



Review Article

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Probiotic significance in periodontics- A short review

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Abstract

Background: Elimination of periodontal pathogen is the main aim of during a periodontal therapy, and scaling root planning is the gold standard. Use of antibiotic for long duration is not advisable due to increased bacterial resistance. Thus adjunctive therapy comes into importance for maintaining good oral flora. Use of probiotic has shown improvement of microbial flora of the gut thus helping to maintain a healthy living. Studies and research on the effect of probiotic on oral microflora will ensure future of periodontal therapy. **Aim:** To assess the clinical efficacy of probiotics in periodontal health. **Material and Methods:** A literature survey was conducted by collecting research studies using keywords like "Probiotics, periodontal health, application" using search engines like google search, pubmed. **Result:** Supporting studies were selected which shows that probiotic is a beneficial formula for improving oral health **Conclusion:** Earlier work has proved that when probiotics used in a certain amount helps in improving the oral flora which proves to be a promising tool in the treatment of periodontal diseases.

Keywords: Probiotic, Periodontal Disease, Application, Benefits.

INTRODUCTION

In Management of periodontal disease in current centuries has progressed near an antibiotic/antimicrobial exemplary of illness or infection controlling. Phase of present moves from hypothesis regarding management commencing particular bacteria extinction into changing bacterial ecosystem by good ones^[1]. By way of growth in occurrence of resistance to antibiotics, probiotics could become hopeful and favourable space for study and exploration for periodontal treatment protocol^[2]. This employs originally happening microbes to convene a strong help while it is managed in sufficient quantities. The character of probiotics in periodontics is yet in beginning in addition a whole considerate regarding comprehensive ecosystem variations brought by probiotics is important in measuring extended period concerns for oral well-being and ailments^[3]. This reviews the writings, origin, application in periodontal diseases, risk related with its management and lessons concerning indication for use of probiotics with prebiotics in periodontal therapy.

Historical Background

The word 'probiotic' signifies comparatively innovative term signifying 'for life' and hence presently applied while mentioning to microbes related by means of helpful things on human being and creatures. The usage of bacteria to support well-being is very olden and could equally be outlined to standard Ancient works wherever eatables fermented using microbes stood as a beneficial instrument. The unique remark regarding optimistic part participated by certain carefully chosen germs was precisely examined and inspected by eminent scientist who was from ukraine employed at the Pasteur Organization during commencement of latter era^[4]. It was projected that the lactic acid-formed by *Lactobacillus bulgaricus* was capable of restoring pathological intestinal micro biota. This scientist proposed regarding "necessity of the gut microbes in food marks it likely to accept processes towards adapting the flora into human system in addition also substitute injurious germs by beneficial germs^[4].

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Word 'probiotics', antonym of word 'antibiotics', remained familiarized 'Constituents formed by bacteria stimulating development of new bacteria'. It was presented that abundant types of protozoa, during its logarithmic stage of development, create materials which will extend the logarithmic stage into new species. Significance of alive cells in probiotics was highlighted by Fuller^[1].

Earlier study facilitated the WHO to foretell helpfulness of probiotics by way of the following-maximum significant immune protection structure. Thus numerous meanings of this word made sure stayed projected. Presently projected agreement characterization of probiotics existed forward by way of the WHO and through Food and Agriculture Organization, USA. It was explained as "Living bacteria administered in suitable quantities discuss a fitness advantage on the host"^[1].

Probiotics and Oral Health

Probiotics has several constructive properties in generating improved oral health. It influences directly also indirectly. Affecting by direct associations is plenty. Principally, it profits by adhering oral bacteria to proteins and biofilm. It also challenges dissimilar to plaque development and also on multifaceted ecology by uniting in addition overriding with bacterial adherence. Over straight communications, probiotics contest with oral microorganisms of ingredients accessible. It creates elements which impede noxious bacteria which hampers oral health^[5].

Whereas additional pointer, indirect connections of probiotics effects the procedure of eliminating noxious bacteria also calming natural circumstances. It controls in addition organizes protection task on native communal also nonimmunologic protection methods. It has capability to control penetrability and likewise to advance groups regarding oral micro flora by fewer harmful kinds. It is demonstrated in the direction of operative in therapeutic of illnesses like decay, periodontitis, bad breath and candidiasis^[6].

The device of linkage to epithelium is a question of significance due to its everlasting effect of bacteria. Amid dissimilar models existing to train the adhesion phenomenon, 2 model classifications dominate: organizations by means of saliva-coated hydroxylapatite, in addition hydroxylapatite coated through buffers, proteins in addition additional ingredients. The configuration of adhesion of dissimilar probiotic types to oral epithelial cells tested. Maximum trials on adhesion ensure to be supported by strains widely used as probiotics in dairy foodstuffs like yogurt and cheese.

Various species are defined as "probiotics". Familiar probiotic type fit in categories of *Lactobacillus* and *Bifidobacterium*^[7].

Mechanism of action:

Probiotics can help to stop in addition cure health disorder by numerous tools: a) Directly communicating: It forms a network agreeably using disease-producing organisms, creating to be tougher to be intended to effect illness. b) Competitive elimination: Favourable micro-organisms openly participate by means of illness, increasing microscopic organism for nourishment or enterocyte bond locations. c) Alteration of host resistant response-It intermingles in addition reinforce the protection arrangement which aids in avoiding ailment. It motivates dendritic cells ensuing in manifestation of helper T cell (Th1) reaction, which controls immunity^[8].

Apoptosis so far additional suggested instrument. Probiotics is likewise identified to create antioxidants, it has the chance to stop plaque development by means of nullifying permitted electrons which are required for formation of calculus^[8].

Application in periodontal therapy

There have existed main changes in management hypothesis beginning from nonspecific to specific method. Currently management choices suggest changing natural balance of functions, in direction towards altering irrational plaque to a biofilm of commensalisms^[9].

Part of the resident microbiota: More than seven hundred strains of oral micro biota are discovered in oral cavity in addition dweller micro biota of one type might comprise thirty- 100 strains. Inhabitant microbiota vigorously adds to host defence by;

1. Obstructing of colonization by pathogens
2. Growth of cell structure and function
3. Growth of the immune system and variation of inflammatory reactions
4. Commensal bacteria influence expression of mediators such as intracellular adhesion molecule I (ICAM-I), Eselectin, and Interleukin(IL-8)
5. Commensal bacteria also modify immune responses and improve cellular homeostatic mechanisms^[8].

Application of carefully chosen favourable bacteria, as an assistant to scaling and root planing (SRP), will likewise hinder the periodontopathogen decolonization of periodontal pockets also attain in addition uphold periodontal wellbeing.

Anticipated mechanisms of probiotic activity with respect to periodontal disease

Thoughtfulness of the extremely refined association of biofilms, through its basic circulatory organizations, quorum detecting, in addition spatially also functionally controlled strain arrangement, its of vital significance to recognize probiotics which is capable in assimilating to biofilm organization. It is essential in contesting for binding sites or to co-aggregate through extra bacteria to stay sustainable in oral cavity. Trials has revealed that putative probiotic contenders will uphold its feasibility while open to saliva and that saliva facilitates its adherence to epithelium.

Fitting the configuration of the biofilm might stand to motivate methods towards modify bacteria- host connections, hence disturbing the infection development. Recently it's revealed that probiotic lactobacilli can disturb the oral ecosystem by precisely stopping the adherence of additional organisms and through adjusting the protein arrangement of the salivary pellicle. The writers reflected that probiotic microorganisms can adjust the protein composition of the pellicle by two dissimilar approaches, specifically tie to and the distortion of salivary proteins. But, ultimate probiotic alteration of oral biofilm growth appeals in extra in-penetration to research^[10].

As per conversed previously, additional method representing the capability of micro-organisms to assimilate to recognized oral bacterial groups is its co-aggregation capability with *F nucleatum*. Later kinds have remained observed as abundant in addition a series of microbes in dental plaque development, retaining its capability to co-aggregate with the bulk of additional microorganisms in the oral cavity. Its showing that interspecies adhesion is facilitated via protein / glycoprotein-carbohydrate cell-surface interfaces. Research has shown different strains of lactobacillus species to adhere with *F. Nucleatum* at more than 80%^[11].

Overall, antimicrobial action devised remained authorized through numerous trails done on animals and also laboratory trials. Mechanism conflicting to generally occurring primary periodontal pathogens like

events occurring and which are in need of species and strains are observed. It was stated that day-to-day consumption of *L salivarius* sequestered from fit humans headed to a diminished quantity of black-stain forming anaerobic rods. A specific group of bacteria showed antibacterial action towards facultative heterofermentative lactobacilli when pathogenic bacteria like *P gingivalis* and *P intermedia* were resisting the antibacterial action^[12].

Establishment of periodontal noxious organisms can be inhibited by probiotic action. Applying the favourable properties of this substance was studied by eminent research explorers. Lactobacilli are not existing usually in sulcus of gingiva but they can be formulated to show its antibacterial property on *P gingivalis*. Such a kind of method, organized by means of the innate immunomodulatory properties of probiotics, influence deal remarkable predictions in the coming years^[13].

A balance of cytokines produced by cells involved in immunoregulatory functions have to be altered by the administration of probiotics. *Lactobacillus plantarum* MLBPL1, *L rhamnosus* GG and *Lactobacillus lactis* has the potency to competently decline the phases of interleukin-8 beforehand *Helicobacter pylori* infection of epithelial cells when administered a concentration 1010 colony-forming units / ml of lactobacilli^[14].

Reducing the risk of disease caused in oral epithelium and also in respiratory and urogenital tracts can be reduced as probiotics show immunoregulatory action by altering the signals sent by toll-like receptors when any microbes enter the body and there first line of defence. Thus innate immunity is increased. Thus it acts as a promising substance for dealing with diseases^[7].

Clinical evidence of probiotic effectiveness in periodontal disease

Reduction of plaque development occurred when tablet containing *L. salivarius* WB21 was introduced also it showed improvement in periodontal health. This strains also improve periodontal health and have also been represented as a biomarker for checking prognosis of periodontal status. Also beneficial effect was seen among smokers when probiotic drugs was administered^[12].

Lactoferrin present in the GCF showed variation when periodontal health improved after administration of probiotics. Thus its proved that probiotic is a promising aid for periodontitis^[12].

At molecular level its revealed that levels of prostaglandin E2 and interferon-c are declined and also reduces the activity of matrix metalloproteinase when probiotic is delivered in people having periodontitis thus improving their periodontal health.

Studies of Probiotics in periodontal disease

When *Lactobacillus salivarius* delivered as a drug, we came to a conclusion that the clinical parameters of periodontal health improved in subjects those remained smokers while, paralleled to palliative individual. The use of favourable bacteria *S sanguis*, *S salivarius*, *S mitis* inside periodontal pockets, revealed in interrupting re-establishment by periodontal noxious organisms, and thus improves bone compactness in addition bone height in canines. It was detected that *L gasseri* strains obtained by individuals having good periodontium remained also additionally well-organized in preventing the development of, than strains from periodontally unhealthy individuals. Laboratory studies showed a decline in *P gingivalis*, *P intermedia*, *P nigrescens* due to everyday incorporation of *L salivarius* in capsule formula^[15].

An actinomycetemcomitans in addition destroy, thus signifying possible opportunity for the properties of B. Bacteriovorous for the inhibition in addition management of periodontitis^[16]. The inhibitory movement of homo fermentive lactobacilli contrary to periodontal pathogens was

mainly linked to their making of acid, not hydrogen peroxide or bacteriocin. Hojo et al. recommended the *S. salivarius* hinder some black pigmented anaerobes by challenging for an indispensable development factor vitamin K^[6]. Harini PM bring into being that probiotic mouth wash was in effect in dropping plaque build-up and gingival swelling^[16]. A study finished by Vivekananda MR by means of *L reuteri* Prodentis lozenges exhibited the plaque reserve, anti-inflammatory, and antimicrobial special effects of *L reuteri* Prodentis^[17]. The study recommended that probiotics can help as a valuable aide or substitute to periodontal management when SRP influence be contraindicated^[17]. Good bacterias such as *Streptococcus oralis* and *Streptococcus uberis* guaranteed in the direction to be benefiting to decline the growth of disease generating microorganisms. Equally the occurrence of *S oralis* and *S uberis* has demonstrated to be a worthy suggestion of strong gingiva^[18]. Thus, probiotics is considered to be a valuable instrument in treating periodontal condition mostly those affected badly. Lately assurance is given that when good bacterias are used in adjunct to gold standard treatment of periodontal conditions there is a decline in the colonization of harmful bacterias and this procedure is recognized as Guided Pocket Recolonization or GRP^[18].

CONCLUSION

With firm developing knowledge and addition of biophysics with molecular biology, exclusive probiotics positions enormous chance to cure diseases in a normal and less-invasive manner. Periodontal health takes recognized danger of numerous health illnesses like diabetes, atherosclerosis and preterm low birth. Hence, a serious necessity towards creating worthy gingival state intended for achieving worthy complete health is of highest significance and this probiotics stand favourable, harmless, regular, and bad properties free preference.

Bearing in mind the present serious methodological evaluations besides precise limited research, broad considerate of the wide-ranging biological alterations prompted by this subject is indispensable toward measure their extended period values for wellbeing of oral cavity besides illness. Methodical lessons and randomized controlled trials remain desirable towards discovering out the finest probiotic/prebiotic strains and worth of their management in diverse oral wellbeing situations.

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REFERENCES

1. Parvez S, Malik KA, Ah Khang S, Kim HY. Probiotics and their fermented food products are beneficial for health. *J Appl Microbiol* 2006 Jun ;100(6):1171-85.
2. Patil MB, Reddy N. Bacteriotherapy and probiotics in dentistry. *KSDJ* 2006; 2:98-102.
3. Mnisha N, Ashar, Prajapathi JB. Role of probiotic cultures and fermented milk in combating blood cholesterol. *Indian J Microbiol* 2001; 41:75-86.
4. Podolsky S. Cultural Divergence: Elie Metchnikoffs bacillus *Bulgarius* Therapy and his underlying concept of health. *Bull Hist Med* 1998 Spring;72(1):1-27.
5. Caglar E, Kuscü OO, Cildir SK, Kuvvetli SS, Sandallin N. A probiotic lozenge administered medical device and its effect on salivary mutans streptococci and lactobacilli. *Int J Paediatr Dent* 2008;18:35-39.
6. Burton JP, Wescombe PA, Moore CJ, Chilcott CN, Tagg JR. Safety assessment of the oral cavity probiotic *Streptococcus salivarius* K12. *Appl Environ Microbiol* 2006;72:3050-53.
7. Stamatova I, Meurman JH. Probiotics and periodontal disease. *Periodontology* 2009;51:141-51.
8. Gupta V, Gupta B. Probiotic and Periodontal disease: a current update. *J Oral Health Community Dent* 2010;4:35-37.
9. Caglar E, Cildir SK, Sandallin N, Ergeneli S, Twetman S. Salivary mutans streptococci and lactobacilli levels after ingestion of the probiotic bacterium *Lactobacillus reuteri* ATCC 55730 by straws or tablets. *Acta*

- Odontol Scand 2006;64:314–18.
10. Krasse P, Carlsson B, Dahl C, Paulsson A, Nilsson A, Sin kiewicz C. Decreased gum bleeding and reduced gingivitis by the probiotic *Lactobacillus reuteri*. Swed Dent Jour 2006;30:55-60.
 11. Haukioja A, Yli-Knuuttila H, Loimaranta V, Kari K, Ouwehand AC, Meurman JH *et al*. Oral adhesion and survival of probiotic and other lactobacilli and bifidobacteria *in vitro*. Oral Microbiol Immunol 2006;21:326–32.
 12. Shimauchi H, Mayanagi G, Nakaya S, Minamibuchi M, Yto Y, Yamaki K *et al*. Improvement of periodontal condition by probiotics with *Lactobacillus salivarius* WB21: a randomized, double-blind, placebo-controlled study. J Clin Periodontol 2008;35:897–905.
 13. Marcotte H, Köll-Klais P, Hultberg A, Zhao Y, Gmür R, Mändar R *et al*. Expression of single-chain antibody against RgpA protease of *Porphyromonas gingivalis* in *Lactobacillus*. J Appl Microbiol. 2006;100(2):256-63.
 14. Rokka S, Myllykangas S, Joutsjoki V. Effect of specific colostral antibodies and selected lactobacilli on the adhesion of *Helicobacter pylori* on AGS cells and the *Helicobacter*-induced IL-8 production. Scand J Immunol 2008;68:280–86.
 15. Köll-Klais P, Mändar 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. 2005;20(6):354-61.
 16. Caglar E, Kargul B, Tanboga I. Bacteriotherapy and probiotics role on oral health. Oral Dis 2005;11:131–37.
 17. Wilson M. Manipulation of the indigenous microbiota. In: Wilson M, editor. Microbial inhabitants of humans. New york: Cambridge University Press; 2005.p 395-416.
 18. Teughel W, Newman MG, Coucke W, Haffaj Ee AD, Van Der Mei HC, Haake SK *et al*. Guiding Periodontal Recolonization: a proof of concept. J Dent Res 2007;86(11):1078-82.