factors, when present in patients with IBS, will also influence the illness experience and treatment outcome. Psychosocial factors that adversely affect health status and clinical outcome include: (1) a history of emotional, sexual, or physical abuse; (2) stressful life events; (3) chronic social stress or anxiety disorder; and (4) maladaptive coping style. Some of these psychosocial influences may occur early in life. For example, increased attention by family to a child's illness complaints seems to result in delayed symptom reporting, health care seeking, and health care costs.
4. Psychosocial factors influence which patients consult physicians. This tends to overestimate the true prevalence of psychosocial disturbance when evaluating patients in referral clinical settings. In fact, persons with IBS who do not see physicians are psychologically similar to subjects without bowel complaints (Drossman et al., 2002).

Balloon-distention studies of the rectosigmoid 14 and the ileum 15 have shown that patients with the irritable bowel syndrome experience pain and bloating at balloon volumes and pressures that are significantly lower than those that induce pain in control subjects,

a phenomenon referred to as visceral hyper sensitivity. One possible explanation is that the sensitivity of receptors in the viscus is altered through the recruitment of silent nociceptors in response to ischemia, distention, intraluminal contents, infection, or psychiatric factors. There may be the increased excitability of the neurons in the dorsal horn of the spinal cord, an area rich in neurotransmitters such as catecholamines and serotonin. Centrally, there may be differences in the way the brain modulates afferent signals from the dorsal horn neurons through the ascending pathways.

#### **4. Diagnosis:**

The irritable bowel syndrome is defined on the basis of the recently modified Rome criteria as the presence for at least 12 weeks (not necessarily consecutive) in the preceding 12 months of abdominal discomfort or pain that cannot be explained by structural or biochemical abnormalities and that has at least two of the following three features: pain is relieved with defecation, its onset is associated with a change in the frequency of bowel movements (diarrhea or constipation), or its onset is associated with a change in the form of the stool (loose, watery, or pellet-like). The syndrome can be divided into four subcategories according to whether the predominant symptom is abdominal pain, diarrhea, constipation, or constipation alternating with diarrhea. Some patients complain of daily symptoms, while others report intermittent symptoms at intervals of weeks or months (He et al., 2001b).

#### **5. Treatment:**

The treatment strategy is based on the nature and severity of the symptoms, the correlation of IBS symptoms with food intake and/or defecation, the degree of functional impairment, and the presence of psychosocial difficulties and psychiatric comorbidity affecting the course of the illness. In general, milder symptoms relate primarily to visceral hyperactivity and/or hypersensitivity and are commonly treated symptomatically with pharmacological agents directed at the gut, whereas more severe symptoms are associated with greater levels of psychosocial difficulties and illness behaviors and often require psychological/ behavioral and antidepressant medications.

The most frequently seen group of IBS patients have mild symptoms. They are usually cared for in primary care practices, usually maintain normal daily activities, have little or no psychosocial difficulties (although they may experience symptom exacerbations with stress), and are not high health care users. Treatment involves education, reassurance, and dietary/lifestyle changes.

A smaller proportion of patients have moderate symptoms. that are usually intermittent, although at times disabling. Symptoms may be associated with considerable symptom-related distress, and historical symptoms are associated with greater physiological gut reactivity (e.g., worse with eating, relieved by defecation). Treatments involve gut-acting pharmacological agents (e.g., anticholinergics, antidiarrheals, newer GI treatments, etc.), and if more persistent, possibly low-dose TCAs and/or psychological treatments.

Finally, only a very small proportion of patients with IBS has severe and sometimes refractory symptoms. These symptoms predominate among patients seen in referral centers; these patients frequently have more severe, often constant pain symptoms, psychiatric comorbidity (e.g., depression, anxiety disorders), and psychosocial difficulties (history of sexual/ physical abuse, poor coping) associated with high health care use rates. These patients require antidepressant medication and possibly mental health or pain center referral, along with an ongoing relationship with the primary care physician to provide psychosocial support through brief, regular visits (Drossman et al., 2002).

Patients with IBS believe that their diet has a significant influence on their symptoms and they are interested in finding out which foods they should avoid. About 60% of IBS patients report a worsening of symptoms following food ingestion: 28% within 15 min after eating and 93% within 3 h. Many IBS patients report specific foods as triggers, most commonly implicating milk and dairy products, wheat products, onion, peas and beans, hot spices, cabbage, certain meats, smoked products, fried food and caffeine as the offending foods (El-Salhy, 2012).

## **6. Linseed**

Flaxseed or linseed (*Linum usitatissimum* L.) comes from the flax plant, an annual herb. The main importance of flaxseed is in the human nutrition sector because it is emerging as an important functional food ingredient thanks to the content of active compounds, pointed to provide health benefits. There are several ways to eat flaxseed: milled, in the form of oil or added to bakery product. Scientific evidences support consumption of flaxseed for the high content in omega-3, omega-6 rich oil,  $\alpha$ -linolenic acid, lignans, high quality proteins and fibers, compounds which are biologically active in the prevention of some chronic diseases (Katoch & Bhatia, 2021).

Flaxseed is an ancient crop with a rich history, dating back nearly 12,000 years. Originally, flaxseed was likely used for its laxative properties before its widespread consumption as a food ingredient. In recent years, there has been a marked increase in health-oriented products containing flaxseed, driven by growing research that highlights its potential health benefits.

Therefore, dietary flaxseed has been the object of a growing research literature supporting its use, as well as trials to help and provide reliable information to the general public, especially to those in a disease-compromised condition, but also to the rest of the population who would like to introduce flaxseed in their diet daily. Linseed's components are strongly associated with various health benefits, such as improving cardiovascular health, preventing certain types of cancer, controlling diabetes, promoting gastro-intestinal well-being, and aiding in weight management. It is increasingly evident that pharmacologic therapy must be complemented by other interventions, such as dietary strategies, to effectively treat diseases or even prevent or delay their onset. Growing awareness of flaxseed's health benefits is driving increased demand, which is likely to impact farmers, food processors, and retailers in the coming years..(Duarte et al., 2025)

### **Results:**

The impact of linseed on Irritable Bowel Syndromesymptoms has been evaluated in several clinical studies. In 2015 an animal experimental study aimed to describe possible mechanism of dual effectiveness of Flaxseed in constipation and diarrhea. The oil and mucilage of Flaxseeds were studied for their laxative, and antidiarrheal activities in mice. The mechanisms of laxative and antidiarrheal activities were further studied using the isolated tissue preparations (rabbit jejunum and guinea-pig ileum) immersed in Tyrode's solution maintained at 37°C and aerated with carbogengas. Isotonic responses were measured on spontaneously contracting isolated jejunum and guinea-pig ileum preparations. Oral administration of Flaxseed oil (30 and 70 mg/kg, orally) and mucilage (1 and 2.5 g/kg, orally) caused dose-dependent increase in wet feces in mice. When studied for its antidiarrheal effect, Flaxseed oil reduced the castor oil-induced diarrheal score by 49.35% and 84.41% and intestinal secretions by 19% and 33.62% at the oral doses of 100 and 300 mg/kg respectively (Hanif Palla & Gilani, 2015).

Another study from 2012 showed effects of linseeds on the symptoms of IBS. In this pilot randomized controlled open-label study, subjects diagnosed with IBS were recruited from primary and secondary care between October and December 2008. Forty subjects were recruited and randomized to the present study eight (20%) subjects (whole linseed group n = 3, ground linseed group n = 1; control group n = 4) did not complete the baseline week (i.e. no baseline data were available) but were included in the intention-to-treat analysis. One further subject was lost to follow-up (whole linseed group), leaving 31 subjects for per protocol analysis. Baseline characteristics were similar between groups. In the present pilot study, the supplementation with whole or ground linseeds was associated with significantly improved IBS symptom severity. However, comparison between the groups failed to detect a significant



difference between either of the linseed interventions and controls taking their usual diet. Furthermore, ground linseeds were no more effective than whole linseeds (Cockerell et al., 2012).

In 1995 study participants were healthy young adults (5 females, 5 males) with a mean ( $\pm$ SD) age of  $25 \pm 3$  y and a body mass index (in kg/m<sup>2</sup>) of  $21.7 \pm 2.4$ . The study followed a randomized crossover design. The men in the study consumed either the control or flaxseed muffins for 4 weeks, which was followed by a 2-week washout period, and then they consumed the other type of muffin for a second 4-week period. The women in the study had the second feeding period synchronized to the same phase of the menstrual period as the first feeding period, which resulted in washout periods varying between 3 and 5 weeks. The total number of bowel movements during the third week of unsaturated are modest in comparison with what can be the flaxseed period was significantly higher than during the achieved by using dietary supplements of marine fish oil rich in corresponding control period. Laxation was improved in this study). The present laxation data confirm previous observations indicating that in infirm elderly patients, the number of bowel movements is positively correlated with flaxseed intake, suggesting that gastrointestinal transit time and/or motility are affected by flaxseed intake what can result in a reduction in the severity of constipation occurring in IBS (Cunnane et al., 1995). A similar conclusion was drawn for S. Tarpila, P. Grohn, T. Silvennoinen and L. Lindberg in an investigator-blinded trial "The efficacy of roughly ground partly defatted on constipation in 55 patients with irritable bowel syndrome". Fifty-five patients were randomized to receive 6-24 g per day either flaxseed or psyllium (seeds of the *Plantago ovata* plant) for 3 months. During the blinded treatment period 26 patients received flaxseed and 29 received psyllium. In flaxseed group, constipation and abdominal symptoms were decreased significantly ( $p=0.002$ ). After the 3 months' blinded period with psyllium, 22 out of 29 patients wanted to continue the study with ground flaxseed for another 3-month-period during which time clinical improvement in constipation and abdominal symptoms could be seen. From the 26 patients in flaxseed group 18 continued as well with an improved clinical response (Tarpila S. et al., 2004).

## Conclusions

Irritable Bowel Syndrome (IBS), like other functional gastrointestinal disorders, is becoming an increasingly common issue among patients in daily clinical practice. In addition to standard pharmacological treatment, maintaining a healthy lifestyle is crucial: appropriate physical activity, a balanced diet, and a set of actions aimed at preventing excessive stress and its negative effects. These measures can help minimize the symptoms of functional disorders and

significantly improve the quality of life. In conclusion there aren't numerous studies testing the therapeutic effect of flaxseed on the symptoms of Irritable Bowel Syndrome. Through an extensive review of current clinical evidence, including randomized controlled trials, pilot studies and animal experimental study we can observe that interventions based on consumption of flaxseed may lead to significant improvement in constipation, diarrhea and the remaining abdominal symptoms. Future studies are needed to assess whether intake of linseed indeed shows superior outcomes compared to other dietary interventions in patients with IBS. As of right now, it seems that dietary modification is one of the promising complementary treatment methods in this group of patients.

**Authors' Contributions:** Conceptualization was done by Agnieszka Woźniacka; methodology by Agnieszka Woźniacka and Alicja Podolska; software by Tomasz Pulanecki; checking by Barbara Boba; formal analysis by Julia Wątor; investigation by Jakub Krzeszowiak; resources by Aleksandra Ożga; data curation by Barbara Chojnacka; writing-rough preparation by Sylwia Bryksy; writing-review and editing by Patrycja Kolano; visualization by Agnieszka Woźniacka and Barbara Boba; supervision by Sylwia Bryksy; project administration by Tomasz Pulanecki; All authors have read and agreed with the published version of the manuscript.

**Funding statement:** The study did not receive special funding.

**Informed Consent Statement:** Not applicable.

**Acknowledgements:** Not applicable.

**Conflict of Interest Statement:** The authors report that there are no conflict of interest.

## References:

- Cockerell, K. M., Watkins, A. S. M., Reeves, L. B., Goddard, L., & Lomer, M. C. E. (2012). Effects of linseeds on the symptoms of irritable bowel syndrome: A pilot randomised controlled trial. *Journal of Human Nutrition and Dietetics*, 25(5), 435–443. <https://doi.org/10.1111/j.1365-277X.2012.01263.x>
- Cunnane, S. C., Hamadeh, M. J., Liede, A. C., Thompson, L. U., Wolever, T. M., & Jenkins, D. J. (1995). Nutritional attributes of traditional flaxseed in healthy young adults<sup>13</sup>. In *Am J Clin Nutr* (Vol. 61). <https://academic.oup.com/ajcn/article-abstract/61/1/62/4651586>
- Drossman, D. A., Camilleri, M., Mayer, E. A., & Whitehead, W. E. (2002). AGA technical review on irritable bowel syndrome. *Gastroenterology*, 123(6), 2108–2131. <https://doi.org/10.1053/gast.2002.37095>
- Duarte, S., Shah, M. A., & Sanches Silva, A. (2025). Flaxseed in Diet: A Comprehensive Look at Pros and Cons. In *Molecules* (Vol. 30, Issue 6). Multidisciplinary Digital Publishing Institute (MDPI). <https://doi.org/10.3390/molecules30061335>
- El-Salhy, M. (2012). Irritable bowel syndrome: Diagnosis and pathogenesis. *World Journal of Gastroenterology*, 18(37), 5151–5163. <https://doi.org/10.3748/wjg.v18.i37.5151>

- Hanif Palla, A., & Gilani, A. H. (2015). Dual effectiveness of Flaxseed in constipation and diarrhea: Possible mechanism. *Journal of Ethnopharmacology*, 169, 60–68. <https://doi.org/10.1016/j.jep.2015.03.064>
- He, T., Rritable, I., Owel, B., Yndrome, S., & Orwitz, R. J. H. (2001a). Review Article Current Concepts 1846 ·. In *N Engl J Med* (Vol. 344, Issue 24). [www.nejm.org](http://www.nejm.org)
- He, T., Rritable, I., Owel, B., Yndrome, S., & Orwitz, R. J. H. (2001b). Review Article Current Concepts 1846 ·. In *N Engl J Med* (Vol. 344, Issue 24). [www.nejm.org](http://www.nejm.org)
- Irritable bowel syndrome in adults: diagnosis and management Clinical guideline*. (2008). [www.nice.org.uk/guidance/cg61](http://www.nice.org.uk/guidance/cg61)
- Katoch, M., & Bhatia, N. S. (2021). Linseed and Its Basic Composition. *International Journal of Advances in Agricultural Science and Technology*, 8(6), 10–26. <https://doi.org/10.47856/ijaast.2021.v08i6.002>