MINI REVIEW

Role of dietary therapy in treatment of IBD

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ABSTRACT

Chronic, progressive, immune-mediated illnesses of the digestive tract are referred to as "Inflammatory Bowel Diseases" (IBDs). IBDs mostly fall into two subtypes: Chron's Disease (CD) and Ulcerative Colitis (UC). Although the exact cause of many disorders is yet unknown, genetic, environmental, and host-related variables all play a role in their development. In terms of managing symptoms, preventing relapses, and taking care of the pathology, recent evidence has demonstrated that food therapy is the cornerstone of IBD treatment. IBD patients demonstrate how nutrition, particularly dietary fibre, may influence the makeup of the microbiome.

These patients are lacking in micronutrients and are more susceptible than the general population to energy protein deficiency. There is now no known dietary component thought to be the cause of IBD, nor is there a known treatment diet for it. This review's objective is to assess how dietary fibres affect CD and UC and to aid medical practitioners in managing these diseases' nutritional needs. To better patients' psychosocial situations and quality of life and to advise the right amount and kind of fibre in the case of IBD, more research is required.

Key Words: *Inflammatory bowel disease; Dietary fibers; Nutrition*

INTRODUCTION

IBDs, or inflammatory bowel diseases, are immune-mediated intestinal disorders that are chronic, progressive, and have relapsing and remitting disease patterns. In addition to an elevated risk of complications such abdominal abscesses, fistulae, strictures and consequent bowel blockage, and Gastrointestinal (GI) cancer, they are linked to high morbidity, disability, and complication risk. The quality of life and everyday activities of patients are significantly impacted by these disorders, which also raises the expense of healthcare. In reality, it is estimated that 1.3 million persons in Europe are affected with IBD, with prevalence rates varying greatly between nations from 79.5 to 84.3 per 100.000 people between 1990 and 2007[1,2].

There are pharmacological and non-pharmacological ways to treat the symptoms of IBD. Aminosalicylates (5-ASA) are now used to treat IBD and can be used with steroids to produce and sustain remission. Mesalamine is the first-line treatment for mild to moderate CD, but sulfasalazine is best for keeping UC in remission. Hydrocortisone and prednisolone with glucocorticoid characteristics are the predominant therapy for IBDs. Prednisolone is the preferable steroid, which can be used temporarily to treat moderate and severe CD symptoms (0.75 mg/kg–1 mg/kg of body weight). Furthermore, azathioprine may be administered with a modest dosage of steroid; immune suppressants have actually been modified for the treatment of IBD [3-5].

50%-70% of patients benefit with thiopurines (azathioprine, 6-mercaptopurine, and methotrexate), although they are often only prescribed to individuals who are steroid resistant or dependent. Anti-TNF monotherapy, particularly in individuals with moderate-severe UC who have a poor response to or intolerance to conventional medication, is successful in sustaining remission.

The diet is also crucial in reducing the chance of developing inflammatory bowel disease, and a medication that can reduce inflammation is still the cornerstone of IBD car. A potential contributing factor to the rise in IBD is the expansion of the Western diet, which is high in fats, protein, simple carbohydrates, and low in fruits and vegetables.

In fact, food has an impact on intestinal inflammation through processes including the capacity to present antigens and the adjustment of the prostaglandin and microbiota balance (both of which are engaged in the inflammatory pattern). The risk of developing UC and CD is increased by a high intake of total fatty acids, Polyunsaturated Fatty Acids (PUFAs), particularly omega 6 fatty acids. Recent research suggests that nutrition may affect the onset of IBD, although few dietary guidelines are currently available. The American College of Gastroenterology (ACG) Practice Guidelines for CD and UC were published in the American Journal of Gastroenterology and include recommendations for frequent small meals or snacks every 3–4 hours, drinking enough fluids to prevent dehydration, consuming foods with probiotics and prebiotics added,

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and taking multivitamins. While in remission, patients can incorporate whole grains and a range of fruits and vegetables in their regular diet; nevertheless, it is advised to consume low-fiber meals when there are symptoms. Lean and white meat, fish, eggs, grains with less than 2 g of fibre per serving, low-fiber vegetables and fruits (such as lettuce, strained vegetable juice, fruit juice without pulp, ripe bananas or melons), less than eight teaspoons/day of oils, and drinking water or caffeine-free beverages are all recommended foods for IBD . Alcohol's impact on IBD is still debatable; some studies show that drinking alcohol can help prevent the development of UC, but this effect seems to be negated if drinking is combined with cigarette smoking [6].

Classification and functions of fibre

Dietary fibre has been defined in a variety of ways throughout the years, and there isn't just one approved definition at the moment. Although the word "fibre" was initially used in 1953, it has since undergone changes. Dietary fibre is defined as "the edible sections of plants or comparable carbohydrates that are resistant to digestion and absorption in the human small intestine, with complete or partial fermentation in the large intestine" by the American Association of Cereal Chemists (AACC). The term "fibre" was later defined by FAO/WHO specialists in 2007 as "non-digestible carbohydrates present in grains, seeds, vegetables, and fruit". This most recent definition is currently acknowledged globally [7-9].

Based on how well they dissolve in water, dietary fibres may be divided into two categories: insoluble (IDF) and soluble (SDF). IDFs have poor fermentability and are not soluble in water. This type of fibre, which is a structural element of cell walls, is mostly found in plants. It contains cellulose, hemicellulose that is insoluble in water, and lignin.

Large amounts of IDF may be found in wholemeal flour, wheat bran, brown rice, nuts, legumes, vegetables and their peels (including celery, cauliflower, and Brussels sprouts), and fruit. On the other hand, SDFs' key traits include their water solubility, capacity to create viscous solutions, and fermentability. They are made up of several oligosaccharides and polysaccharides that are not derived from wood, such as pectins, -glucans, and water-soluble gums. Whole grains (such as oats, barley, and wheat), legumes (such as lentils, split peas, guar seeds, pinto beans, black beans, red beans, chickpeas, and lima beans), some fruits and vegetables (such as apples, oranges, and carrots), and seeds (such as linseed and psyllium seeds) are excellent sources of this type of dietary fibre. To support proper digestive processes, the European Food Safety Authority (EFSA) advises healthy individuals to ingest a minimum of 25 g of fibre daily.

The American Heart Association Eating Plan advocates a diverse diet to assure intake of fibre from a range of sources. Without taking any supplements, the recommended daily intake of dietary fibre is 25 g to 30 g from food only. The Academy of Nutrition and Dietetics' viewpoint advocates getting enough fibre from a range of plant foods as general suggestions.

The effect of dietary fibers in IBD

Dietary fibres have drawn a lot of attention in the literature since 1978 as a potential treatment for IBD, but their function is uncertain and its results are inconsistent.

A diet high in fibre, vitamin D, and enough citrus fruit consumption is said to play a preventive effect in the case of IBD. In fact, a high diet of vegetables lowers the risk of UC, whereas a high intake of fibre and fruit is linked to a 73%-80% lowered risk of CD. It is crucial to emphasise that individuals with stricturing Crohn's disease should be mindful of their consumption of dietary fibre and fibrous foods for the symptomatic treatment of strictures. They may also require nutritional supplements either parenterally or enterally. There is conflicting data about the use of high-fiber diets in IBD, notwithstanding Anantakrishnan et al observation's that consuming at least 24.3 g of fibre per day (especially fibre derived from fruit) lowers the chance of developing Crohn's disease by 40% but not UC. They are clearly not advised during flare-ups, active disease states, fistulas, or strictures as of yet. With CD, a low-fiber diet should actually only be used temporarily and only under specific circumstances, such as acute relapses (with diarrhoea and cramps), intestinal stenosis, bacterial overgrowth of the small intestine, and following some sort of surgery. The importance of fermentable carbohydrates, commonly known as FODMAPs (oligosaccharides, disaccharides, monosaccharides, and fermentable polyols), in IBD should also be mentioned. Due to their memory of water and gas in the intestinal lumen being partly or entirely indigestible, FODMAPs exert an osmotic and fermentative activity. Irritable Bowel Syndrome (IBS), which is characterised by symptoms including stomach discomfort, meteorism, bloating, diarrhoea, or constipation, is often treated with a low-FODMAP diet [10]. While IBS-like intestinal symptoms are reported by around one-third of IBD patients without real gastrointestinal inflammation, it is common knowledge that these symptoms overlap.

Side effects of dietary fibers with a focus on IBD

As of now, the EFSA, The American Heart Association Eating Plan, and the Academy of Nutrition and Dietetics all recommend consuming the recommended daily amount of dietary fibre, although there is no tolerated maximum limit for total fibre consumption such as diarrhoea, bloating, intestinal obstruction, or constipation. Constipation can be brought on by inadequate hydration, decreased physical activity, and high fibre intake. Fiber is not properly digested or eliminated from the body, resulting in intestinal obstructions. In this instance, gut bacteria ferment these undigested fibres, which results in gas production and symptoms like bloating and flatulence.

Moreover, consuming a lot of fibre might slow down the rate at which some micronutrients are absorbed via the GI tract, particularly calcium and iron. This is caused by the chemical and physical properties of fibre, including their capacity for fermentation, bulking, binding, viscosity and gel formation, capacity for retaining water, and solubility , as well as the presence of specific chemicals such phytates, oxalates, and tannins. For IBD patients, who are already undernourished due to gastro-intestinal malabsorption and are further destabilised, this is a major problem.

Since they have lower levels of fermentative microbe activity than people with normal levels, IBD patients express intolerance to certain kinds of fibres .

The fibres are intact and indigestible without these microorganisms, which engage with host cell receptors to cause intestinal inflammation.

Gut Microbiota in IBD

In contrast to the microbiota of healthy people, IBD patients have

dysbiosis of the gut microbiota, which is characterised by enrichment of *Enterobacteriaceae* and a decreased *Firmicutes* and *Bacteroides* ratio. *Lachnospiraceae* and *Bacteroidetes* are decreased, whereas *Veillonellaceae, Fusobacteriaceae, Proteobacteria* (*Klebsiella pneumoniae* or *Enterobacteriaceae*), and *Actinobacteria* are increased. *K. pneumoniae* (Kp) strains were identified and colonised by Kp to cause gut inflammation in animal IBD models after Federici et al. shown that *K. pneumoniae* (Kp) strains are linked with IBD severity throughout. They were able to create a phage combination treatment in IBD mice that particularly reduced intestinal inflammation and the pathogenic Kp2 clade. Moreover, *Actinobacteria* are potentially pathogenic species that, under some circumstances, may create a significant number of toxins that trigger the activation of intestinal inflammation, which is what causes the beginning of symptoms of IBD. Firmicutes in particular, in CD.

In comparison to healthy individuals, *Clostridium leptum* and *Faecalibacterium prausnitzii* are decreased. *F. prausnitzii* has anti-inflammatory properties; in fact, it is one of the bacteria that produce butyrate, which helps to preserve mucosal integrity and lessen pathogen adherence and colonisation in the intestine. Prevotella, on the other hand, is up.

Diet controls and promotes the diversity, richness, and expansion of the gut microbiota. Through changing host-microbe interactions, food type, quality, and origin have an impact on the microbial population. In fact, the normal Western diet's low consumption of dietary fibre and high intake of fat and sugar may have an impact on the decline of some bacterial taxa. The modulation of the gut microbiota by dietary fibre is crucial for controlling the metabolism of macronutrients and the physiological circumstances of the host.

CONCLUSIONS

IBD can be effectively treated with diet, although no specific dietary element is thought to be the cause of the condition. Hence, it is important to encourage IBD patients to eat a diversified diet that satisfies their needs for energy and minerals, including dietary fibres. IBD patients typically ingest less fibre than healthy controls, according to the research. Studies have revealed that people with IBD are unlikely to have a healthy microbiome by fibre supplementation alone. Protein-energy deficiency is more common in IBD patients than in the general population. They struggle to put on weight, and those who have CD may be deficient in micronutrients including iron, vitamin B12, and vitamin D.

Many of these dietary issues significantly degrade patients' quality of life and have major psychological effects. In fact, the majority of IBD patients think that certain foods cause their condition to flare up, although there is no research to back up this idea.

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