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Do Probiotics Have a Part in Dentistry and Dental Care?

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ABSTRACT
Background:
This review discusses the most recent research on probiotic bacteriotherapy from the standpoint of dental health. Recent experimental research and the outcomes of randomised controlled trials have demonstrated that some species of gut bacteria, particularly Lactobacillus and Bifidobacterium, may have positive effects on the oral cavity by suppressing cariogenic streptococci and Candida sp. gastrointestinal illnesses have been successfully managed using probiotics. Additionally, they seem to reduce allergies and disorders with immunological pathology symptoms. The mechanisms of probiotic effect seem to be related to immune regulation and colonisation resistance. Different antimicrobial compounds, including organic acids, hydrogen peroxide, carbon peroxide, diacetyl, low molecular weight antimicrobial chemicals, bacteriocins, and adhesion inhibitors, which can have an impact on oral microbiota, can be produced by lactic acid bacteria.
On the probiotic effect in the oral cavity, there is still a lack of information. It is necessary to learn more about how probiotics colonise in the mouth and any potential effects they may have on and within oral biofilms. There is every reason to think that the hypothesised probiotic mechanisms of action in the mouth and other gastrointestinal tract regions are same.Probiotic therapy is an intriguing and topical idea that deserves additional investigation in the realms of oral medicine and dentistry given the growing global problem of antimicrobial antibiotic resistance.

Keywords: Probiotics, Lactic Acid Bacteria, Bifidobacteria, Dental Health, Dental Disease, Dental Caries, Periodontal Disease, Oral Candidosis, Oral Yeast Infection

1. INTRODUCTION

With the rise of multiresistant bacteria, antibiotic resistance is becoming a more significant global issue (1). Scientists are now looking for alternative strategies to fight infectious diseases as a result of this regrettable development. However, a long-forgotten theory about employing bacteria for health benefits has just been revived and is the subject of extensive investigation using cutting-edge study designs and methodologies.The administration of naturally occurring human-origin bacteria as a therapeutic manipulation of the bacterial micro environment in the gut (3) and bacteriotherapy, which typically involves colonic infusion of

donor human intestinal flora into patients suffering from severe gastrointestinal (GI) disorders (2), appear to offer cutting-edge tools for the treatment of infectious diseases.

Probiotics

Probiotics are defined as bacterial cultures or living microorganisms that, when consumed in specific amounts, provide health advantages beyond basic nutrition and sustain a balanced and healthy gut bacterial flora. (7) They are therefore living bacteria that alter the intestinal microbial balance of the host to benefit it. (10) In order to maintain the qualities that contribute to their favourable health effects, these bacteria must be a part of the natural flora in order to be able to withstand acid and bile, endure throughout intestinal transit, cling to the intestinal mucosa, and create antimicrobial substances. Additionally, probiotics must be able to prevent the growth of gut pathogens and maintain their stability during production and storage, which can affect both viability and functional qualities. (4)

The probiotic bacteria Lactobacillus rhamnosus GG, ATCC 53103 (LGG), has been the subject of the most research. In 1985, it was initially isolated from human intestine, and named after the discoverers, Barry Goldin and Sherwood Gorbach. (5) The advantages of LGG for human health were quickly confirmed in several experimental and clinical trials. (6) It has been demonstrated to generate a chemical that may have inhibitory effects on a variety of bacterial species, including cariogenic Streptococcus spp. (7)

There is little evidence, nevertheless, that the probiotic action—such as the impact that prevents caries—continues after ingesting the bacteria. Most likely, host-dependent factors influence colonisation behaviour in general. This was recently reported by Brigidi et al. (8), who used the polymerase chain reaction (PCR) approach to monitor intestine colonisation for strains of Streptococcus thermophilus and Bifidobacterium. In their research, either yoghurt was taken by healthy volunteers or patients with inflammatory bowel disease received bacteriotherapy. The researchers examined faeces samples for germs and found that there was only brief, temporary colonisation. Except for the aforementioned pilot study, there are no other data from oral colonisation patterns of probiotic bacteria (9).Data on probiotics in oral ecology are generally lacking.

Normal intestinal flora

Normal intestinal microflora is a metabolically active yet unstudied host defence organ. There are 300–500 distinct bacterial species in the large intestine. (4) Some of them have the capacity to spread infection when certain conditions exist.

The formation of the normal flora is influenced by contact with the maternal intestinal flora and environment, as well as possibly by genetic factors. Microbial colonisation of the gut begins after birth. (10) It is believed that breastfed babies naturally have a prevalence of bifidobacteria, but formula-fed babies have a more complicated microbiota resembling that of adults. However, during weaning, the microbiota gradually changes to resemble adult microflora. (6, 7)

The microflora's makeup may either protect the person or make them more susceptible to illness. The infant's healthy gut microbiota has a significant impact on how their immune system develops. (8) A healthy balance between the various bacteria species promotes the early development of the immune system and shields the child from allergies. (9) Thus, the promotion of health can also benefit from gut microorganisms. Particularly probiotics are understood to play a contribution in the prevention or treatment of various disorders. (3)

Probiotics' mechanisms of action

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The probiotic action may be mediated by a number of ways. Probiotics strengthen the mucosal barrier and restore normal gut microecology after diarrhoea to promote colonisation resistance to gut pathogens. (9) Antigen transport is accelerated if the gut microbiota is inadequate. All of the gastrointestinal studies that are referenced in the proposed mechanisms of probiotic effect are true. More research is required to determine their application to oral health. However, there is every reason to suppose that at least some probiotic processes may also be involved in that portion of the system since the mouth is the first part of the gastrointestinal tract. Additionally, it is possible that resident probiotics exist in the oral microflora and have a role in the production and growth of oral biofilms in general as well as the intricate ecosystem of dental plaque.

Dental health and probiotics

There aren't many studies on the presence, function, and outcomes of probiotic bacteria in the mouth. In their study of 130 participants in Thailand, Sookhee et al. (5) discovered 3790 lactic acid bacterial species from healthy oral cavities. Five of these species had inhibitory effects on oral Candida and other bacteria.

The scientists stated that a number of variables, including pH, catalase, proteolytic enzymes, and temperature, had an impact on the antibacterial properties of the bacteria. These series' final identification led to the discovery of Lactobacillus paracasei and L. rhamnosus, strains the authors recommended as promising candidates for more research.

Probiotic cheese was recently studied in 294 self-acting seniors, aged 70 to 100 years. (9) For a double-blind, placebo-controlled intervention research, the participants were randomly assigned. The findings demonstrated that probiotics decreased oral Candida prevalence and, interestingly, the likelihood of hyposalivation in the elderly.The likelihood of being in the high yeast count class (> 105 colony-forming units (cfu) ml)1 was reduced by 75% (OR 14 0.25, 95% CI 0.10-0.65) by probiotic intervention.This preliminary finding is intriguing because Candida sp. is becoming more resistant to antifungal medications, and it offers hope that probiotics may one day be used as an additional therapy to treat oral yeast infections.

Finally, because lactic acid bacteria do ferment sugars and therefore lower pH, it is crucial to ensure that, for instance, probiotics provided to dairy products do not conflict with other protective components. In light of this, Wei et al. (7) observed that isolated immune protein antibodies intended for passive immunisation against dental caries were unaffected by LGG-fermented milk. During the course of the 2-month observation period, the anti-cariogenic streptococci antibody activity persisted. The scientists came to the conclusion that adding bovine-specific antibodies against mutans streptococci to probiotic milk products might be advantageous from an anticariogenic standpoint.

Additional 'bacteriotherapy' options for treating oral disorders

Additionally, prebiotic elements, which are nondigestible food components thought to positively influence the gut flora, have already been studied in clinical trials (5). After adding oligofructose to infant cereals, a positive trend for fewer days of diarrhoea in Peruvian children was recently noticed (6). The prebiotic notion hasn't been studied in relation to oral disorders, though. There is every reason to think that altering oral microbiota may also be helped by a prebiotic strategy.It's interesting to note in this context that human milk includes oligosaccharides with prebiotic properties (9). The child's diet significantly affects how the oral microbiota develops.

To sum up, when discussing contemporary biotechnological methods for treating oral diseases with bacteriotherapy, one might be sceptical, but it depends on how readily the

public accepts the use of genetically modified bacteria as an alternative therapy for chronic, non-fatal diseases like dental diseases. However, it is intriguing and warrants more research to replace harmful microbes with altered or inactivated bacteria that may have positive properties (8). Phage treatment and prebiotics should also be thoroughly researched in relation to oral infections, in addition.

2. CONCLUSION

The idea put forth by Elie Metchnikoff is now being backed by mounting evidence that some components of the gut microflora are in fact advantageous to health. They'll probably be crucial in the fight against issues brought on by antibiotic misuse and antimicrobial resistance. But despite what the findings of the initial intervention experiments appear to indicate, it is still unclear if Metchnikoff's theories can be used to advance oral health. However, the study of probiotics is a very young and exciting area in oral microbiology and oral medicine. The idea sheds new insight on how diet and health, especially dental health, are related.

Other oral microbes besides the caries pathogens and Candida examined to date need to be prevented from growing, hence more research is required to understand how different probiotic strains can do this. It is unknown how probiotics generally affect the oral microbiota. Additionally unknown are the probiotics' methods of action in the intricate interactions between emerging and established microbial colonies and dental biofilms. To determine the most effective method of probiotic administration and the amounts required for various preventive or therapeutic reasons, randomised controlled trials must be conducted. Additionally, we know very little about any potential resident probiotics that may exist naturally in the mouth.

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