**A Comprehensive Review on Probiotics and its Significance**

**Sakshi Gupta1, Shanker Suwan Singh2, Raveena Chaudahry1**

**1Research Scholar, SHUATS, Prayagraj; 2Assistant Professor, Dairy Engineering, SHUATS, Prayagraj**

***Abstract:* Probiotics** are one of the most popular super supplements on the market today. They contain live bacteria and yeasts that do wonders to human health when consumed in adequate amount. Bacteria are usually thought as harmful or dangerous, but the truth is our body is full of both good and bad bacteria. Probiotics are the good bacteria and our body needs them. This review aims to provide an overview of probiotics, the gut health benefits, their role in immune system and disease prevention. Furthermore, current trends in the development of probiotic products also discussed. Overall, this review aims at better understanding of probiotics and their significance as emerging functional foods.

**Keywords: Probiotics, supplements, good bacteria, gut health**, **functional food**.

**Introduction**

Probiotic bacteria are found in the digestive intestinal tract. There are around more than 400 different types of bacteria that reside in the human intestinal tract. Our Probiotic Complex ensures that the levels of healthy bacteria are maintained leaving us feeling healthy, well, and strong. There is increasing interest concerning probiotics from the public, researchers, governmental organizations **(such as the WHO/FAO, 2002)** and medicinal and food companies.

**Features of Probiotic Products:**

* Supports a settled healthy stomach
* Give our body a boost of good bacteria
* Provides overall well-being and good health
* Contains no milk, lactose, wheat or gluten and soy

Probiotics means “let the good microbes from different fields get their benefits and take a rest”. The work include, digestion of food, production of useful products to destroy the bad microbes, to maintain the digestive system’s pH, and complement the functions of the missed digestive enzymes (because of missed or defective genes), and so on. Probiotics will augment the efficiency of our biological fermenters, the digestive system.

**Probiotics are very beneficial to overall health, but they are especially good for the digestive system.** Probiotics may help replenish the good bacteria in the gut after taking medication such as antibiotics, and they may also help lower the amount of bad bacteria, which can cause infections. So, it became clear that human intestinal micro-flora performs metabolic functions, such as fermenting dietary residues that are indigestible and endogenous mucus, saves energy, absorption of ions and production of vitamin K. Probiotics play roles in the development and the homeostasis of the immune system, and epithelial cell proliferation and differentiation **(Cammarota et al., 2009).** Probiotics are not an invention but it existed in our traditional foods from olden times such as yogurt, beverages, salty fishes, and different types of cheese and so on **(Amara el al., 2012).** Such food complex contains different types of useful bacteria. The first real use of food containing Probiotics might be the fermented milk **(Hosono, 1992).** Later this fermented milk is converted into cheese, yogurt and so on **(Metchnikoff el al., 1910; Metchnikoff, 2004 and Amara et al., 2012).**

In olden times, people include food containing Probiotics in their daily diet **(Amara el al., 2012).** However, when our intestinal microflora has been affected critically due to any reasons, Probiotics should be given in large dosage in the form of tablets or in any other suitable forms **(Reid et al., 2003).** A healthy intestine maintains a considerable balance of bacteria such as lactobacilli, clostridia, streptococci and coliform. Conditions could change the balance of our intestinal flora such as stress, high fat diets, excessive alcohol use, meat, inadequate food, sugar, chlorine and fluoride in drinking water, genetic disorders, antibiotics, exposure to environmental toxins and many others factors **(Hosono, 1992).** In reality, human health is affected by many different endogenous and exogenous factors that could possibly change microflora position. Useful microflora undertakes good health and builds immune system slowly to be ready for the pathogens **(Bandyopadhyay el al., 2009 and Cammarota et al., 2009).**

Role of Probiotics in maintaining our health in disease treatment and management:

1. Probiotics help to reduce the destructive effect of antibiotic and also help to regenerate any loss in beneficial microflora present in human gut. Some Bacillus species are recommended for use with antibiotics while they are resistant to them **(Bandyopadhayay et al., 2009 and Cammarota et al., 2009).**
2. Improving intestinal tract health **(Vanderhoof, 2000).**
3. Reduces the risk of certain cancer. **(Mego et al., 2005).**
4. Control of serum cholesterol levels **(Helivak et al., 2005).**
5. Improved digestion of lactose against food containing lactose.
6. Probiotics also regulate the protective functions of the intestinal mucosa including the synthesis and secretion of antibacterial peptides **(Cammarota et al., 2009).**
7. Hypertension (Blood pressure control) **(Helivak et al., 2005).**

Although more research is needed, there are encouraging evidences that probiotics may help with the faster healing of many intestinal infections, digestive disorders such as diarrhea caused by infections, irritable bowel syndrome, and inflammatory bowel disease. Prevention and treatment of vaginal yeast infections, urinary tract infections, liver diseases, allergic disorders such as atopic dermatitis (eczema) and allergic rhinitis (hay fever), tooth decay, other oral problems and reduces the severity of common cold and flu.

**Consumption profile of Probiotics**

India is emerging as a major probiotic market of the future with annual growth rate of 22.6% until the coming years. Indian probiotic industries are Amul, Mother Dairy, Yakult Danone and Nestle, etc. Probiotics in India generally comes in two forms i.e., milk products and fermented milk products with the former occupying 62% of the market share and the latter having 38% market share **(Indian Consumer Survey, 2010).**

Amul was the first to make a dent at National level with its probiotic ice creams profile in February, 2007. Amul, also tasted success in the probiotics category with its ice cream introduced probiotic lassi. Probiotic products majorly contribute to 10% to its ice-cream sales and 25 per cent of its Dahi (Indian yoghurt) sales. Mother Dairy has the largest milk (liquid/unprocessed) plants in Asia selling more than 25 lakh liters of milk per day, b-Activ Probiotic Dahi, b-Activ Probiotic Lassi, b- Activ Curd and Nutrifit (Strawberry and Mango) are the company’s probiotic products. Probiotic products are contributing to 15% of the turnover of their fresh dairy products. **Nestle NESVITA was India’s first Dahi containing Probiotics for healthy digestion.** Yakult Danone India Pvt.Ltd. (YDIPL) is a 50:50 joint venture between Japan’s Yakult Honsha and The French- Danone Group and is offering Yakult, a probiotic drink made from fermented milk, Lactobacillusand sugar. With the entry of Yakult in India, the increase in the visibility and growth of probiotic category is expectedly growing. Though the acceptance is growing slowly, but it will take a long time while before changing the mindset of Indian consumers.

**Global consumption scenario of Probiotics**

The increasing interest in ‘these magic bugs’ has grown tremendously during the last few years due to their protective role in the gut to keep our gut healthy and fit. Probiotics have gained enormous popularity amongst the individuals that are searching for “natural” alternative means to promote good intestinal health. Sales of probiotic products have a rising trend from 2010 to 2014, increasing globally by 35% from US$23.1 billion to $30.3 billion. Some regions have increased their use by even more than the average, including Eastern Europe(67%), Asia Pacific (67%) and Latin America (47%), comprising nearly half of probiotics sold globally in 2014 **(Statista, 2014).**

The growth of probiotic products in the developed world has been quite amazing. Probiotics supplements have seen the highest foundation in formulation, packaging, delivery forms, and market positioning. In fact, probiotic supplements are expected to grow 60% in between 2015 to 2020, compared to 25% for sour milks products and a small 4% for yogurt.

**Recent trends in development of probiotic products**

The use of probiotics has considerably increased and their potential domain of application offers an innovative approach for the development of novel probiotic formulations under the category of functional foods for the management in human clinical care which is extremely wide: oncology, hypercholesterolemia, bowel inflammatory diseases or infectious diseases, protection against diarrhea, allergic disorders, lactose intolerance, H. pylori infection, and even against systemic disease. The clinical utility of probiotics may extend to fields such as allergic disease and cancer (**Alexandre et al., 2014).** There is a wide variety of functional foods that were developed recently among these foods probiotic functional food has exerted positive effects on the overall health. It can be divided into both probiotic dairy foods and probiotic non-dairy foods:

**Probiotics dairy foods:**

The market for probiotic dairy food is increasing annually, as an increased demand for dairy probiotic products comes from health promotion effects of probiotic bacteria which are initially originated from milk products, prevention of lactose intolerance and bioactive compounds of fermented dairy products. Hence, development of the probiotic products is a key research priority for designing novel food and is challenging for food industries as well as science sectors.

**Probiotic non-dairy foods:**

There is also a demand for the non-dairy probiotic products with the increase in the customers’ vegetarianism throughout the developed countries. Nondairy probiotic products are showing a big interest among vegetarians and lactose intolerance customers.  Among the non-dairy based fermented products, cereals based, fruits and vegetables based, and soy based foods are gaining popularity **(Prado et al., 2008; Gupta et al., 2012; Gawkowski et al., 2013; Martins et al., 2013).**  The difference between dairy and non-dairy based fermented food products are listed in the table below:

|  |  |  |  |
| --- | --- | --- | --- |
| **S.no.** | **Parameters** | **Dairy probiotic foods** | **Non-dairy probiotic foods** |
| 1. | Lactose intolerance | Negative effect | No issue |
| 2. | Calcium availability | Positive effect | No issue |
| 3. | High fat  | Negative effect | No issue |
| 4. | Cholesterol content | Negative effect | No issue |
| 5. | Dietary fiber | No issue  | Positive effect |
| 6. | Digestibility | Not easy | Easy to digest |
| 7. | Survival rate of probiotics | High | Low |
| 8. | Flavour (diacetyl/acetaldehyde) | Positive effect | No issue |
| 9. | Phyto-chemicals | No issue | Negative effect |
| 10. | Isoflavones | No issue | Positive effect |

**(Source- Anonymous)**

However, specific health claims associated with probiotics food formulations and their safety in the target human population remain a real challenge to establish the credibility of their health promoting functions. The probiotics use today, have been selected on the basis of the most commonly used probiotic strains of lactic acid bacteria such as Lactobacillus, Bifidobacterium and Streptococcus (**Baquerizo et al., 2014)** but new probiotic from other species and genera have recently been introduced. It is well established that different probiotic strains induce distinct responses, and thus specific strains might have specific targets in reducing the risk and treatment of human disease **(Isolauri E et al., 2004)**

**Conclusion**

In this review in depth exploration of probiotics which include mode of action and significance in human health are explained. There are different types of microbes that humans are exposed during their lives which are unsuitable for their health. Antibiotic treatment could destroy useful microflora. In such situations, Probiotics should be used to regenerate microflora. Probiotics are the best and the cheapest way to recover any losses in the digestive system microflora and to improve the health. Probiotics are the rapidly expanding functional foods. Indian probiotic industry is in its early stage of growth and currently accounts for only a small fraction i.e. less than 1% of total world market turnover in the probiotic industry. Also, probiotic industry is rising at a steady pace with conditions set for tremendous growth in near future. Better understanding of the significance of probiotics will surely contribute in promoting overall health of the well-beings and their integration into healthcare practices.

**References**

1. Amara, A. In: Amara, A. (Ed.), Toward Healthy Genes. Schu¨ ling Verlage, Germany, 2012.
2. Alexandre Y, Le Blay G, Boisrame-Gastrin S, Le Gall F, Hery-Amaud G, et al. Probiotics: A new way to fight bacterial pulmonary infections? v.44, p.9-17, 2014.
3. Bandyopadhyay, P., Das Mohapatra, and P.K. Effect of a Probiotic bacterium Bacillus circulans PB7 in the formulated diets: on growth, nutritional quality and immunity of Catla catla (Ham.).Fish Physiol. Biochem. v.35, p.467–478, 2009.
4. Baquerizo Nole KL, Yim E, Keri JE. Probiotics and prebiotics in dermatology. v.71, p.814-821, 2014.
5. Cammarota, M., De Rosa, M., Stellavato, A., Lamberti, M., Marzaioli, I., Giuliano, M. In vitro evaluation of Lactobacillus plantarum DSMZ 12028 as a probiotic: emphasis on innate immunity. Int. J. Food Microbiol. v.135, p.90–98, 2009.
6. Gawkowski D, Chikindas ML. Non-dairy probiotic beverages: the next step into human health, v.4, p.127–142, 2013.
7. Gupta S, Abu-Ghannam N. Probiotic fermentation of plant based products: possibilities and opportunities, v.52, p.183–199, 2012.
8. Helivak P, Odraska J, Ferencik M, Ebringer L, Jahnova E. One year application of probiotic strain Enterococcus faecium M-74 decreases serum cholesterol levels. v.106, p.67-72, 2005.
9. Hosono, A. Fermented milk in the orient. In: Naga sawa, Y., Hosono, A. (Eds.), Functions of Fermented Milk: Challenges for the Health Sciences. Elsevier Applied Science, London, UK, p.61–78, 1992.
10. Isolauri E, Sutas Y, Kankaanpaa P, Arvilommi H, Salminem S. Probiotics: effects on immunity. Am J Clin Nutr; 73(Suppl. 2): S444–50, 2004.
11. Martins EMF, Ramos AM, Vanzela ESLB, Stringheta PC, Pinto CLO, Martins JM. Products of vegetable origin: a new alternative for the consumption of probiotic bacteria; v.51, p.764–770, 2013.
12. Mego M, Holec V, Drgona L, Hainova K, Ciemikova S, et al. Probiotic bacteria in cancer patients undergoing chemotherapy and radiation therapy. v.21, p.712-723, 2005.
13. Metchnikoff, I.I. The Prolongation of Life: Optimistic Studies. Springer Publishing Company, New York, NY, USA, 2004.
14. Metchnikoff, I.I., Mitchell, P.C. Nature of Man or Studies in Optimistic Philosophy. Kessinger Publishing, Whitefish, MT, USA, 1910.
15. Prado FC, Parada JL, Pandey A, Soccol CR. Trends in non-dairy probiotic beverages, v.41, p.111–123, 2008.
16. Reid, G., Sanders, M.E., Gaskins, H.R., Gibson, G.R., Mercenier, A., Rastall, R., Roberfroid, M., Rowland, I., Cherbut, C., Klaenhammer, T.R. New scientific paradigms for Probiotics andprebiotics. J. Clin. Gastroenterol. 37, 105–118, 2003.
17. Vanderhoof JA, Whitney DB, Antonson DL, Hanner TL, Lupo JV, Young RJ. *Lactobacillus* GG in the prevention of antibiotic-associated diarrhea in children. v.135, p.564-568, 2000.
18. WHO/FAO. Guidelines for the Evaluation of probiotics in Food. London, 2002.