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Studying the Effect of Probiotics on Liver Factors and Disease Recovery in People with Hepatitis (Review)

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Abstract

Context: There is a common connection between the liver and the intestine, which is the main factor in the health of both organs. The bacterial flora in the intestine plays a very important role in improving the functions of liver cells; any change in the number and type of these microorganisms causes significant disorders in the liver.

Methods: This study was conducted by searching for articles on various sites with keywords in Persian and English.

Results: The results of various studies showed that the use of combination treatments with probiotic bacteria can have good protective effects against liver diseases, including hepatitis. Preliminary studies and clinical trials have shown that probiotics can reduce liver damage and accelerate cell repair by reducing systemic inflammation, improving intestinal barrier function, and regulating the immune response. In various liver diseases such as nonalcoholic fatty liver disease and chronic hepatitis, the use of probiotics has had positive results. Liver biomarkers such as alanine aminotransferase (ALT) and aspartate aminotransferase (AST) are sensitive and reliable indicators of liver cell damage, whose levels increase during inflammation and injury. A faster decrease in these enzymes can indicate a quicker recovery of liver damage. Therefore, examining the effect of probiotics on changes in these biomarkers and also determining the time required for enzymes to return to normal levels can more accurately determine the role of this intervention.

Conclusions: In addition to helping to better understand the mechanisms of action of probiotics, the results of this study can provide valuable guidance for physicians in choosing adjuvant treatments and improving the quality of life of people with this disease. Finally, this study can play an important role in the development of health and medical policies at the national level and serve as a basis for future research in the field of the use of probiotics in viral liver diseases of patients.

Keywords: Probiotics, Biomarkers, Liver, Hepatitis

1. Context

Various extrinsic and intrinsic factors cause the destruction of liver cells, ultimately leading to liver disease. One of the most important factors is the change in the amount of bacteria in the intestinal tract, which is a high-risk factor for diabetes and obesity (1). The large intestine is home to 300 to 500 different species of microorganisms, and the digestive system is closely connected to the liver (2). Alcohol, viruses, drugs, and alcohol are the main causes of hepatitis. According to one study, 10^9 colony-forming units (CFU)/mL and 10^{12} CFU/mL of bacteria may be found in the ileum and terminal colon. The amount of gram-negative and anaerobic bacteria that predominate in the intestinal tract is 100 to 1000 times more than aerobic bacteria.

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The most common bacteria are *Porphyromonas*, *Bifidobacterium*, *Lactobacillus*, *Clostridium*, and *Escherichia coli* (3). Studies have also shown that the population pattern of microorganisms is unique to each individual and differs from others (4). In healthy individuals, the provision of certain nutrients is one of the activities associated with intestinal microorganisms (5). Intestinal bacteria play an important role in strengthening immunity against the entry of pathogens from outside. Probiotics are live, beneficial microorganisms that, when consumed in sufficient amounts by humans or animals, can have beneficial effects on the host's health by affecting the body's microbial flora (6, 7). Probiotics can modulate the host's immune response and prevent and treat diseases such as lactose intolerance, urogenital infections, gastrointestinal infections, allergies, antibiotic side effects, oral health issues including gum disease and halitosis, various cancers, and inflammatory bowel disease. Probiotics play a variety of roles in the body's health, but their most important function is maintaining the health of the gastrointestinal tract (8). Probiotics can be sold in the form of capsules, powders, tablets, fortified yogurts, cheeses, and milk. These probiotics are safe, and no apparent side effects have been observed among thousands of people who have consumed these products. Dairy foods can be a good carrier for delivering probiotics and prebiotics to the body (9). These organisms are also abundant in legumes, soybeans, and asparagus (10).

The word probiotic is derived from the Greek words "pro" (for) and "biot" (life). It was first used by Stillwell and Lilly in 1965 to refer to substances secreted by microorganisms. Parker used the word probiotic in 1974 to refer to microorganisms that contribute to the intestinal microbial balance, and in 1989, Fuller defined probiotics and stated that probiotics, as dietary supplements, exert beneficial effects on the host, thereby improving the balance of intestinal microbial flora. In 2002, a comprehensive definition of probiotics was given by WHO and FAO based on the fact that probiotics are live microorganisms that, when administered in adequate amounts, confer a beneficial effect on the growth of their host. For this reason, it can be said that these compounds are the opposite of antibiotics. Given that there are beneficial and harmful bacteria in every person's body and that a balance between beneficial and harmful bacteria is maintained in the body of a healthy person, many factors such as the use of antibiotics, chemotherapy, radiotherapy, environmental toxins, consumption of chlorinated water, and genetic factors can disrupt this balance and cause the destruction of beneficial microbes and the dominance of pathogenic microbes in the host body. Probiotic food products have attracted more attention than ever before due to their nutritional value in addition to their therapeutic and health-promoting effects (11, 12). Today, the benefits of using probiotics in controlling various diseases have been identified, but further research in this field seems necessary.

2. Methods

A systematic literature search was conducted in PubMed, Scopus, Embase, Cochrane, Web of Science, and Google Scholar databases based on keywords.

3. Results

Intestinal microorganisms affect digestion and host immunity. Intestinal microorganisms are closely related to the liver. In liver cirrhosis, beneficial microorganisms are reduced, and harmful microorganisms are increased (13-16). In a study investigating probiotic supplementation in liver cancer in men in southern China, a significant reduction in AFB-N7 concentrations was observed in the group receiving probiotics (17). In a study by Ma et al., oral treatment with probiotics significantly reduced NKT cells in insulin resistance and hepatic steatosis (18). Another study also showed a positive effect of probiotics in alcoholic steatohepatitis (19).

In another study, the effect of probiotics on serum alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels was investigated. In the study by Segawa et al., alcoholic liver injury was assessed by measuring the activity of ALT and AST in serum, and alcoholic fatty liver was assessed by the content of triglyceride (TG) and total cholesterol in the liver. Oral administration of L. brevis significantly prevented the increase in serum ALT and AST levels as well as the content of TG and total cholesterol in the liver caused by ethanol consumption (20).

A study investigated the effects of chronic alcohol consumption on gut flora and the potential therapeutic role of probiotics in alcohol-induced liver damage. In this study, patients received *Bifidobacterium bifidum* and *Lactobacillus plantarum* 8PA3 for 5 days versus standard treatment alone (abstinence plus vitamins). Results showed that ALT, AST, and γ-glutamyl transpeptidase (GGT) were significantly increased in the alcoholic group compared to the healthy control group (21). In a study investigating the effect of probiotics on biomarkers of liver cell damage and recovery time in a population of children with acute hepatitis A, the results showed that the gut microbiota profile of

patients with cirrhosis was very different from that of healthy individuals. This was demonstrated by a significant reduction in α-diversity and a decrease in the abundance of SCFA-producing bacteria, including *Firmicutes*, *Coprococcus*, and *Clostridium* IV. Pathogenic bacteria such as *Gammaproteobacteria*, *Villonella*, and *Bacillus* were significantly enriched in patients with cirrhosis (22).

4. Discussion

In the study by Zhdanovich and Martynov, which investigated the effect of probiotics in the treatment of acute hepatitis, a significant increase in the total number of bifidobacteria was observed in the main group after treatment. Additionally, in the main group of patients with AVHA, a significant increase in the total number of *E. coli* bacteria was observed after treatment (23). In today's society, long-term alcohol consumption worldwide increases the number of patients at risk of alcohol-related liver diseases. Since the available drugs to reduce liver disorders have significant side effects, probiotics are widely recommended for reducing liver diseases (24).

In a study by Xiong et al., the clinical efficacy of probiotics in the treatment of alcoholic liver disease was investigated. Probiotics reduced the inflammatory response of the liver and improved liver function (25). In another study that examined the effects of two probiotics, *Lacticaseibacillus casei* Grx12 and *Limosilatobacillus fermentum* Grx07, on liver mechanisms, the results showed that the amount of liver damage was reduced in this group (26). In a study by Li et al., probiotics and antibodies inhibited inflammatory activity and resolved fatty liver disease (27).

4.1. Conclusions

The results showed that probiotics had a very positive effect on the treatment of liver disease and enzymes.

Footnotes

Authors' Contribution: Study concept and design: B. H. and D. S.; Analysis and interpretation of data: H. T. and H. P.; Drafting of the manuscript: S. M.; Critical revision of the manuscript for important intellectual content: M. J.

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