VOLUME - 12, ISSUE - 02, FEBRUARY - 2023 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Oral Medicine & Radiology

PROBIOTICS ROLE IN DENTAL CARIES

Ashmita Alex*	CRRI, Karpaga Vinayaga Institute of Dental Sciences, Chengalpattu. *Corresponding Author
Aruna. G	CRRI, Karpaga Vinayaga Institute of Dental Sciences, Chengalpattu.
Dr. V. Kalaiselvi	Reader, Karpaga Vinayaga Institute of Dental Sciences, Chengalpattu.
Dr. R. R. Mahendra Raj	Senior Professor and Head of the Department, Karpaga Vinayaga Institute of Dental Sciences, Chengalpattu.

ABSTRACT In recent years, probiotics have been used to upgrade oral health. Time has come to shift the ideal treatment of specific bacteria elimination to altering bacterial ecology of probiotics. Probiotics are dietary supplements containing potentially beneficial bacterial or yeast. They have a promising role in maintaining oral health through interaction with oral microbes thus contributing to healthy microbial equilibrium. The aim of this review is to understand the mechanism of action of probiotic bacteria in the oral cavity and summarize observed effects of probiotics in the field of dentistry

KEYWORDS : Probiotics, Dental caries, Antibiotics, Oral Health

INTRODUCTION

In recent years, probiotics have been used to upgrade oral health. Time has come to shift the ideal treatment of specific bacteria elimination to altering bacterial ecology of probiotics [1]. The human gut contains ten times more bacteria than cells elsewhere in the human body [2]. this vast biomass consists of over 400 known bacterial species that create extreme metabolic activity and of key importance of human health.

This ecosystem gets disrupted when exposed to toxics in the form of polluted water and food, and mainly due to injudicious use of antibiotics [7-8]. This leads to antibiotic resistance; it has become an important global problem [10]. this cause destruction of beneficial bacterial leaving resistant ones. To overcome this the health care professional has promoted the use of beneficial bacteria that is probiotics which stimulate oral health by promoting indigenous flora and reverting back the change [2,7,8,11].

Definition

Probiotics are live microorganisms promoted which claims that thy provide health benefit when consumed, generally by improving or restoring the gut microbiota. An oct 2001 report by WHO defines probiotics as Live microorganisms which when administered in adequate amounts confer a health benefit on the host. An international life science institute Europe consensus documents proposed a simple and widely accepted definition of probiotics as"viable microbial food supplements which beneficially influence the health of human". These bacteria must belong to natural flora of body in order to resist gastric secretions and survive during intestinal transit. They must adhere to the intestinal mucosa and must have the ability to inhibit pathogens present in gut [8,9,11].

History

In the year 1900s, Ellie Metchnikoff developed a theory while studying the flora of human intestine, fatuity in human beings is caused by poisoning of body by some bacterial products [2]. To prevent this mitosis in the year of 1907, Ellie Metchnikoff discovered that the consumption of Bulgarian yogurt was good for health. In the year 1965, Lilley and Stillwell coined the term probiotics [3]. Probiotics is defined as the nondigestible food ingredient that beneficially affects the host by selectively stimulating or limiting the growth of bacteria in colon [1]. In 1994, WHO deemed probiotics to be the next important defense system when commonly prescribed antibiotics are rendered as useless by antibiotic resistance [2]. this introduced a new concept of probiotics in medicine and dentistry.

Probiotics And Oral Health

On several studies there is no less than 1000 bacteria sparely reside on oral cavity [2]. Probiotic bacteria are of two types (1) lactic acid producing bacteria like lactobacillus, streptococcus, Bifidobacterium [2]. (2) non lactic acid producing bacterium like bacillus [3]. of these most prominent probiotic bacteria in oral cavity is lactobacillus and Bifidobacterium genre [1]. Koll-Kaliese et.al. reported that the healthy oral cavity was populated with lactobacillus gasseri and lactobacillus fermentum bacteria, where the periodontitis patient does not have these two species while they are populated with lactobacillus plantaris [4].

Lactobacillus produce enzymes that digest and metabolizes the carbohydrates and proteins. thereby they facilitate breakdown of bile salts by synthesizing Vit B and Vit K [3]

Ample clinical studies results indicate that there is beneficial effect on consumption of yogurt by reducing the cariogenic activity of streptococci in oral cavity. [4] streptococcus thermophilus and lactobacillus bulgaricus are the bacterial strains that helps in yogurt production [3].

To be able to have a probiotic activity ,a bacteria should stick to oral cavity surface should take a part of biofilm [1]. They should also have a genetic stability [1]. current evidences shows that probiotic effects are strain specific. That is the beneficial effect produced by one bacteria may not be similar to the other bacteria [1]

Sources Of Probiotics

Food

Fermented foods are made through the growth and metabolic activity of variety of live organisms. Many of these foods are the source of microbes. Many commercial yogurts a type of fermented food contain probiotic microorganisms like *lactobacillus bulgaricus* and *streptococcus thermophilus*.

Certain unfermented food such as milk, juice, smoothies' cereals etc. have probiotic properties

Dietary Supplements

Probiotics are also available in several dietary supplements like capsules, powders, liquids and other forms. These products contain a variety of strains and doses [1].

Prebiotic Fibers

Prebiotics are the fibers that does not get digested by our body

but they help beneficial bacteria to grow in our gut. These include almonds, garlic and chick piece.[1]

Probiotic Properties

- Should be nonpathogenic and have antagonism against enteric pathogens
- Should have the ability to produce anti-microbial substances
- Should have adherence to gut lining and persistence in human intestinal tract
- Should have acid and bile tolerant and is safety in food and clinical use
- Should be non-pathogenic and susceptible to anti biotics

Mechanism of Probiotic action on oral Health

General mechanism of probiotics can be divided into three categorize

a) Normalization of intestinal microbiota
b) Modulation of immune response
c) Metabolic effects

The mechanism of probiotic action in the oral cavity could be similar to those described for the intestine [2]. Thus far oral colonization by probiotic bacteria has often been considered essential for them to exert oral effect ; the possibility of systemic effects cannot be excluded. The total IgA levels in saliva seem unaffected by probiotic use [11,12]. As there are bacterial species associated with oral disease ,some species associated with oral health. However it is still questionable that bacteria administered in food could be used as probiotics to normalize oral microbiota.

Mechanism of probiotic action in exclusion of pathogens[1]

1. Several probiotics alter the ability of pathogens to adhere to or invade colonic epithelial cells in vitro
2. Probiotics could sequester essential nutrients from invading pathogens and impair their colonization ability
3. Probiotics may inhibit the expression of virulence functions by altering the gene expression program of pathogens
4. Probiotic may create unfavorable environment for pathogen colonization by altering the mucous layer, pH and other factors in the local surroundings

Role Of Probiotics In Dental Caries

Dental caries is an infectious disease that effect most of the population. This multifactorial and complex disease process occur along the interface between the dental biofilm and enamel surface[1]. Probiotic and molecular genetic techniques have been used to replace the cariogenic organisms with strains of bacteria that are not cariogenic[2].

The efficacy of probiotics on dental caries has been studied worldwide utilizing different strains species of Lactobacillus like *L. rhamnosus* GG *and L.casei* inhibits the growth of oral streptococci. *S. mutans* is the most common organism that leads to development of caries. Several studies suggest that consumption of products containing probiotic lactobacilli or bifidobacterial could reduce the number of streptococci mutans in saliva.

The pathogenicity of S.mutans is related to their acidogenic potential and ability to form water insoluble extracellular and enzymatically undegradable polysaccharide from sucrose . these extracellular polysaccharides promote adhesion and colonization of cariogenic organisms[1].

Meurman and colleagues demonstrated that the long term consumption of milk containing probiotic lactobacillus rhamuosus GG strain reduces initial caries in kindergarten children.

In addition to classical probiotic strains, Hillman and his colleagues introduced a nonacid producing S.mutans strain that produces a bacteriocin active against other S.mutans strains into the oral cavity to replace the naturally occurring cariogenic strains[2,5]

CONCLUSION

In this article, we reviewed studies that provide some evidence of probiotic benefits in preventing and treating dental caries. [7] Probiotics play an important role in combating issues with overuse of antibiotics and antimicrobial resistance. It is right time to change the way bacteria are treated in today's new technological era[1]. Further studies to understand the ability of probiotic bacteria to survive, grow, and have a therapeutic effect when used for treatment or when added to foods, to fix the doses and schedules of administration of probiotics [2]. Hence, randomized controlled trials and systematic studies are needed to find out the best probiotic strains and means of their administration in different oral health conditions and oral health promotion. With fast evolving technology and integration of biophysics with molecular biology, designer probiotics pose huge opportunity to treat diseases in a natural and non-invasive way.[1]

REFERENCES

1. Tandon V, Arora V, Yadav V, Singh V, Punia H, Agrawal S, Gupta V. Concept of Probiotics in Dentistry. Int J Dent Med Res 2015;1(6):206-209
2. Narwal A (2011) Probiotics in Dentistry – A Review. J Nutr Food Sci 1:114
3. Alok A, Singh ID, Singh S, Kishore M, Jha PC, Iqubal MA. Probiotics: A New Era of Biotherapy. Adv Biomed Res. 2017 Mar 7;6:31.
4. Näse L, Hatakka K, Savilahti E, Saxelin M, Pönkä A, Poussa T, Korpela R, Meurman JH. Effect of long-term consumption of a probiotic bacterium, Lactobacillus rhamnosus GG, in milk on dental caries and caries risk in children. Caries Res. 2001 Nov-Dec;35(6):412-20..
5. Ahola AJ, Yli-Knuuttila H, Suomalainen T, Poussa T, Ahlström A, Meurman JH, Korpela R. Short-term consumption of probiotic-containing cheese and its effect on dental caries risk factors. Arch Oral Biol. 2002 Nov;47(11):799-804.
6. Mahasneh, S.A.; Mahasneh, A.M. Probiotics: A Promising Role in Dental Health. *Dent. J.* 2017, *5*,
7. Suvarna VC, Boby VG,(2005) probiotics on oral health.a current assessment. Current science 88:1744-1748
8. Izumita D (2001) A new approach in dentistry. Clinical and basic medical research on EM-X-A collection of research papers 2: 77-81.
9. Salminen MK, Tynkkynen S, Rautelin H, Saxelin M, Vaara M, et al. (2002) Lactobacillus bacterium during a rapid increase in probiotic use of L.Rhamnosus GG in Finland. CID 35: 1155-1160
10. Meurman JH. Probiotics: do they have a role in oral medicine and dentistry? Eur J Oral Sci. 2005 Jun;113(3):188-96. doi: 10.1111/j.1600-0722.2005.00191.x. PMID: 15953242.
11. Patil Mb, Reddy N (2006) Bacteriotherapy and probiotics in dentistry. KSDJ 2: 98-102.
12. Kekkonen RA, Lummela N, Karjalainen H, Latvala S, Tynkynen S, et al. (2008) Probiotic intervention has strain-specific anti-inflammatory effects in healthy adults. World J Gastroenterol 14: 2029-2036.
13. Paineau D, Carcano D, Leyer G, Darquy S, Alyanakian MA, Simoneau G, Bergmann JF, Brassart D, Bornet F, Ouwehand AC. Effects of seven potential probiotic strains on specific immune responses in healthy adults: a double-blind, randomized, controlled trial. FEMS Immunol Med Microbiol. 2008 Jun;53(1):107-13.
14. Anderson MH, Shi WA. Probiotic approach to caries management. Pediatr Dent. 2006;28(2):151-3. 20.
15. Anusavice KJ. Present and future approaches for the control of caries. J Dent Edu. 2005;69(5):538-54. 21.
16. Ahola AJ, Yli-Knuuttila H, Suomalainen T, Poussa T, Ahlistrom A, et al. (2002) Short term consumption of probiotic-containing cheese and its effect on dental caries risk factors. Arch Oral Biol 47: 799-804