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A Review of the Effect of Synbiotic Foods on Reducing and Treating Constipation in Fasted People during the Month of Ramadan

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ABSTRACT

Background: Fasting during Ramadan is an obligatory duty for all Muslims in the world. One of the most common side effects of fasting is constipation if fasted people do not follow a proper diet. Therefore, the purpose of this study is to review the effect of synbiotic foods on reducing and treating constipation in fasted people during Ramadan. **Methods**: Search engines including PubMed, Scopus, Embase, Science Direct, Google scholar, Magiran, and scientific information database (SID) were applied with keywords such as Fasting, Synbiotics, Constipation, Ramadan, Digestive System, Probiotics and Prebiotics to find related articles published up to 2022. Finally, 45 articles were included in the review. **Results**: Synbiotics are actually oral supplements and a mixture of probiotics and prebiotics. The use of these compounds, in addition to reducing the complication of constipation, has other benefits that can be a step towards reducing the use of drugs and changing lifestyle not only this month but also at other times. **Conclusion:** The use of fiber-containing compounds, beneficial for the activity of the gastrointestinal tract, both microbial and to improve its peristalsis, is especially necessary in the elderly, whose peristalsis has decreased due to aging. The placement of synbiotic foods such as synbiotic dairy products will help to control this complication due to the presence of prebiotics and beneficial probiotics.

Keywords: *Fasting; Sinbiotics; Constipation; Ramadan*.

Introduction

One of the main actions of humans is swallowing and excreting. Food enters the large intestine from the small intestine, and excretion is done by the large intestine. The stool enters the rectum from the colon. There are two important muscles at the end of the rectum that stool must pass through to leave the body. These two muscles are the internal sphincter muscle and the external sphincter muscle. The internal sphincter muscle is involuntary. This muscle opens

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automatically and allows feces to pass through it (Arco *et al.*, 2022). When the feces enter the highest part of the anal canal, it is sensed by sensitive nerve cells. In this case, people who have a normal sensory system need to empty quickly. The external sphincter muscle is a voluntary muscle that you can control. In fact, this muscle keeps the stool in the rectum, so that the conditions for evacuation are achieved. Retention of stool repeatedly and many times causes nerve cells to become insensitive and constipation. Also, staying stool for a long time in the rectum and colon causes its water to be absorbed and the stool becomes hard. This is the reason for evacuation as soon as you feel a bowel movement (Scott *et al.*, 2021).

Constipation is a symptom that can mean different things to different people, but it usually means that a person is having trouble opening his bowels. It affects one in seven people, and the two groups of people most likely to become constipated are young women and the elderly, especially those who need to take regular medications (Ribeiro *et al.*, 2018). Constipation is a chronic disease that affects about 16% of the world's population. Research has shown that this complication is 2.3 times more common and symptomatic in women than men (Mugie *et al.*, 2011, Scott *et al.*, 2021). The disease seems to be related to age, diet, and lifestyle, and many health resources around the world are used to diagnose and treat it. However, common treatments in one-third of patients are unsatisfactory (Rantis *et al.*, 1997).

It should be noted that constipation is one of the factors that has a significant impact on the quality of life and health-related quality of life in these patients is less than normal people in society (Arco *et al.*, 2022, Chang, 2004). Due to its high prevalence, many resources are allocated to this disease. Among outpatient visits, constipation is one of the five most commonly diagnosed gastrointestinal problems diagnosed by physicians (Bharucha *et al.*, 2013) and imposes a high economic burden on the patient and the community, which is due to the chronicity of this disease (Mohaghegh Shalmani *et al.*, 2011).

Fasting during Ramadan is an obligatory duty for all adult Muslims in the world. One of the features of Ramadan compared to other months of the year is the restriction of food and beverage consumption. However, if a person's diet is changed in such a way that many essential nutrients are removed from the diet, several changes can be observed as a result (Ribeiro *et al.*, 2018).

Healthy eating is especially important in fasting. One of the most common complications at this time is constipation. This complication is more common in adults during fasting due to the reduction of peristalsis. It is recommended that these people change their diet and take dietary supplements instead of using laxatives (Tamadoni *et al.*, 2020).

In fact, starvation and low water intake lead to constipation. Reducing calorie intake and reducing physical activity also increase the risk of constipation. This problem is often seen due to changes in the pattern of meals and sleep during Ramadan, as well as irregularity and reduced peristalsis. People with constipation during Ramadan can largely cure this problem by having a proper nutritional pattern. The aim of this study is to review the effect of synbiotic foods on reducing and treating constipation in fasting people during Ramadan.

Materials and Methods

This review was extracted by searching the creditable databases, including PubMed, Scopus, Embase, Science Direct, Google scholar, Magiran, and scientific information database (SID) using keywords such as Fasting, Synbiotics, Constipation, Ramadan, Digestive System, Probiotics and Prebiotics from the published literature (English and Persian language). In this regard, a variety of studies including prospective cohort, retrospective, case-control, clinical guidelines, cross-sectional, and review articles were searched up to 2022.

The inclusion criteria consisted of articles that reported any possible correlation between

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symbiotic food and reducing and treating constipation. Search strategy yielded 242 publications; first, the abstracts were investigated and unrelated articles were excluded which resulted in 41 articles. Subsequently, the references of the publications yielded by the search were reviewed to identify additional relevant articles (4 articles), and a total of 45 articles were included in the review.

Results

Human digestive system

Perhaps until a decade ago, the general perception was that the gastrointestinal tract was the only place to absorb and digest food. However, research in recent years has revealed the fact that this unique system has many functions that are essential for human survival and health. Researchers have so far identified more than 500 species of beneficial and active microflora in the gastrointestinal tract (Harish K and Varghese T, 2006, Homayouni A *et al.*, 2018).

In addition to affecting intestinal tissue health, the intestinal flora plays other important roles, including modulating the immune system, drug metabolism, normal peristalsis, breaking down toxins and dietary carcinogens, making vitamins, and fermenting some non-food items. It is digestible, absorbs little electrolytes, grows and differentiates intestinal epithelial cells, prevents the implantation of pathogenic bacteria such as Escherichia coli and Clostridia in the intestine, and acts as an allergen for the host (Barrea L *et al.*, 2020, Capo *et al.*, 2019, Song MW *et al.*, 2021).

In general, intestinal bacteria are divided into beneficial, harmful, and neutral types for human health. Beneficial bacteria such as probiotics are inhibited by their growth and activity and prevent the multiplication of harmful bacteria. In addition, by synthesizing some essential substances for the body, such as vitamins and amino acids, they play an important role in maintaining good health. The use of probiotics as a supplement also has beneficial effects on the gastrointestinal health of patients. These microorganisms can help treat constipation by increasing peristalsis or reducing the passage of food through the gastrointestinal tract (Bonyadi *et al.*, 2014, Sharma *et al.*, 2014).

In general, the human intestinal microflora can be altered in three ways through the use of antibiotics, and the use of probiotics. For this reason, the use of foods or dietary supplements that increase the population of beneficial intestinal microflora will be very effective on a person's health (Ashaolu, 2020). It should be noted that in order to be healthy, the necessary balance between different types of gastrointestinal flora is essential and a change in diet can be one of the reasons for changing the gastrointestinal flora (Harish K and Varghese T, 2006, Homayouni A *et al.*, 2018).

Constipation

Constipation is one of the most common digestive problems in the world that occurs in all people, but is more common in the elderly (Eor *et al.*, 2019). Research has shown that the microbial flora in the gut changes during constipation. In the 7th century, a Japanese physician theorized that a proper microbial balance in the gut could prevent disease, and an imbalance of gut microbial flora could lead to a variety of diseases, including diarrhea, intestinal infection and radiotherapy, inflammation of the intestines and stomach, constipation, irritable bowel syndrome, Crohn's disease, inflammation of the colon, food allergies, and some cancers (Jaroszewska *et al.*, 2019).

The most common complaint of patients is constipation. According to available articles, constipation is the most common gastrointestinal problem in the United States, between 4% and 28%, and in Iran it is 1.4% to 37%, which is more of a symptom than a disease. This problem is more common in women and adults aged over 65 years (Ramos CI *et al.*, 2022). Clinical signs of constipation according to the Rome criteria protocol include defecation less than 3 times a week, straining during defecation, hard stools (in 25%), and feeling of lack of evacuation or insufficient evacuation. Many factors can affect the change of gastrointestinal flora and reduce peristalsis and, consequently, constipation, the most important of which are diseases and drug use,

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aging, dietary changes such as not consuming enough fluids and vegetables. For the treatment of constipation in most cases, the use of plenty of fluids and fiber, the use of laxatives, and toilet training are also recommended. Although these methods are useful in people without previous history, they do not guarantee the success of treatment (Botelho *et al.*, 2020).

Nutritional and non-pharmacological treatment for constipation includes the consumption of sufficient amounts of dietary fiber and fluids (da Silveira *et al.*, 2017). It should be noted that recent research has indicated the fact that fluid intake only increases the volume of urine and does not have a significant effect on increased peristalsis and fecal consistency. Moreover, although fiber intake is effective on intestinal microflora and fecal dilation, it does not provide significant results alone (Duron *et al.*, 2020). The administration of fiber supplements to the diet does not bring stool volume to normal, which has been confirmed in a study in 2% of patients with the administration of 5 g of fiber daily. However, fiber supplementation reduces the time of oral anal transit and increases the number of peristalsis by 2 to 3 times a week; however, in reported cases of severe constipation by patients, it did not cause a significant reduction. Fiber supplements are not very desirable due to side effects such as bloating, bad taste, and abdominal distension, especially in the first few weeks of use (Linsenmeyer *et al.*, 2022).

Conversely, in some patients, reducing fiber intake can be beneficial, for example, in the elderly or the elderly, sebum is not only ineffective, but also causes fecal incontinence in the second group (Ohkusa *et al.*, 2019). In a study of clinical trials performed on patients with constipation, bifidobacterium lactis, Lactobacillus casei, and Escherichia coli were found to have an effect on evacuation frequency and degree of fecal consistency in adults (Ohkusa *et al.*, 2019). In some studies, the positive role of some probiotic bacteria such as Lactobacillus has been proven in increasing peristalsis (Ohkusa *et al.*, 2019). In a study in Germany, the effects of probiotics on the treatment of constipation were studied, which had positive effects and results (Sanctuary *et al.*, 2019). In fact, probiotics can reduce the passage of food by stimulating peristalsis and help reduce and treat constipation. Therefore, in order to achieve the best option to reduce and treat constipation with the diet, researchers suggest the use of other treatment options, including live therapists, which is called probiotic therapy (Jafari *et al.*, 2021).

Probiotic bacteria and probiotic therapy

The word probiotic, meaning "for life," was first coined in the early twentieth century by Elie metchnikoff. According to the WHO/FAO definition, probiotics are living microorganisms that, if consumed enough, can have positive effects on the host. Probiotics generally contain some beneficial bacteria and fungi (Górska *et al.*, 2019).

Probiotic microorganisms are usually available as dry extracts in either dried or frozen forms that can be added to industrial and household food products (Huang and Hu, 2017). These microorganisms are consumed either as food supplements or as fermented or non-fermented food products (Tripathi and Giri, 2014).

A wide range of microorganisms are considered probiotics, but most of them fall into two categories including lactobacilli and bifidobacteria, both of which are naturally part of the beneficial flora of the gastrointestinal tract. In fact, it is called a probiotic product when it contains at least 107 live bacteria (Puebla-Barragan and Reid, 2019).

These microorganisms reduce some of diseases such as constipation by reducing the absorption of cholesterol in the intestine (Bubnov *et al.*, 2017), competing with pathogenic bacteria for nutrients and their binding sites, lowering the pH of the intestinal environment, etc. (Eslami *et al.*, 2019). The function of these organisms, in addition to beneficial effects on peristalsis, includes balancing blood pressure, preventing allergies, reducing diarrhea, and regulating and improving the function of the immune system (Zawistowska-Rojek and Tyski, 2018).

Their mechanism of action is such that by producing lactic acid and short-chain fatty acids, they reduce the pH of the colon, and as a result of

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this action, they increase the peristalsis in the stomach. Also, some probiotic species have the ability to convert bile salts to free bile, and thus increase the volume of water in the colon and are an effective factor in softening the stool and play an important role in improving excretion (Tang and Zhao, 2019).

Criteria for selecting probiotics include the ability to survive during processing and storage of the product, the ability to survive inside the intestinal tract, and a positive impact on the health of the host. Extensive therapeutic applications have been reported for probiotics, including prevention of urogenital diseases, osteoporosis and food allergies, reduction of constipation and control of inflammatory bowel disease, and protection against colon and bladder cancer (Chugh and Kamal-Eldin, 2020, Zawistowska-Rojek and Tyski, 2018). Probiotic therapy is a new science that has attracted the attention of many nutrition and medical researchers and has so far shown its effects on the treatment of inflammatory bowel disease and bacterial diarrhea as well as irritable bowel syndrome. However, limited studies have been conducted on this disease despite its prevalence (Afshar *et al.*, 2020).

Prebiotic food

Prebiotics contain substances that improve the activity and composition of microflora living in the intestinal environment and thus are effective in promoting the health of the host (Kehinde *et al.*, 2020). In fact, prebiotics are indigestible or poorly digestible oligosaccharides that selectively stimulate the growth or activity of probiotics once they reach the intestinal environment as a source of carbon or energy (Yan *et al.*, 2018). These compounds are mainly from carbohydrates such as dietary fiber, lactose, lactulose, oligosaccharides, starch and have properties such as resistance to intestinal environment, fermentability by intestinal microflora, beneficial effects on the host, and resistance to various food processes in industry (Kehinde *et al.*, 2020). The effect on intestinal microflora, strengthening the immune system, reducing inflammatory diseases and intestinal cancer, effect on fat metabolism, increasing mineral absorption, and lowering blood cholesterol are among the most important beneficial effects of these compounds (Ballan *et al.*, 2020).

Synbiotic food

Sybiotics are actually mixed supplements of probiotics and prebiotics that have beneficial effects by helping to grow and strengthen beneficial microorganisms in the host's digestive tract (García *et al.*, 2019, Yu *et al.*, 2017). In fact, the addition of prebiotics to synbiotic food increases the survival of probiotics and thus increases the shelf life of the food (Khodadad and Sabbaghian, 2010, Patel *et al.*, 2014). A variety of synbiotic food types are produced around the world, including ice-cream, yogurt, cheese, sour cream, powdered milk, kefir, komis, juices, meat products, sauerkraut, pickles and fermented soy products, and soy milk. Since these compounds increase probiotics, the effects of probiotics will increase (Szlufman and Shemesh, 2021).

Conclusion

Fasting is an important duty for all Muslims in the world. Due to the limited consumption of water and food at certain times, in order to maintain good health, it is necessary to have a suitable selection of food at the time of ‘Iftar’ and ‘suhoor’. Some people suffer from constipation due to not following a proper diet, which is much more necessary for these people if they have a previous background. The use of fiber-containing compounds, beneficial for the activity of the gastrointestinal tract, both microbial and to improve its peristalsis, is especially necessary in the elderly, whose peristalsis has decreased due to aging, but the placement of synbiotic foods such as synbiotic dairy products will help to control this complication these days due to the presence of dietary fiber (prebiotics) and beneficial microorganisms for the gastrointestinal tract (probiotics). Consumption of these beneficial foods is recommended to all people, not only during Ramadan, but also as a necessary change in the diet, which not only reduces and treats constipation, but also has various effects on a

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person's health.

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Authors' contributions

Marzban A and Shirdeli M were involved in designing and supervising the survey. Sadeghi-Nodoshan F and Marzban A were involved in designing the study, data collecting, and data analyzing. Shirdeli M and Yaghoubi F participated in writing the manuscript. All authors critically reviewed the manuscript and approved the final version submitted for publication.

Conflict of interest

The authors declare no conflict of interest.

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