



HEALTH ENHANCING EFFECTS OF PROBIOTICS: A REVIEW

Healthcare

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ABSTRACT

Nowadays it is a well established fact that there is a strong relationship between health and Diet. In the last two decades Probiotics have become immensely popular resultant, enormous scientific evidences in favor of their beneficial effects on human health. The importance of probiotics is momentous because of its commercial and clinical use. Probiotics helps in improving gut micro-flora, thereby plays an important role in improving Host's health. This magnificent relationship has attracted extensive research. Meticulously, Probiotics play a key role in defense mechanism. By modifying intestinal micro-flora, probiotics directly or indirectly manipulates the health of the Host by proving protection against harmful bacteria. Likewise Probiotics has influence on immune system, symptoms of Lactose Intolerance, stimulates toxin elimination and also have other beneficial effects that are related to gastrointestinal tract. In this work, health benefits provided to human being by probiotics are being reviewed and discussed.

KEYWORDS

Probiotics, Health Effects, Lacto Bacillus.

1. INTRODUCTION

In the late Nineteenth Century, microbiologists uncovered the micro-flora in gastrointestinal tracts of healthy individuals that varied from those found in infected individuals. This beneficial micro-flora was termed as "Probiotics" [1]. According to WHO, "Probiotics are live microorganisms, which when administered in adequate amount confer health benefits to the host" [2].

There are several well characterized beneficial microorganisms, consisting strains of Lactobacilli and Bifidobacteria are available for human consumption. The strains of *Pedococcus* and some other yeast are also beneficial, altogether they help to protect the host against dangerous microorganisms and improves the host's immune system [2][4].

The consumption of Probiotics improves the intestinal health by regulation of microbiota along with synthesizing and increasing the bioavailability of nutrients [2]. It activates the specific genes of localized cells and modulates the gastrointestinal hormone release and helps in regulating brain behavior by bidirectional signaling of neurons [6]. Probiotics have enormous prospective health attributes projected with the help of figure I: [2].

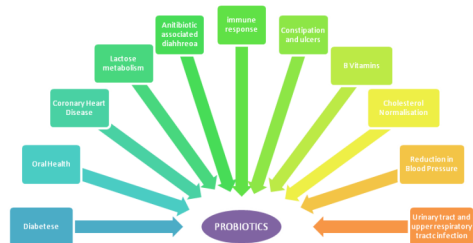


FIG I: Health Attribute of Probiotics

Although Probiotics have extensive potential in clinical and nutritional applications, substantial researches are required for the implementation of probiotics in human nutrition. The review is an attempt to emphasize on the possible biochemical and health enhancing effects of the probiotics.

2. Desirable Probiotic Properties

The paramount importance of a probiotic strain is to survive in the presumed active site and to endow with its beneficial effects; in addition, it should be tolerable by the immune system [2][5]. Probiotics should be safe, effective and stable. But this does not give the direction to select among several probiotic strains [7]. The certain desirable properties of probiotics which are being determined by in vitro tests, in order to attain the beneficial effects are [5]:

- It should not be allergic, carcinogenic and pathogenic
- It must be able to grow in, in - vivo conditions, to tolerate low pH and high concentration.
- For immune modulation, it must have adhesion to mucosal and epithelial surfaces.
- Antimicrobial actions against pathogens
- Bile salt hydrolase activity.
- Compatible with food manufacturing process.

3. Mechanism of Probiotics Activity

The main benefit of probiotics is their ability to maintain balance in between bacteria and pathogens, ensuring normal functioning of organisms [11]. Basically, the effect of probiotics varies in different strains [9]. The impact of probiotics is often depends on the mechanism by which they utilize their activity of colonization in human gut which results in improving immune system [10]. The numerous beneficial effects of probiotics involves following mechanism [11];

- Competition with pathogens to reduce their adhesion to surfaces [5][9][11].
- Inhibits the production of bacterial toxin [11].
- Modulate the immune system of the host [11].
- Antimicrobial activity by producing antimicrobial substance [5][9][11].

The mechanism of probiotic activity has been summaries below (figure II) [11].

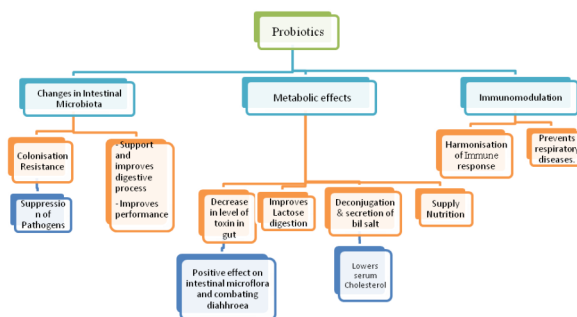


FIGURE II: Mechanism of Probiotics Activity [11]

4. Probiotics: Benefits for Human Health

The past decade has shown evidences in favor of the beneficial effects of the probiotics [3][5]. The need for alternate treatment to traditional therapies of gastrointestinal tract have led to use the knowledge on microbiocenosis and the benefits of probiotics [3][11]. There is a range of health benefits serve by these bacteria, including;

- i. Inhibits the growth of microorganisms in Gastrointestinal Tract [12].
- ii. Improves the gut microflora [13].
- iii. Helpful in treating inflammatory enteral conditions [11].
- iv. Improves lactose digestion [11].
- v. Helpful in Irritable Bowel Syndrome [11].

It is notable that, these benefits of probiotics are strain specific [3][5][11]. However, all proposed benefits cannot be provided by all the strains and even, strain of same species may be not be effective against above mentioned benefits [3].

Significance of Probiotics and its Potential Application

The potential properties and mechanism of probiotics which has proven to be beneficial in several diseases are discussed below:

5.1 Antibiotic Associated Diarrhea (AAD)

AAD is a common complication of most antibiotic therapy and clostridium difficile disease (CDD), the condition arises due to suppression of normal microflora. This may either lead to diarrhea without mucosal abnormality or pseudo membranous colitis. The latter is caused by clostridium difficile and is of severe form of AAD [5][11]. The treatment for these conditions is to either stop consuming antibiotic or the use of 'Vancomycin' or 'metronidazole therapy' [5]. Though, several studies have defined the positive effect of probiotics in treating AAD, others have also shown the contradiction [11][5]. A recent clinical trial evaluated various *Bacillus* strains and concluded, decreases in the incidence of AAD [23]. Whereas in another study, two type of yogurt; supplemented with strain of bifidobacterium and *L. acidophilus* and conventional yogurt for two groups was used, furnishing that, the consumption of either of the mentioned yogurt may help in reducing the incidence, duration and onset of AAD. To conclude the effects of several strains of probiotics may needs to be find-out more meticulously [24].

5.2 Allergy and Probiotics

A recent Meta analysis on pro/prebiotics for eczema prevention found that probiotic may reduce the incidence of eczema in the infants aged less than 2 years [31]. A recent study, using *L. Salivarius* and *B. Berve* for their immune-modulatory activity in asthmatic patients stated that, growth of several clinical pathogens were slightly inhibited and there was a decrease in the secretion of pro inflammatory cytokines [25]. Another study using *L. Berves* shows a remarkable reduction in the incidence of influenza [26]. Nevertheless there is still a major scope for further study in this field.

5.3 Diabetes and Probiotics

According to 8th edition of Diabetes atlas, 425 million people have diabetes worldwide. Southeast Asia accounts for 78 million people. Moreover these numbers are expected to be 629 million by 2045, if no steps will be taken [27]. The treatment of this disorder includes multiple medications but there is still no vital cure. Nonetheless there are studies, proving beneficial effects of probiotics in treating diabetes. A recent review examined several studies using various probiotic strains including *L. Planatarum*, *B. Animalis* subsp. *Lactis* and *L. acidophilus* concluded that strains were helpful in reducing the risk of HbA1C, Total cholesterol, methylation process and increases HDL level [11]. Furthermore, the studies of dynamic nature must be included to verify the exact effects of probiotics in this field.

5.4 Lactose Intolerance

Lactose intolerance is beta-galactosidase deficiency resulting in the inability to breakdown the lactose into the monosaccharide [5]. The lactose which has not been hydrolyzed is osmotic active and along with its metabolites it creates the osmotic pressure into the colon which develops symptoms of diarrhea [28]. Therefore, the assumptions can be made that modulating the environment of colonic microbiota may influence lactose intolerance [29]. A recent study using conventional yogurt and yogurt enriched with *B. Anamalis* concluded that supplementation alters the amount and activity of the colonic microbiota and alleviates the symptoms of lactose intolerance [29]. Although there are studies, which states that yogurt supplemented with *S. Thermophilus* and *L. Delbrueckii* ssp. *Bulgaricus* are more effective in improving Lactose metabolism [5]. Therefore the positive response of the probiotic supplementation to improve Lactose Metabolism may consider as a therapeutic alternative [5].

5.5 Irritable Bowel Syndrome (IBS)

The most common gastrointestinal disorder is IBS. It is characterized by abdominal pain, release of gases and altered bowel habits. *Lactobacillus* and *Bifidobacterium* are the most discovered microorganisms with respect to IBS. Several systematic reviews and meta-analysis shows a drift towards an improvement of symptoms with *L. Casei* Shirota (inhibited the growth of *Helicobacter Pylori*), *S. Cerevisiae* (reduces the incidence of Diarrhea) and *B. Lactis* (inhibitory effects against *Helicobacter pylori*). As studies suggested that probiotics are safe to consume for their beneficial effects in IBS, these are ideal supplement to IBS therapy [30].

5.6 OBESITY AND PROBIOTICS

Obesity is a growing epidemic and leads to undesirable metabolic effects [33][35]. According to WHO data "The prevalence of obesity has nearly tripled since 1975. In 2016, 1.9 Billion adults, 18 years and older, were found overweight. Of these over 650 Million were obese". [35]. Obesity has its adverse effects and is a major risk factor for Cardiovascular diseases, type 2 diabetes and increased BMI [33].

Intestinal micro flora gets highly influenced by obesity and is one of the important risk factor. It has a major role to play as metabolic doorway between the host and the environment and may become an important treatment alternative for obesity. A recent review, found that only *Lactobacillus Rhamnosus* GGMCC is effective for weight loss in human beings [33]. Another review and meta- analysis concluded, various studies using several strain of *Lactobacillus* and *Bifidobacterium* showed significant reduce in body weight, BMI and fat percentage [34]. Taking into account the all available data and studies on the concept of treatment of the gut micro biota to alleviate obesity has grown with considerable interest these days. However, more substantiation studies are required to verify beneficial effects of Probiotics in treating Obesity.

5.7 Oral Health and Probiotics

There are several aspects supporting the idea of having variety of bacteria that could be beneficial in prevention of oral diseases [37]. A recent review affirmed that most of the clinical trials for oral disease have used strains of *Lactobacillus* and *Bifidobacterium*. Though, the mechanism of activity of probiotics is not clearly established but they are associated with reduced CFU counts of carcinogenic pathogens and restrained periodontal pathogens. There are several studies recommends that probiotic *Lactobacilli* or *Bifidobacterium* can reduce the number of mutans streptococci in saliva [37]. Whereas, another review stated the use of *Lactococcus*, *Pedococcus*, *Bacillus* and *Yeast* have beneficial effects in oral health [38].

6. CONCLUSION

The growing attention of both biochemical and health benefits of probiotics are highlighted in this work. The scientific evidences are supporting the integration of probiotics in nutrition to improve the health of organisms. There are adequate evidences stating the prevention and treatment of certain conditions. However there are studies which make it controversial too. On the other hand, the most proven effects of probiotics summarized herein includes; the stimulation of gut microflora of the host, prevention of the colonization of pathogens and improving the gastrointestinal environment. To conclude, the development of the fact that probiotics for human consumption in several disorder are still in its infancy, further controlled human researches are needed to determine the accurate dosage and mechanism of probiotics in improving human health.

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