



## International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

ISSN:2347-6567

IJAMSCR |Volume 8 | Issue 1 | Jan - Mar - 2020  
www.ijamscr.com

Review article

Medical research

### A review on probiotics and its health benefits

**Arthapu Hari Krishna, Makkena Ramya Sri, Pasupuleti Bhuvana Kalyani, Shaik Jabeena, Shaik Sharmila, Vankudavatu Lakshmibai, Mudavath Hanumanaik, Tunuguntla Bhavani Ramesh Kumar, Balaji Maddiboyina**

*Department of Pharmaceutics, Vishwabharathi College of Pharmaceutical Sciences, Guntur, Andhra Pradesh, India*

**\*Corresponding Author: Dr. Balaji Maddiboyina**

#### ABSTRACT

With the mounting attention in self-care and integrative medicine coupled with our health assumption baby boomer population, respect of the link between diet and health has certainly not been sturdier. The consumers' devastating concern in and ultimatum for functional foods, including probiotics, make it overbearing the health professionals stay well-informed of the latest research discoveries and presented products. This article delivers an instantaneous of research on the health benefits of probiotics and suggestions evidence to help the clinician make applicable endorsements to clients. Certain researchers rely on that a synergistic effect subsists between constituents in dairy foods and probiotic cultures, and that there are components in milk that "turn on" the beneficial genes in probiotic bacteria, making dairy foods an exceptional vehicle for presenting these bacteria into the gut. Europe and Asia lead the rest of the world in offering a variety of other food products containing probiotics.

**Keywords:** Probiotic, Prebiotic, Lactobacillus, Bifidobacterium, Colon, Diarrhoea

#### INTRODUCTION

In recent years the concept of providing functional foods containing healthful components rather than removing potentially harmful ones (e.g., saturated fat) is gaining ground in the world. Purposeful foods, designer foods, pharma foods and nutraceuticals are substitutes for foods with constituents that can avert and indulgence diseases. A probiotic may also be a purposeful food, but more definitely it is a live microbial feed supplement that constructively distresses the host yonder amending for traditional nutrient paucities by enlightening its intestinal balance. Hence, it may be considered a functional food with the special property of containing live, beneficial

microorganisms [1]. Guideline of the intestinal microbial stability consequences from the competition among the sundry bacterial species that endure passage through the upper gastrointestinal tract and colonize the human colon.

Probiotic," means that appliances are engaged to selectively eradicate only the pathogen while parting the residue of the oral ecosystem intact. Probiotic is consequent from Latin word "pro"-for and Greek word "biotic"- life. Probiotics are live microorganisms (in most cases, bacteria) that are comparable to beneficial microorganisms institute in the human gut. They are also entitled "friendly bacteria" or "good bacteria." Probiotics are vacant to clients primarily in the form of eating

supplements and foods. They can be used as corresponding and substitute medicine.

Probiotics can be bacteria, moulds, and yeast. But most probiotics are bacteria. Among bacteria, lactic acid bacteria are more popular in the listed organisms as species used in probiotic preparation [2-5]. *Lactobacillus bulgaricus* (*L. bulgaricus*), *Lactobacillus plantarum*, *Streptococcus thermophilus* (*S. thermophilus*), *Enterococcus faecium*, *Enterococcus faecalis*, *Bifidobacterium* species, and *Escherichia coli* were listed.

Furthermost probiotics are bacteria comparable to those naturally initiate in people's guts, specifically in those of breastfed infants (who have natural shield beside many diseases). Most often, the bacteria arise from two groups, *Lactobacillus* or *Bifidobacterium*. Contained by each group, there are altered species (for example, *Lactobacillus acidophilus* and *Bifidobacterium bifidus*), and within each species, dissimilar straining (or varieties). A scarce conjoint probiotics, such as *Saccharomyces boulardii*, are yeasts, which are diverse from bacteria.

### Subsequent characteristics are sorts of a good probiotic [6, 7]

1. It should be a strain, which is proficient of exercising a favorable consequence on the host animal, e.g. amplified growth or resistance to disease.
2. It ought to be nonpathogenic and non-toxic.
3. It would be extant as viable cells, rather in large numbers.
4. It must be proficient of persisting and metabolizing in the gut environment e.g. resistance to low pH, organic acids acid and bile
5. It had better be stable beneath storage and field conditions.

The organisms used in probiotics are known to produce antimicrobial substances that might affect the colonic microflora balance. Mechanisms by which probiotics could improve health include [8]

1. Production of acids, peroxides or bacteriocins bactericidal to groups that negatively impact health;
2. Competition with pathogens for mucosal binding sites;
3. Competition for substrates;
4. Stimulation of the immune system.

While there is some evidence to indicate these processes occur in vitro and in animal models, the efficacy of probiotics for humans remains

speculative because well-designed and controlled studies that yield more conclusive evidence with proper statistical analyses allowing claims to be incorporated into established nutritional pathways are often lacking. Notwithstanding a lack of clear-cut mechanisms, probiotics may provide health benefits under certain circumstances [9].

Probiotics are marketed as functional foods, whereby they are ingested for their purported positive advantages in the digestive tract and/or systemic areas like the liver, vagina or bloodstream. Consumers should be provided with an independent assessment of physiological, microbial and safety aspects of these live microbial products especially if they can improve health [10-12]. Probiotic trials should use the best methodologies available. For probiotics to exert beneficial properties, they must have a high viability in the product and have robust survival properties in the gut, which is their first point of contact. Moreover, they should not adversely affect immune up-regulation, produce toxins, disrupt colonocyte function or have the ability to transfer antibiotic resistance to the normal gut microflora. Food vehicles include live yoghurts, fermented dairy drinks, freeze-dried supplements (capsules, pills, liquid suspensions, sprays), cheese, fromage frais and fruit juices. Both single and multiple strain products are available [13].

### Prebiotics

An alternative, or additional, approach is the prebiotic concept. A prebiotic is 'a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon that can improve the host health. Thus, the prebiotic approach advocates the administration of non-viable entities. Dietary carbohydrates, such as fibres, are candidate prebiotics, but most promise has been realized with non-digestible oligosaccharides, because of their selective metabolism. In particular, the ingestion of fructo-oligosaccharides (FOS) has been shown to stimulate bifidobacteria in the lower gut. As prebiotics exploit non-viable food ingredients, their applicability in diets is wide ranging. A further approach is synbiotics, where probiotics and prebiotics are combined. The prebiotic activity of fructose-containing oligosaccharides has been confirmed in both laboratory and human trials [14].

Combined mixtures of probiotics and prebiotics are often used because their synergic effects are conferred onto food products. For this reason, such mixtures are called synbiotics. The synbiotic effect may be directed towards two different “target regions” of the GIT: i.e. both the small and the large intestines. In addition, if the prebiotic carbohydrate is utilised by a probiotic strain, its growth and proliferation in the gut will be selectively promoted.

### Composition of probiotics

Probiotics can be bacteria, moulds, yeast. But most probiotics are bacteria. Among bacteria, lactic acid bacteria are more popular. *Lactobacillus acidophilus*, *L. casei*, *L. lactis*, *L. helveticus*, *L. salivarius*, *L. plantrum*, *L. bulgaricus*, *L. rhamnosus*, *L. johnsonii*, *L. reuteri*, *L. fermentum*, *L. del brueckii*, *Streptococcus thermophilus*, *Enterococcus faecium*, *E. faecalis*, *Bifidobacterium bifidum*, *B. breve*, *B. longum* and *Saccharomyces boulardii* are commonly used bacterial probiotics. A probiotic may be made out of a single bacterial strain or it may be a consortium as well. Probiotics can be in powder form, liquid form, gel, paste, granules or available in the form of capsules, sachets [15].

### Foods containing probiotics and its uses

Foods such as cheese, yogurt, sour cream, smoothies, cereal, fitness bars, infant formulas, asparagus, soybeans contain probiotics. Probiotics are used in general health, animal agriculture, fertility of soil and oral cavity.

### Features of probiotics

A good probiotic agent needs to be non-pathogenic, nontoxic, resistant to gastric acid, adhere to gut epithelial tissue and produce antibacterial substances. It should persist, albeit for short periods in the gastro-intestinal tract influencing metabolic activities like cholesterol assimilation, lactose activity and vitamin production. The survival of probiotic organisms in the gut depends on the colonization factors that they possess, organelles which enable them to resist the antibacterial mechanisms that operate in the gut. In addition to the antibacterial mechanisms, they need to avoid the effects of peristalsis, which tend to flush out bacteria with food. This can be achieved either by immobilizing themselves or by growing at a much faster rate than the rate of

removal by peristalsis. The probiotic strain needs to be resistant to the bile acid, e.g. *Bifidobacteria* strains proved significantly less acid-resistant than the *Lactobacillus* strains, when exposed to human gastric juice [16].

## PROBIOTICS IN HEALTH

### Diarrheal Diseases

Attributes of lactic acid bacteria such as anti-microbial agent production and competition with potential pathogens in the gut provided the impetus for investigating a role for probiotics in diarrhoea. Acute gastroenteritis diarrhoea in infancy is normally due to rotavirus and a number of trials have shown a reduction in the duration and incidence of diarrhoea in response to probiotics.

### Inflammatory Bowel Disease

The potent anti-inflammatory effects of probiotics have clearly emphasized how the therapeutic potential of these agents may extend beyond their ability to displace other organisms and has led to their evaluation in inflammatory bowel disease both a lactobacillus and a bifidobacterium produced a marked and parallel reduction in inflammation in the colon and cecum and in the production of the pro-inflammatory cytokines IFN- $\gamma$ , TNF- $\alpha$ , and IL-12, while levels of the anti-inflammatory cytokine TGF- $\beta$  were maintained. Similar effects have been demonstrated for the probiotic cocktail VSL#3 (containing *Bifidobacterium breve*, *Bifidobacterium longum*, *Bifidobacterium infantis*, *Lactobacillus acidophilus*, *Lactobacillus plantarum*, *Lactobacillus paracasei*, *Lactobacillus bulgaricus*, *Streptococcus thermophilus*) [17].

### Lactose Intolerance

Lactose intolerance is a physiological state in human beings where they lack the ability to produce an enzyme named lactase or B-galactosidase. This lactase is essential to assimilate the disaccharide in milk and needs to be split into glucose and galactose. Individuals lacking lactase will not be able to digest milk and it often poses a problem in newborn infants. People with lactose intolerance problem express abdominal discomfort, diarrhoea, cramps, flatulence, nausea, vomiting, etc. Another problem associated with lactose intolerance is calcium deficiency. Calcium

malabsorption may be due to deletion of diets with milk to avoid the complications of lactose intolerance. Yogurt contains less lactose than milk and delays gastric emptying, which partly explains why lactose-intolerant individuals tolerate yogurt. However, yogurt tolerance is mainly due to the supply of lactase activity from the lactic acid bacteria present in the yogurt itself. Evidence shows that bacteria must be live and present in sufficient quantity to be of benefit; yogurts containing  $10^8$  bacteria/ml are required. Calcium absorption is better and more in acidic conditions; hence, if lactose is converted to lactic acid, pH of the gut decreases, i.e. it becomes acidic favouring enhanced absorption of calcium. So, if probiotics are fed to lactose intolerance patients, then milk lactose is hydrolysed by probiotic strains and lactose is assimilated and calcium absorption is also favoured [18].

### Prevention of Colon Cancer

Colon cancer is a multi-factorial and complex neoplasm involving both genetics and environmental factors. There seems to be a strong relationship between colon cancer, diet and intestinal microflora. Probiotic modulation of the intestinal microflora may affect the activity of one of the enzymes (7 $\alpha$ -dehydroxylase) forming these toxic products but probiotics may also reduce the toxicity of bile salts binding to them. While growing in the colon, probiotics seem to exert different functions such as controlling the growth of potentially harmful bacteria, binding to mutagens, preventing harmful enzyme activity in the gut (b-glucuronidase, nitroreductase), interacting with the cells of the colon, forming conjugated linoleic acid, a compound with anti-inflammatory properties that may inhibit the development of cancer. The dietary administration of *B. longum* ( $1 \times 10^{10}$  live bacterial cells/d) completely suppressed colon tumours induced by the compound 2-amino, 3-methyl, 3-imidazol (4, 5-f) quinoline, which is a carcinogen found in human diet [19]. The changes in gut bacterial enzymes that generate carcinogens and tumour promoters such as  $\text{NH}_3$  and secondary bile acids, stimulation of immune surveillance, suppression of inflammatory processes, binding of carcinogens in the gut will have various levels of scientific support.

### Constipation

Constipation is common especially in elderly people. An increase in the number of bowel movements or a decrease in transit time has been reported in controlled studies that employed probiotics for treating constipation. The widely used laxative lactulose is a prebiotic, as it is not attacked by human disaccharidases and is substrate for the bifidobacteria in the colonic flora, that catabolise it to smaller molecules, creating an osmotic effect [15].

### Cholesterol assimilation

Probiotic strains, especially lactic acid bacteria have a major role to play in the cholesterol lowering mechanism. As the cholesterol level keeps increasing in the serum, it leads to cardiac diseases. Probiotic strains assimilate the cholesterol for their own metabolism. Probiotic strains can get bound to the cholesterol molecule, and they are capable of degrading cholesterol to its catabolic products. The cholesterol level can be reduced indirectly by deconjugating the cholesterol to bile acids, thereby reducing the total body pool. The bile acids commonly occur in the form of bile salts with glycine and taurine [20].

### Allergy

Probiotics have been shown to reduce the incidence of childhood eczema by half, compared to placebo, when administered during pregnancy and up to 6 months postnatally. Probiotics may exert a beneficial effect on allergic reaction by improving mucosal barrier function. In addition, probiotics consumption by young children may beneficially affect immune system development. Probiotics such as *Lactobacillus* GG may be helpful in alleviating some of the symptoms of food allergies such as those associated with milk protein. Probiotics consumption may thus be a means for primary prevention of allergy in susceptible individuals [12].

### Probiotics in Pregnancy

Good nutrition during pregnancy improves the chances of having a healthy baby who will be at lower risk of diseases later in life. Bacterial vaginosis, has been suggested as a factor that increases risk of preterm labour and infant mortality and probiotics been shown to decrease risk of bacterial vaginosis and maintain normal

lactobacilli vaginal flora. In animal studies, these strains were found to be safe during pregnancy and to enhance the health of mothers and newborns [21]. Another area of interest in the use of probiotics in pregnancy is to prevent allergic reactions. Studies using *L. rhamnosus* GG and *B. lactis* BB12 have shown that atopic dermatitis, a condition that causes severe skin rashes in up to 15% of babies, can be prevented in 50% of cases if mothers ingest probiotics during pregnancy and newborns ingest them during the first 6 months of life. Probiotics during pregnancy also have an excellent safety record.

### Probiotics in skin diseases

Probiotic formulations have been widely studied for the treatment of atopic dermatitis (AD; a type of eczema), a pathology defined as an inflammatory, chronically relapsing, non-contagious and pruritic skin disease which is associated with elevated IgE levels and Th2 responses. AD in animal models and human studies has been investigated using different probiotic different strains such as *Bifidobacterium*, *Lactobacillus*, and *Lactococcus* [18].

### Probiotics in Upper Respiratory Tract Infections (URTI)

A desirable ability for a probiotic is to exert competitive exclusion. A higher affinity for binding sites would allow them to exclude attached pathogens that could subsequently be eliminated through co-aggregation. On the other hand, strong adherence to host cells would allow the probiotic to occupy any free space on the epithelial surface. Thus, they could slow down the multiplication of the pathogens by competing with them for space and nutrients. In the case of URIs, most clinical trials are destined to prevent disease in the healthy population or to prevent recurrence in disease-prone patients [22].

### Probiotics in HIV

The prevention or resolution of bacterial vaginosis is particularly important in women at risk of human immunodeficiency virus (HIV) infection. Studies have shown that women with bacterial vaginosis (no lactobacilli) are at significantly increased risk of HIV. Thus treatment of bacterial vaginosis and promotion of vaginal lactobacilli may reduce a woman's risk of acquiring HIV-1, gonorrhea and trichomoniasis. Human vaginal probiotic strain (*Lactobacillus reuteri* RC-14) can

express potent functional viral inhibitors which may potentially lower the sexual transmission of HIV [14].

### Probiotics in Urogenital infections

Bacterial vaginosis, yeast vaginitis and recurrent urinary tract infections (UTIs) are common urogenital problems. The normal vaginal flora in premenopausal women consists primarily of lactobacilli, which are protective against infection, but many pathophysiologic factors can cause unstable vaginal flora that may result in infection. There are only few studies with the use of probiotics in vaginal infections. The overwhelming experiences have revealed a positive effect of *L. acidophilus*. Evidence from the available studies also suggests that probiotics can be beneficial for preventing recurrent UTIs in women.

### Probiotics in surgical practice

Postoperative complications in GI surgery could involve bacteremia and infectious complications. The main causes could be the translocation of the GI bacteria or its toxins as a consequence of bacterial overgrowth, the loss of intestinal epithelial integrity and the immunologic compromising of the host. Probiotics could be good candidate to fight against these factors through the competition with potential pathogens for nutrients or enterocyte adhesion sites, degradation of toxins, production of antimicrobial factors, and local and systemic immunomodulation [6].

### Probiotics in Hypertension

Some preliminary evidence suggests that food products derived from probiotics bacteria could possibly contribute to blood pressure control. This antihypertensive effect has been documented with studies in spontaneous hypertensive rats. Two tripeptides, valine- proline-proline and isoleucine-proline- proline, isolated from fermentation of a milk-based medium by *Saccharomyces cerevisiae* and *Lactobacillus helveticus* have been identified as the active components. These tripeptides function as angiotensin-I-converting enzyme inhibitors and reduce blood pressure [11].

### Probiotics in Periodontal infection

Probiotics for periodontal therapy have not been extensively studied. Clinical studies where probiotic species have been investigated



specifically from a periodontal disease perspective are sparse. *Lactobacillus reuteri* and *Lactobacillus brevis* are among the species able to affect gingivitis and periodontitis [18].

## PROBIOTIC IN DRUG DELIVERY SYSTEM

### Prebiotic Encapsulates

Adding the prebiotic inulin to yoghurt boosted the growth of probiotic bacteria and, when used in a novel double-microencapsulation, extended the survival rates of the friendly bacteria. The various prebiotic fibres protect the stability and viability of probiotic *Lactobacillus rhamnosus* strains during freeze-drying, storage in freeze-dried form and after formulation into apple juice and chocolate-coated breakfast cereals. The prebiotics studied were: sorbitol, mannitol, lactulose, xylitol, inulin, fructooligosaccharide FOS and raffinose.

### Alginate-coated Gelatin Microsphere Encapsulation

Alginate-coated gelatin microspheres were produced to encapsulate the probiotic *Bifidobacterium adolescentis* 15703T for enhancing survival during exposure to the adverse conditions of the gastro-intestinal tract. Gelatin microspheres were cross-linked with the non-cytotoxic genipin and coated with alginate cross-linked by Ca<sup>2+</sup> from external or internal sources [23].

### Techniques for the Preservation of Probiotics

A novel encapsulation method for probiotics, which excludes the use of organic solvents. The efficiency/potential of this new method increases stability of sensitive probiotic cultures, specifically *Bifidobacteria*. The potential of interpolymer complex formation in scCO<sub>2</sub> for the encapsulation of sensitive probiotic cultures was demonstrated for the first time [24].

## REFERENCES

- [1]. Siitonen S, Vapaatalo H, Salminen S, Gordin A, Saxelin M, Wikberg R, Kirkkola AL. Effect of *Lactobacillus* GG yoghurt in prevention of antibiotic associated diarrhoea. *Ann Med* 22, 1990, 57-59.
- [2]. Nanji AA, Khettry U, Sadrzadeh SMH. *Lactobacillus* feeding reduces endotoxemia and severity of experimental alcoholic liver (disease). *Proc Soc Exp Biol Med* 205, 1994, 243-247.
- [3]. Seki M, Igarashi T, Fukuda Y, Simamura S, Kaswashima T, Ogasa K. The effect of *Bifidobacterium* cultured milk on the "regularity" among an aged group. *Nutr Foodstuff* 31, 1978, 379-87.

## STATUS OF PROBIOTICS IN INDIA

Probiotics are rarely used for human beings. Sporolac, *Saccharomyces boulardii* and yogurt (*L. bulgaricus* + *L. thermophilus*) are the most common ones. Sporolac is manufactured using *Sporolactobacilli*. *Lactobacilli* solution is an example of a probiotic, usually given to paediatric patients in India. The latest and recent addition to the list of probiotics in India is ViBact (which is made up of genetically modified *Bacillus mesentericus*), which acts as an alternate to B-complex capsules. In India, only sporulating *lactobacilli* are produced and they are sold with some of the antibiotic preparations.

## CONCLUSION

The functional food industry's perception of the importance of gut microbiology in human health and nutrition has led to a major increase in probiotic and probiotic-based products. Not all products will be reliable in terms of their efficacy, however, and it is important that these are not allowed to skew an important area of human health and the functional food concept generally. The full potential of probiotics can only be realized when their benefits can be established scientifically. It is highly likely that benefits from current and future probiotics have gone undetected and, therefore, full utilization of these organisms has not been achieved. With the current focus on disease prevention and the quest for optimal health at all ages, the probiotic market potential is enormous. Health professionals are in an ideal position to help guide their clients toward appropriate prophylactic and therapeutic uses of probiotics that deliver the desired beneficial health effects.

- [4]. Shahani KM, Chandan RC. Nutritional and healthful aspects of cultured and culture-containing dairy foods. *J Dairy Sci* 62, 1979, 1685-1694.
- [5]. Friend BA, Shahani KM. Nutritional and therapeutic aspects of lactobacilli. *J Appl Nutr* 1984; 36: 125-53.
- [6]. Sanders ME. Probiotics. *Food Technology* 53(11), 1999, 67-77.
- [7]. Aso Y, Akazan H. Prophylactic effect of a *Lactobacillus casei* preparation on the recurrence of superficial bladder cancer. *Urol Int* 49, 1992, 125-9.
- [8]. Salminen S, Von Wright A, Morelli L, Marteau P, Brassart D, De Vos WM. Demonstration of safety of probiotics-a review. *Int J Food Microbiol* 44, 1998, 93-106.
- [9]. LeBlanc JG, de Giori GS, Smid EJ, Hugenholtz J, Sesma F. Folate production by lactic acid bacteria and other food-grade microorganisms. *Commun Curr Res Educ Top Trends Appl Microbiol* 1, 2007, 329-339.
- [10]. Patil MB, Reddy N. Bacteriotherapy and probiotics in dentistry. *KSDJ* 2, 2006, 98-102.
- [11]. Wadher KJ, Mahore JG, Umekar MJ. Probiotics: living medicines in health maintenance and disease prevention. *Int J Pharm Bio Sci* 1(3), 2010, 1-9.
- [12]. Galdeano CM, Perdigon G. The probiotic bacterium *Lactobacillus casei* induces activation of the gut mucosal immune system through innate immunity. *Clin Vaccine Immunol* 13(2), 2006, 219-226.
- [13]. Saikali J, Picard C, Freitas M, Holt PR. Fermented milks, probiotic cultures, and colon cancer. *Nutr Cancer* 49(1), 2004, 14-24.
- [14]. Parvez S, Malik KA, Kang SA, Kim HY. Probiotics and their fermented food products are beneficial for health. *J Appl Microbiol* 100(6), 2006, 1171-1185.
- [15]. Ramchandran L, Shah NP. Yogurt can beneficially affect blood contributors of cardiovascular health status in hypertensive rats. *J Food Sci* 76(4), 2011, H131-H136.
- [16]. Wynn SG. Veterinary medicine today timely topics in nutrition. *J Am Vet Med Assoc*. 234(5), 2009, 603-606.
- [17]. Riccia DND, Bizzini F, Perili MG, Polimenni A, Trinceirri V. Anti-inflammatory effects of *Lactobacillus brevis* (CD2) on periodontal disease. *Oral Dis* 13, 2007, 376-385.
- [18]. Köll-Klais P, Mäandar R, Leibur E, Marcotte H, Hammarström L, Mikelsaar M. Oral lactobacilli in chronic periodontitis and periodontal health: species composition and antimicrobial activity. *Oral Microbiol Immunol* 20, 2005, 354-361.
- [19]. Victor DJ, Liu DTC, Anupama T, Priya DAM. Role of probiotics and bacterial replacement therapy in periodontal disease management. *J Dent Sci* 1(1), 2010, 99-102.
- [20]. Hibbing ME, Fuqua C, Parsek MR, Peterson SB. Bacterial competition: surviving in the microbial jungle. *Nature Rev Microbiol* 8, 2010, 15-25.
- [21]. Preidis GA, Versalovic J. Targeting the human microbiome with antibiotics, probiotics and prebiotics: gastroenterology enters the metagenomics era. *Gastroenterology* 136, 2009, 2015-2031.
- [22]. Zeng J, Li YQ, Zuo XL, Zhen YB, Yang J, Liu CH. Clinical trial: effect of active lactic acid bacteria on mucosal barrier function in patients with diarrhoea-predominant irritable bowel syndrome. *Aliment Pharmacol Ther* 28, 2008, 994-1002.
- [23]. Quigley EMM. Bacteria: a new player in gastrointestinal motility disorders—infections, bacterial overgrowth and probiotics. *Gastroenterol Clin N Am* 36, 2007, 735-748.

**How to cite this article:** Arthapu Hari Krishna, Makkena Ramya Sri, Pasupuleti Bhuvana Kalyani, Shaik Jabeena, Shaik Sharmila, Vankudavatu Lakshmibai, Mudavath Hanumanaik, Tunuguntla Bhavani Ramesh Kumar, Balaji Maddiboyina. A review on probiotics and its health benefits. *Int J of Allied Med Sci and Clin Res* 2020; 8(1): 91-97.

**Source of Support:** Nil. **Conflict of Interest:** None declared.