



## Role of prebiotic and probiotic in gastrointestinal Disease

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**Abstract:** The human gastrointestinal tract is colonized by a complex ecosystem of microorganisms. Intestinal bacteria are not only commensal, but they also undergo a symbiotic co-evolution along with their host. Beneficial intestinal bacteria have numerous and important functions, e.g., they produce various nutrients for their host. Prevent infections caused by intestinal pathogens, and modulate a normal immunological response. Therefore, modification of the intestinal microbiota in order to achieve, restore, and maintain favorable balance in the ecosystem, and the activity of microorganisms present in the gastrointestinal tract is necessary for the improved health condition of the host. The introduction of probiotics, prebiotics, or syn-biotics into human diet, favorable for the intestinal microbiota. They may be consumed in the form of raw vegetables and fruit, fermented pickles, or dairy products. Another source may be pharmaceutical formulas and functional food. This paper provides a review of available information and summarises the current knowledge on the effects of probiotics, prebiotics, and synbiotics on human health. The mechanism of beneficial action of those substances is discussed, and verified study results proving their efficacy in human nutrition are presented. Prebiotics may be used as an alternative to .The probiotics or as an additional support for them .different prebiotics will restoring the growth of different indigenous gut bacteria.

**Keywords:** prebiotics, probiotics, gut inflammation, Functional food,

### Introduction:-

Prebiotic are as a non-digestible food Products that the host by affects the particularly restoring the growth of limited number of bacteria in the Colon. The term is more overlaps with the definition of or less dietary fiber with the particularly exception of certain species. Probiotics are used of a treatment for several medical conditions, allergic disease. Bacterial vaginosis, infections of prevention. Of dental caries of respiratory infections probiotics are the used for treatment for a variety shown by gastrointestinal of disease. The Particular way show by bifid bacteria which may supported by the ingestion of substances. I.e., fructooligosaccharides & insulin trans galactosylated oligosaccharides & Soyabean oligo Saccharides. A viable defined in Containing micro-organism in exact numbers, alter the micro flora in a Compartment of the host & by the exact beneficial health effect in this host. The need to include product in addition to the microorganisms.

The requirement of sufficient microbial number to apply .preferences for the phrase alteration of the micro flora because the optional properties. Of the indigenous microflora were not defined until now the evidence of benefit Can be exhibit only by health effect ..The term Prebiotic (for life Probiotic word greek are Come it means most probably in 1954 in entitled Anti-und Comparing his article Probiotic the harmful effect of of other antibacterial antibiotics of other agents on the intestinal microbiota with the beneficial effects. The positive effect of Probiotic gastrointestinal diseases e.d. Gastrointestinal disorder elimination of Helicobacter inflammatory bowel disease, diarrhoeas & allergic disease imitable disease, bowel syndrome, The effectiveness of Probiotics for treatment of diseases such. As obesity insulin resistance syndrome , type 2 diabetes; and non-alcoholic fatty liver disease. The use of probiotic in different cancer The prebiotic may be used up an alternative to probiotics or & the additional support for them.

The Different Prebiotic will stimulate the growth of different late indigenous gut bacteria There are many reports effects of Prebiotic on human health High potential is attributed to the Simultaneous use of Probiotics & Prebiotics.

The Purpose of nation is the this type of combi improvement of Survival of probiotic microorganism in the gastrointestinal tract. Different Prebiotics will stimulant to the growth of the multiple indigenous gut bacteria . The development of the prebiotic intended for the benefit for human health became the to take the different types of species that may result fruit, vegetables, cereals, of other edible plants are Source of carbohydrate constituting Potential Prebiotics. For example potential Sources tomatoes, artichokes, bananas, asparagus, garlic. Onions green vegetables chicory, legumes linseed, barley and wheat.

### History:-

The term Prebiotic was invented by Gibson & Roberfroid who proposed for pre-exchanged which means after •Probiotics have been used therapeutically for many centuries in different between to longevity & digestive health .

Parts of the world for their count but to of digestive health.

The first person of western medicine publish on the topic of probiotics to in the early 20th century was the Russian Nobel Prize winner by Metchnikoff, when he described longevity in people in eastern Europe who lived largely on milk fermented by LAB.

He theoretically that proteolytic microbes in the colon Produced toxic substances responsible for the colon produced toxic substances responsible for the aging Proceed f Proposed that Consumption of fermented milk. Would coat the Calon with LABS decreasing intertinal ph, suppressing proteolyte bacteria & leading to slowing of the ageing process medchnikoff & his followers ingested. Milk fermentation with this. Bulgarian Bacillus of reported health benefits. Researchers & Clinicians have studied of used Probiotics in a variety of medical Conditions in the last decade, over 5000 articles were Published in the medical literature. This review. Will examine the evidence for and against Probiotics in the management of a broad range of gastrointestinal disease and probiotics have gained tremendous Popularity in recent years among both industry and individuals Searching for natural' means to Promote health, In 2008, nearly \$16 billion were spent globally for these products that the supplementation of diet with lactic acid bacteria can early Probiotic intervention.

Different gastrointestinal Disease:-

The Probiotic in gastrointestinal diseases

Prevention of acute diarrhea

The Probiotics are prevented in acute diarrhea. This analysis included 34 ran damaged Prevented. Placebo-Controlled trials evaluating the effects of probiotics. In various diarrheas states, including antibiotic associated diarrheas (n=10). And travelers diarrheas (n=6) and other acute diarrhea (n=9) The most of the Studies evaluated Lactobacilli Species most commonly Lactobacillus Lactobacillus bulgaricus (n=7) boulardii (n=5) Twelve trials & were in children (18years), and 21 trials were in adults (18 year). All of 28 of the trials as yielding Protective Point estimate of which 10 attained statistical significance and 6 trials had statistically significant non protective point estimates.

When all of the studied about diarrhea with probiotics were associated with a 35%.Reduction in the risk for diarrhea, with substantial heterogeneity .

HIV infection

∴ Longitudinally transonission of in HIV is in exesed 3 fold in HIV-Positive women with bacterial vaginosis.

Probiotic are thought to favorably in fluce the disturbed vaginal microbiota and different therapeutic repects .

I.e. Probiotics could have Indirect impact on child hood HIV infection. It is intercepting to note that the natural prebiotic, human milk oligosaccharides have shown to competitively interact HIV Per receptor binding Site in vitro.

Stomach:-

The Probiotic arrive in the stomach. Where they are exposed to the acidic environment most gastric fluid. The acidic is extremely lethal to bacteria, especially to bacteria non-resistant to acig Sub- which of bacterial cause the this reduction cytoplasmic ph. The influx of hydrogen ions (H<sup>+</sup>) leads to a decrease in activity of glycolytic enzymes, which further affects the f-fo-A-Ta Page Proton Pump. The reduction of Atapase Proton pump activity in low PH is responsible for the survival of Probiotics. The other adverse Condition present in the including ionic stomach strength enzyme activity of mechanical churning have been shown on to have an impact viability of Probiotic.

Small intestine:-

The Probiotic bacteria will reach small intestine where abundant Pancreatic juice& bile are Present The PH in the Small intestine is about G-0-7.0<sub>2</sub> bile acids & digestive enzymes can also impact probiotic viability through cell membrane.

Disruption and DNA damage. The in vitro studies have demonstrated that the viability of Lactobacillus salivarius. List f pediococcus pentosaceup lios is reduced in stimulated intestinal fluid.

Colon:-

The probiotic will encounter Colounization resistance from commensal bacteria. The probiotic must Compete with the host microbiota for nutrient and site of the colonize.

The probiotic excreted out of the Colon.

Prebiotics & Gut Immunity:-

Prebiotics is applicable to the selectively the fermented food Components. Although much of focupes digestible oligosaccharides most dietary fibers that tire fermentable carbohydrates. Fiber carbohydrates including cellulose, pectin, gums, beta glucan, & lignin. Are not digested in the upper gastrointestinal tract because the host does not have the enzymatic capability to degrade these carbohydrates.

Probiotics of Out Immunity: -

The metchnikoff proposed that "good" bacteria lactic acid - producing were beneficial to. The host by reducing the growth & thus the toxic Product of other bacteria within the Colon. Promoting the homeostasis cheacths in the host He invented Bacillus bulgaricus and Promoted its use as a therapy to maintain homeostasis health in the host. He invented Backing bulgaricus & prevent aging therepy Popularizing yogurt which formed the foundation for prebiotic .

Treatment of infectious diarrhea:-

The efficacy of Probiotics in the treatment of infectious diarrhea has also been assessed in a meta-analysis. A total 63 studies were included in the analysis of there so recruited infunti young children.

The Probiotics reduced the diarrhea in 24.76h.

Use of Prebiotics and Probiotic gastrointestinal diseases :-

Probiotics have intestinal barrier, immunologic antibacterial and motility. And sensation effects that may contribute to their efficacy in various indications, probiotics shown by the effects in intestinal mucosa numerous ways They appear to have direct

effects on the epithelial barrier, Separation of goblet cells including increasing mucin expression/secretion by goblet cells. Have enhancing the tight junction Stability limiting bacterial movement across mucous layer.

The Production of antimicrobial Peptides, including B-defensing; Probiotics influence mucosal immunity by increasing level of Iga-producing cells in the lamina propria and Promoting secretion of secretory I9. A into the luminal mucus layers activities that limit epithelial Colonization by bacteria. Probiotic have the Potential to have a direct antimicrobial effect. In Probiotics have the Some species Potential directly kill or increase the growth of pathogenic bacteria.

The use of the Probiotic in the reducing the severity and duration of acute infections, diarrhea in children, preventing the growth antibiotic. Different. Diarrhea, managing hepatic encephalopathy remission in patients with ulcerative colitis diarrhea, evening encephalopathy, initial attack of Pouchitis, maintaining remission. The symptoms related recolites.

Use of Prebiotics in range of gastrointestinal & non gastrointestinal conditions, treatment of infectious diarrhea in adult and children, prevention of antibiotic associated diarrhea to treatment prevention of difficile diarrhea.

Prebiotics may be used as an alternative to probiotics or as an additional support for them. However different prebiotics will stimulate the growth of different indigenous gut bacteria.

#### Liver Disease

There is no question that prebiotics and probiotics are extremely helpful in the treatment of hepatic encephalopathy. Now nonalcoholic fatty liver disease (NAFLD) can be added to the list of uses in liver disease.

Studies of the microbiota reveal definite dysbiosis in subjects with chronic liver disease. Bacterial overgrowth, bacterial translocation, and dysmotility are other mechanisms that have been observed in cirrhosis.

However, the most commonly used and effective treatment of hepatic encephalopathy has been the prebiotic lactulose. The limiting factor in its use is the production of diarrhea. It also is effective as a symbiotic in use with probiotics.

The simplest use of probiotics in patients with liver disease has been the use of yogurt for the treatment of mild hepatic encephalopathy. With the yogurt study, which contained *Lactobacillus bogaritus* and *Thiobacillus thermophilus*, the subjects on the yogurt did not develop any symptoms. In another study where symbiotics a prebiotic and a probiotic were used, the symbiotic was subsequently effective compared with other forms of therapy.

In numerous studies, lactulose combined with a probiotic has been most effective in decreasing neuropsychiatric symptoms of encephalopathy. The limiting factor of lactulose use is the development of diarrhea and abdominal cramps. In a random controlled trial, the use of VSL#3 over an extended period was effective therapy for hepatic encephalopathy.

The patients on VSL#3 and probiotic-treated patients developed fewer symptoms. From the references cited, it is clear that the clinician must choose the therapy wanted: either a simple prebiotic if tolerated or a symbiotic.

There are many therapeutic choices available in treating mild to severe hepatic encephalopathy, and it is the clinician's choice depending on the clinical situation.

It also is apparent that symbiotics or probiotics can be helpful to prevent infectious complications in patients after liver transplantation. This has been shown in a prospective randomized study.

In a meta-analysis, it was confirmed. Therefore, it would seem that probiotics should be used in all liver transplant patients. During the past decade, it has become clear that probiotics are effective in treating NAFLD, first in pediatric reports and more recently in adults. The biochemical studies have shown that it is related to choline deficiency.

There are now numerous studies that have shown a variety of probiotics are effective in controlling the course of NAFLD. In the studies reported, all combinations of probiotics have been effective, including VSL#3, *Lactobacillus bulgaris*, and *Streptococcus thermophilus*, a combination of *L. plantarum*, *Bifidobacteria longum*, and *L. rhamnonus*.

The clinician has to pick his or her choice and follow the references carefully. This is an excellent good turn in the use of probiotics, and it should be used by clinicians treating NAFLD.

The author has listed the main uses of probiotics, probiotics, and symbiotics, which are supported by meta-analysis in gastrointestinal disease, but there are many uses with less literature support that are certainly going to come forth, such as their use in obesity, rare autoimmune disease, and bee-sting desensitization, to balance the microbiota and effect stress.

#### Hospital-acquired Diarrhea

Hospital-acquired diarrheas are common, and rotavirus is probably the most common cause. There have been some attempts to prevent hospital-acquired diarrhea, and the only reported successful one is with LGG Supplementation with *Bifidobacteria* to hospitalized infants has prevented the incidence of diarrhea and hospital acquired diseases.

The beneficial effect of *Bifidobacteria breve* strain occult has been recorded in immunocompromised children on chemotherapy to cure infections and increased anaerobes. Of all of the available literature, there seems to be 2 references that can be used for the use of probiotics in children with infections.

#### Antibiotic-associated Diarrhea and *Clostridium difficile*-associated Diarrhea

A great number of random controlled trials have been performed, and there are many meta-analyses conducted on the efficacy of probiotics in preventing antibiotic associated diarrhea (AAD) and *Clostridium difficile*-associated diarrhea (CDAD).

These studies have been performed in adults and children. Analysis shows that the risk of CDAD is reduced by 64%. It included 23 random controlled trials with 4213 patients studied in both adults and children. The analyses reveal that either LGG effective.

## Fecal Microbial Transplant

Severe or refractory CDAD has been successfully treated by fecal microbial transplant (FMT), which is described in detail. Early reports from Europe and later confirming reports in the United States lead to wide acceptance that FMT can be curative of refractory *C. difficile* diarrhea. There are now guidelines for the treatment of refractory *C. difficile* diarrhea and long-term studies documenting its long-term effectiveness.

Although there were high hopes that FMT would be helpful in other diseases such as IBD, it is not been proven effective yet for the treatment of ulcerative colitis or Crohn disease. Since the guidelines have been written, there has been important technique advances.

There is now evidence that FMT can be performed with fresh frozen volunteer specimens. This technique is early in its development, but should be proven very helpful when the frozen specimens are appropriately marketed.

Although it is disappointing that FMT has not proven to help in IBD, one can expect future research will show areas in which it can be effective.

## Acute Infectious Diarrhea

In most cases, especially in children, the onset of diarrhea is due to an episode of infectious gastroenteritis. It is generally defined as a decrease in the consistency of stool to loose or liquid and an increase in the frequency of evacuations, which are more than 3 in 24 hours.<sup>55</sup> Johnston and his group<sup>56</sup> showed that there was great variation in the data collection in acute diarrhea.

The choice of treatment varies, but Guandalini<sup>58</sup> and an expert panel reviewed the recent data up to 2015, and it was thought that *Lactobacillus GG* (LGG) is the best treatment for acute gastroenteritis diarrhea and that it saves at least 1 day of sickness.

The question of treatment, therefore, varies with the use of a probiotic, but it also raises the question of prevention in healthy adults and children. Most prevention studies have been performed with probiotic strains related to milk-based feedings.

These initial studies demonstrated a definite reduction in the incidence of severity of acute disease. However, studies question the data. *Lactobacillus reuteri* DSM 17938 has been shown to be effective in a careful study, but there were few others to follow this even though the investigators claim it was cost-saving.

Nevertheless, the American Academy of Pediatrics considered probiotics beneficial for use in special circumstances, such as in long-term health care facilities.

## Conclusions

It is still early days for probiotics, but they offer the potential to modify the gut microbial balance in such a way as to bring direct health benefits cheaply and safely. We discussed various unfavourable conditions which influence the viability and muco adhesion of probiotics during GI transit. Colonization of probiotics on the mucus layer could be achieved when adhesive proteins from each side bind together, on the premise of overcoming the colonization resistance. Thus, the

Characteristics and functions of different proteins were specifically reviewed. However, most of current research on Mucoadhesion-related molecules of probiotics are limited to lactic acid bacteria. Adhesive proteins and muco adhesion mechanisms of probiotics such as *Bifidobacterium*, *Enterococcus*, *Pediococcus* are still waiting for exploring. Besides, how probiotics communicate with commensal bacteria and some are successfully introduced to gut microbiota is also of great interest. Understanding these factors will facilitate the employment of effective delivery strategies designed for probiotics to overcome colonization resistance and achieve health benefits.



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