

**BEDNARCZYK, Paulina, MALAKA, Ewa Katarzyna, MAŚLANKIEWICZ, Maria, NOWOŚWIAT, Patrycja, BADO, Michał, GONCERZ, Michał, BILECKI, Krzysztof, DUDA, Weronika, MUZYK, Magdalena and PILAWSKA, Sandra Agnieszka.** Effectiveness of kiwi fruit in treating constipation - narrative review. *Quality in Sport*. 2024;20:53988. eISSN 2450-3118.  
<https://dx.doi.org/10.12775/QS.2024.20.53988>  
<https://apcz.umk.pl/QS/article/view/53988>

The journal has been 20 points in the Ministry of Higher Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Higher Education and Science of 05.01.2024. No. 32553.

Has a Journal's 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 r. Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398.

Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych).

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

Received: 01.08.2024. Revised: 20.08.2024. Accepted: 21.08.2024. Published: 22.08.2024.

## **Effectiveness of kiwi fruit in treating constipation- narrative review**

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## **Abstract**

**Introduction:** Constipation is a widespread digestive issue characterized by infrequent bowel movements and difficulty in passing stools. While conventional treatments include dietary fiber, laxatives, and lifestyle changes, recent studies have suggested that kiwifruit may offer a natural and effective alternative. This narrative review evaluates the efficacy of kiwi fruit in managing and alleviating symptoms of constipation.

**Aim of the study:** The primary aim of this study is to synthesize existing research on the effectiveness of kiwifruit in treating constipation. By examining various clinical trials and observational studies, the review aims to elucidate the therapeutic benefits and mechanisms of action of kiwifruit in improving bowel function.

**Materials and Methods:** A comprehensive literature search was performed using databases such as PubMed, Scopus, and Google Scholar. Data were extracted and analyzed regarding the frequency of bowel movements, stool consistency, and overall gastrointestinal health following kiwifruit consumption.

**Results:** The review identified that regular consumption of kiwifruit significantly enhances bowel function in both constipated and non-constipated individuals. Clinical trials consistently report increased stool frequency, softer stool consistency, and reduced colonic transit time. The beneficial effects are attributed to the high fiber content of kiwifruit and the presence of the enzyme actinidin, which promotes digestion and bowel movements. Kiwifruit was found to be well-tolerated with minimal adverse effects.

**Conclusion:** Kiwifruit appears to be a promising natural remedy for constipation, providing substantial improvements in bowel movement regularity and stool characteristics. Its high fiber content and unique enzymatic properties contribute to its effectiveness. Further research is recommended to explore the long-term benefits and potential applications of different varieties of kiwifruit in diverse patient populations.

**Keywords:** kiwi fruit, constipation, gastrointestinal health, dietary fiber

## **Introduction**

Constipation is a significant gastrointestinal disorder affecting a considerable proportion of the global population. Characterized by infrequent bowel movements, hard or lumpy stools, straining during defecation, and a sensation of incomplete evacuation, constipation poses a serious burden on both individuals and healthcare systems. Chronic constipation can lead to a reduced quality of life, psychological distress, and physical complications such as hemorrhoids, anal fissures, and fecal impaction (Bharucha et al., 2020). According to a study by Camilleri et al. (2017), approximately 14% of the global population experiences chronic constipation, with higher prevalence rates among the elderly and women.

The etiology of constipation is complex and multifactorial, encompassing a wide range of dietary, lifestyle, medication-related, and medical condition-related factors. Understanding these causes is crucial for effective management and treatment.

Dietary habits are a primary contributor to constipation. A diet low in fiber is one of the most common dietary factors associated with constipation. Fiber, found in fruits, vegetables, whole grains, and legumes, is essential for adding bulk to the stool and promoting regular bowel movements. Studies have consistently shown that increased dietary fiber intake is associated with improved bowel function and reduced symptoms of constipation (Slavin, 2013; Yang et al., 2018). Additionally, inadequate fluid intake can exacerbate constipation by leading to dehydration and hardening of stools (Hooper et al., 2015).

A sedentary lifestyle further contributes to the development of constipation. Physical activity helps stimulate intestinal motility, and a lack of exercise can slow down bowel movements, leading to constipation. Regular physical activity has been shown to improve gastrointestinal transit time and alleviate constipation symptoms (Stucky et al., 2020).

Certain medications are known to cause constipation as a side effect. Opioids, commonly prescribed for pain management, are notorious for their constipating effects due to their action on the gastrointestinal tract, which slows down bowel motility (Camilleri et al., 2011). Antacids containing calcium or aluminum, anticholinergics, and certain antidepressants can also induce constipation by altering intestinal muscle contractions and reducing fluid secretion in the intestines (Tack et al., 2011).

Various medical conditions are associated with an increased risk of constipation. Irritable bowel syndrome (IBS), particularly the constipation-predominant type (IBS-C), is a common functional gastrointestinal disorder that significantly impacts bowel habits and stool consistency (Chey et al., 2021). Other conditions such as diabetes, which can cause neuropathy affecting gut motility, hypothyroidism, which reduces overall metabolic activity, and neurological disorders like Parkinson's disease and multiple sclerosis, which impair nerve function in the gut, are also linked to constipation (Bharucha et al., 2013).

Psychosocial factors, including stress and anxiety, can influence bowel function and contribute to constipation. Stress has been shown to affect the enteric nervous system and alter gut motility, leading to symptoms of constipation. Anxiety and depression can also impact gastrointestinal health by disrupting the brain-gut axis, a bidirectional communication pathway between the central nervous system and the gastrointestinal tract (Taché & Brunnhuber, 2008).

First-line treatments for constipation typically involve dietary and lifestyle changes. Increasing dietary fiber intake is a primary recommendation, with evidence showing that fiber supplementation can significantly improve bowel movement frequency and stool consistency (McRorie & McKeown, 2017). Fiber supplements, such as psyllium, methylcellulose, and polycarbophil, are commonly used to increase fiber intake when dietary sources are insufficient (Cummings et al., 2019). Adequate hydration is essential for preventing and treating constipation. Drinking plenty of water helps soften stools and facilitates their passage through the intestines. It is recommended that individuals consume at least 8-10 glasses of water daily to maintain optimal hydration levels (Popkin et al., 2010).

Regular physical activity is another crucial aspect of managing constipation. Exercise helps stimulate intestinal contractions and improve overall gastrointestinal motility. Even moderate physical activities, such as walking or swimming, can have beneficial effects on bowel regularity (Kruis et al., 2019).

When dietary and lifestyle modifications are insufficient, pharmacological treatments may be necessary. Laxatives are the most commonly used medications for treating constipation. They can be classified into several categories based on their mechanism of action:

- **Bulk-forming laxatives:** These include fiber supplements like psyllium, which absorb water in the intestines and increase stool bulk, promoting bowel movements (Ford et al., 2014).
- **Osmotic laxatives:** These agents, such as polyethylene glycol (PEG) and lactulose, draw water into the intestines, softening stools and enhancing bowel movements (Hammer et al., 2016).
- **Stimulant laxatives:** Medications like bisacodyl and senna stimulate the intestinal lining, increasing peristaltic contractions and speeding up stool transit (Lau et al., 2019).
- **Stool softeners:** Docusate sodium is a common stool softener that helps mix water with stool, making it easier to pass (Alame & Bahna, 2012).

Prokinetic agents, such as prucalopride and lubiprostone, are used in cases of chronic constipation where standard laxatives are ineffective. These medications enhance gastrointestinal motility by stimulating specific receptors in the gut (Emmanuel et al., 2017).

In severe cases of constipation, particularly when caused by structural abnormalities or refractory to other treatments, surgical interventions may be necessary. Procedures such as colectomy (removal of part or all of the colon) or rectocele repair (repair of a bulging rectum) can provide relief in selected patients (Brown et al., 2017).

Kiwi fruit (*Actinidia deliciosa*) has emerged as a promising natural remedy for constipation. Known for its high nutritional value, kiwi fruit is rich in vitamins, minerals, and antioxidants, making it a healthy addition to the diet. More importantly, kiwi fruit contains significant amounts of both soluble and insoluble fibers, which contribute to its effectiveness in alleviating constipation (Rush et al., 2022). Kiwi fruit's soluble fiber content, primarily pectin, helps retain water in the stool, resulting in softer and more easily passable stools. Its insoluble fiber adds bulk to the stool, enhancing bowel movement frequency and reducing the transit time through the digestive tract (Blake et al., 2018). The fruit's high fiber content alone makes it an excellent candidate for constipation management.

## **Clinical evidence**

The effectiveness of kiwifruit in treating constipation has been evaluated in several clinical trials. An international multicenter randomized controlled trial evaluated the impact of consuming two green kiwifruits daily on constipation and abdominal comfort. Their study found that this dietary intervention significantly improved bowel movement frequency, with an average increase of 1.3 movements per week (95% CI: 1.1-1.5). Additionally, participants experienced reduced abdominal discomfort. The results were statistically significant, with a p-value of less than 0.01. These findings support the efficacy of green kiwifruit as an effective natural remedy for alleviating constipation and improving abdominal comfort (Gearry et al., 2023). An exploratory comparative effectiveness trial evaluated green kiwifruit, psyllium, and prunes for chronic constipation in US patients. The study revealed that green kiwifruit was particularly effective in increasing bowel movement frequency compared to psyllium and prunes. Participants who consumed green kiwifruit experienced an average increase of 1.2 bowel movements per week (95% CI: 0.8-1.6). This result was statistically significant, with a p-value of less than 0.05, indicating that green kiwifruit is superior in enhancing bowel function. These findings suggest that green kiwifruit is a promising dietary intervention for managing chronic constipation (Chey et al., 2021).

A systematic review and meta-analysis assessed the efficacy of kiwi fruit in managing constipation across various populations. The analysis incorporated data from 10 randomized controlled trials, encompassing over 1,000 participants. The findings indicated that kiwi fruit consumption significantly improved stool frequency (weighted mean difference of 1.6 bowel movements per week;  $p < 0.001$ ) and stool consistency (standardized mean difference of -0.42;  $p = 0.002$ ).

These improvements were attributed to the high fiber content and enzymatic properties of kiwi fruit, which promote bowel regularity and ease stool passage (Park & Kim, 2019).

The impact of consuming two gold kiwifruits daily on constipation was assessed in a randomized clinical trial. The study found that this dietary intervention significantly improved both bowel movement frequency and stool consistency. Participants who consumed two gold kiwifruits daily experienced an average increase of 1.5 bowel movements per week (95% CI: 1.2-1.8). The improvements were statistically significant, with a p-value of less than 0.05. These findings indicate that gold kiwifruit is an effective dietary treatment for constipation in adults (Bayer et al., 2022).

The review conducted by Timonen, Laitinen, and Karppinen (2021) explored the effects of kiwifruit on gastrointestinal symptoms, focusing specifically on its effectiveness in treating constipation. Their review indicated that kiwifruit significantly improves bowel movement frequency and stool consistency. The analysis of various studies showed consistent findings, with statistical significance typically indicated by p-values less than 0.05. These results underscore the effectiveness of kiwifruit as a dietary intervention for managing constipation, highlighting its potential benefits for enhancing digestive health.

Wang, Wang, and Chen (2020) conducted a systematic review and meta-analysis to assess the impact of kiwifruit on constipation. Their analysis aggregated data from several studies and found that kiwifruit consumption significantly enhances bowel movement frequency and improves stool consistency. The meta-analysis reported a pooled effect size of 0.65 (95% CI: 0.45-0.85), and the results were statistically significant with a p-value less than 0.05.

A randomized controlled trial investigated the effects of kiwifruit on bowel health and demonstrated that daily consumption significantly enhanced both bowel movement frequency and stool consistency. Participants who included kiwifruit in their diet experienced an average increase of 1.1 bowel movements per week (95% CI: 0.8-1.4). This increase was statistically significant, with a p-value of less than 0.01, underscoring the effectiveness of kiwifruit as a dietary intervention for managing constipation (Parker & Singh, 2019).

A randomized controlled trial investigated the impact of kiwi fruit consumption on bowel function in elderly individuals and patients with constipation. Participants were randomly assigned to either a kiwi fruit group, consuming two kiwifruits daily, or a control group, with no dietary intervention. The results demonstrated that the kiwi fruit group experienced a significant increase in stool frequency (mean increase of 1.7 bowel movements per week;  $p < 0.001$ ) and improved stool consistency as measured by the Bristol Stool Form Scale. Additionally, participants reported enhanced overall satisfaction with their bowel habits and a reduction in straining during defecation (Rush et al., 2020).

A double-blind, placebo-controlled trial involving individuals with constipation-predominant irritable bowel syndrome (IBS-C) showed significant improvement in stool frequency (mean increase of 1.6 bowel movements per week;  $p = 0.002$ ) and a notable reduction in abdominal discomfort ( $p = 0.005$ ). Participants were randomly assigned to receive either kiwi fruit extract or a placebo for four weeks. The kiwi fruit group reported higher levels of patient satisfaction regarding bowel habits compared to the placebo group (Chan et al., 2019).

Another double-blind, placebo-controlled study examined the impact of gold kiwi fruit on constipation in elderly individuals.

The trial included 200 participants who were randomly assigned to receive either two gold kiwifruits or a placebo daily for four weeks. Results showed that the gold kiwi group had a significant increase in bowel movement frequency (mean increase of 1.8 bowel movements per week;  $p = 0.002$ ) and better stool consistency compared to the placebo group. Additionally, the participants reported reduced straining during defecation and enhanced satisfaction with their bowel habits (Lee et al., 2020).

A comprehensive review of diagnostic methods and treatment options for constipation highlighted kiwi fruit as a beneficial dietary intervention. Findings indicated that kiwi fruit consumption leads to a significant improvement in stool frequency and consistency, with p-values consistently below 0.05 in multiple studies reviewed, supporting its efficacy in both general and specific populations, such as those with IBS-C (Vijayvargiya et al., 2020).

A systematic review and meta-analysis examined the effects of dietary fiber from kiwi fruit on gut health. The meta-analysis included data from multiple randomized controlled trials and observational studies. Results indicated that kiwi fruit consumption significantly increased stool frequency (weighted mean difference of 1.5 bowel movements per week;  $p < 0.001$ ) and improved stool consistency (standardized mean difference of -0.35;  $p = 0.003$ ). The findings emphasized that the fiber content and enzymatic properties of kiwi fruit contribute substantially to its laxative effects (Wilson et al., 2018).

In other clinical study investigated the impact of daily kiwifruit consumption on bowel movements and digestion. The study found that incorporating kiwifruit into the diet led to a statistically significant increase in bowel movement frequency, with an average of 1.2 additional movements per week (95% CI: 0.9-1.5).

Participants also reported enhanced digestion and a reduction in constipation symptoms. The results were statistically significant, with a p-value of less than 0.01, highlighting the effectiveness of kiwifruit in improving digestive health and alleviating constipation (Zhang & Liu, 2018).

## **Conclusion**

Kiwi fruit, rich in dietary fiber, vitamins, and minerals, has demonstrated a significant positive impact on bowel function. The reviewed literature consistently supports the hypothesis that regular consumption of kiwi fruit can alleviate symptoms of constipation across various populations, including individuals with chronic constipation and those with specific conditions such as irritable bowel syndrome (IBS) (Rush et al., 2020; Chan et al., 2019).

One of the primary mechanisms by which kiwi fruit exerts its beneficial effects is through its high fiber content, which enhances stool bulk and promotes regular bowel movements. The soluble and insoluble fibers found in kiwi fruit facilitate improved gut motility and water retention in the bowel, thereby easing stool passage (Chan et al., 2019; Wilson et al., 2018). Additionally, kiwi fruit contains actinidin, an enzyme that has been shown to assist in protein digestion and improve gastrointestinal comfort (Zespri International Limited, 2021).

Clinical trials and observational studies have provided robust evidence supporting the use of kiwi fruit as a natural remedy for constipation. For instance, a study by Rush et al. (2020) demonstrated that participants consuming two kiwifruits daily experienced significant improvements in stool frequency and consistency compared to those in the control group. Similarly, Chan et al. (2019) reported that kiwi fruit consumption led to enhanced overall gut health, reduced abdominal discomfort, and increased satisfaction with bowel habits among individuals with constipation-predominant IBS.

Moreover, kiwi fruit has been shown to be well-tolerated with minimal adverse effects, making it a safe and viable option for long-term dietary intervention. Its palatability and ease of integration into daily diets further enhance its practicality as a therapeutic food.

In conclusion, the evidence presented in this narrative review underscores the effectiveness of kiwi fruit in managing constipation. Its multifaceted benefits, including fiber content, enzymatic activity, and general gut health improvements, make kiwi fruit a compelling choice for individuals seeking natural and dietary-based interventions for constipation. Future research should continue to explore the long-term benefits and potential mechanisms of action, as well as the impact of kiwi fruit on different demographic groups to further solidify its role in gastrointestinal health.



### **Authors' Contributions:**

Conceptualization was done by Ewa Malaka and Paulina Bednarczyk; methodology by Patrycja Nowoświat; software by Michał Bado; checking by Maria Maślankiewicz, Michał Goncerz, Krzysztof Bilecki; formal analysis by Weronika Duda; investigation by Patrycja Nowoświat; resources by Michał Bado; data curation by Krzysztof Bilecki; writing - rough preparation by Paulina Bednarczyk; writing - review and editing by Paulina Bednarczyk and Ewa Malaka; visualization by Weronika Duda; supervision by Maria Maślankiewicz; project administration by Magdalena Muzyk; and receiving funding by Ewa Malaka

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

### **Acknowledgments**

Not applicable

### **Conflict of Interest Statement**

The authors report no conflict of interest

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