Galacto-Oligosaccharides: A Promising Functional Prebiotic

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In the contemporary environment, translational research in the life sciences has grown in importance and interest. It has gained momentum over the past decade as a result of increased investment in studies focused on the advantages to human health. In recent years, probiotics and prebiotics are the major areas which have drawn more and more attention from the scientific, medical, and public sectors. The gastrointestinal (GI) system involves stomach, intestines, and colon which is known as the gut. It breaks down and absorbs nutrients from food and also eliminates waste. The health of gastrointestinal system impact both physical and mental health of a human body. Probiotics and prebiotics are the major areas which has a direct impact over the homeostasis of human gut health. Probiotics have long been used to improve the digestive function**.** However, from the last two decades, it is in forefront in the field of health and wellness as a result of the advances made in this field. The interest in probiotics has grown enormously in view of their multiple health promoting physiological functions. Many of the scientific evidences have also now revealed their mode of action and beneficial effects in GI tract, effectiveness and relevancy. Lactobacilli and bifidobacteria are frequently the focus of dietary interventions because they are documented mainly to provide health benefits. Prebiotics are mainly plant fibers known to aid in the growth of beneficial bacteria in your digestive system. Your digestive system functions better as a result. The beneficial bacteria in your stomach get their nourishment from prebiotics. They're indigestible carbohydrates for your body. They then travel to your lower digestive tract, where they feed the good bacteria by acting as sustenance. They have the ability to make the gut work better (Mei *et al*., 2022).

Prebiotics: The gut booster

Both probiotics and prebiotics are good for the GI system but they act in different ways through distinct mechanisms. Probiotics involve live beneficial yeast and bacteria that act beneficially towards better health. Prebiotics are the source of nourishment to the beneficial probiotic bacteria. So prebiotics can be defined as non-viable, non-digestible dietary element which is metabolised specifically by good gut bacteria. They have the ability to feed intestinal microbiota and in turn the breakdown products majorly short chain fatty acids which have health promoting characteristics and it get released in the bloodstream thereby acting not only at the place where it is produced but also impart biofunctional effect at other distant organs (Maathuis *et al*., 2012). Galactooligosaccharides, fructooligosaccharides, oligofructose, chicory fiber, inulin etc are the prebiotics in dietary supplement form.

Galacto-oligosaccharides

Galacto-oligosaccharides (GOS) are prebiotics made up of plant sugars linked in chains (Iqbal *et al*., 2023). GOS are indigestible dietary component that can pass through the upper gastrointestinal tract largely undigested and get fermented in the colon producing short-chain fatty acids (SCFAs) which help to further control the intestinal flora of the body. GOS are oligosaccharides which are a class of oligomeric saccharides composed of 2–10 identical or different monosaccharides linked by glycosidic bonds to form straight or branched chains and are formed by the β-galactosidase transgalactosylation.

Health benefits

Functional oligosaccharides mainly galacto-oligosaccharides cannot be digested and absorbed by the body, will directly enter the intestinal tract and get utilized by Bifidobacteria (Richards *et al*., 2020). Galacto-oligosaccharides helps in absorbing calcium, and also change the rate at which foods cause spikes in blood sugar thereby reducing the glycemic index. The oligosaccharides get the foods ferment faster, so they spend less time in the digestive system which helps in a greater extend to not get constipated and also increase bowel mass and promote growth of beneficial bacteria. It is also observed that GOS helps

in keeping the epithelial cells properly line the GI system, efficient colonic epithelial cell proliferation and differentiation to keep the gut healthy. GOS can attach to bacterial binding sites on the surface of enterocytes, which inhibits the adherence of pathogenic microbes thereby shows antibacterial effect. An increase in the concentration of calcium ions alongwith increasing passive calcium absorption is reported to have influenced in increased mineral absorption. Due to its difficult conversion to fat and cholesterol, GOS has been shown to enhance lipid metabolism, lower serum total cholesterol, raise serum high-density lipoprotein levels, and successfully prevent and treat hypertension and hyperlipidemia.

Conclusions

Inclusion of prebiotics to the diet has been shown to be a better way to keep the gut flora balanced and GOS is recognized as a natural ingredient with prebiotic properties which is marketed as a mixture of galactosyl oligosaccharides with different degrees of polymerization and configurations. Effects of prebiotics (GOS), especially on infant growth and nutritional development of humans are well documented. Although prebiotics are beneficial there are certain worse symptoms associated with it like bloating, constipation, diarrhea, gas formation etc have been observed in certain cases, but optimization of the concentration of prebiotics and selection of proper inclusion methods in food matrix will greatly help in combating this situation. Due to the key role of GOS in the functional food field, screening for β-galactosidase with transgalactosylation will undoubtedly attract great attention for researchers.

References

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