

Probiotics in dentistry

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ABSTRACT

Probiotics are living and viable micro-organism that confers benefits to the health of the host when consumed, in adequate quantities, as part of a food or a supplement. Oral diseases are an important problem for public health as well as an altered balance of the biome can induce both local and systemic diseases. In the dentistry field, the probiotic *L. Reuteri* deserves attention apart: it is a colonizer of the intestine and is part of the indigenous bacterial flora of the oral cavity. The use of probiotics in dentistry has extended to the treatment of periodontal disease and for some soft tissue pathology such as oral candidosis and oral lichen planus. Probiotics can be considered an alternative to conventional treatments but more clinical trials must be performed to better understand their potential benefits.

Keywords: *probiotics, lactobacillus reuteri, lactobacillus ramnosus, lactobacillus plantarum, oral candidosis, oral probiotics.*

1. INTRODUCTION

The term probiotics derive from Greek (pro and bios) and it means “for life”.

The probiotic actions are:

- 1) Antimicrobial: in order to inhibit the growth of pathogens bacterially
- 2) Probiotics metabolite, like the lactic acid of *lactobacillus*, could inhibit the growth of some pH sensitive pathogens bacterial
- 3) Probiotics could inhibit the toxin release from bacteria.

Probiotics are living and viable micro-organism that confers benefits to the health of the host when consumed, in adequate quantities, as part of a food or a supplement [1,2]. The prebiotics instead, are organic substances able to promote the growth of probiotic bacteria as they act as a nutrient substrate and resistant endogenous degradation [1]. The most common prebiotics are the fruit-oligosaccharide (FOS), and galacto-oligosaccharides (GOS). Inulin is the best known of the FOS and the most studied. Among the GOS, the two most important substances are lactose and lactitol “now-digestible food substances” [3]. Probiotics must respond to two characteristics: being of human origin (present in the human intestine, and creating permanent colonies); resisting the acidity of the stomach and to the action of the bile [3]. They act by antagonizing the pathogenic microorganisms and they produce antimicrobials. Oral diseases is an important problem for public health as well as an altered balance of the biome can induce both local diseases (pathologies of the gums) and district pathologies (heart disease or respiratory complications or diabetes atherosclerosis). This section is dedicated to oral hygiene in which

we will treat the problems related to the importance of oral health. Their safety must be proven but there are numerous studies on their effectiveness. Most of the organisms actually known are included in the GRAS (Generally Recognized as Safe) list and therefore their use is considered safe. Their beneficial effect depends from selected ducks (there are thousands of them and each strain has its own activity and action), probiotics are classified in terms of gender: (eg. *lactobacillus*), species (eg. *Helveticus*) and strain (eg. R0052) [3]. The *Lactobacilli* and the *Bifidus* bacteria are found in every district or in a variable number of intestinal, but only in same district, they perform a direct probiotic action or synergies with the other intestinal components, while on others they are normal “diners”. In the large intestine (small and large) the *Bifidobacteria* are not numerous as the *Lactobacilli*: from 6 to 10 times, almost all the probiotics play essential functions in the development of the newborn while the *lactobacilli* play this role after [3]. Between *Lactobacilli* we recognize *Lactobacillus Acidophilus* that protects against the invasion of *Helicobacter pylori* and helps to decrease lactose intolerance caused by the deficiency of the enzyme lactase (beta-galactosidase) producing itself a lot of the enzymes and therefore helping to digest more lactose. The *Fermentum LF3* produces large amounts of Glutathione, a powerful anti-oxidant which protects tight joints from oxidation. This function helps the body to protect itself against the so called “food intolerances” because it reflects the absorption of substances that are not correctly digested [4]. *Lactobacillus casei* is able to modulate the inflammatory response in patients affected by Crohn and from juvenile chronic arthritis [4].

2. PROBIOTIC ACTION MODALITY

The action of probiotics takes place on three distinct levels: they have an antimicrobial action to inhibit the growth of

pathogens agents; the probiotic metabolites, like lactic acid of *Lactobacillus*, can inhibit the growth of some ph-sensitive

pathogens; they are able to bind to toxins released by pathogens

3. USE OF PROBIOTICS IN THE ORAL CAVITY

Probiotics can stimulate local immunity and protect oral mucosa from the many pathogens present in the oral ecosystem in a diversified way. Their main action is to influence the adhesion of various pathogens to the surface of host cells thanks to competitive exclusion [3,4,5]. Moreover, the binding of probiotics to host cells can induce some host cells to secrete anti-inflammation cytokines that reduce tissue inflammation. In the dentistry field, the probiotic *L. Reuteri* deserves attention apart: it is a colonizer of the intestine and is part of the indigenous bacterial flora of the oral cavity. In fact, it is transmitted from mother to child through mother's milk [5]. It is used in the therapies of the gaseous colic of the newborn in the constipation, in the gastrointestinal disorders of the children, in atopic dermatitis, in *h. pylori* infection etc [5]. In the oral cavity, it performs an antimicrobial action for the production of rheuterin and it is able to counteract the bacteria responsible for the periodontal disease [6,7]. It has also the ability to distributed himself in saliva and adhere to the oral mucosa. It has an anti-inflammatory action, and the ability to modulate the immune response [8]. The use of probiotics in dentistry has also extended to the treatment of some diseases of the oral mucosa. For the treatment of oral candidiasis [9,10] probiotics like *Lactobacillus Plantarum*, *Fermentum L23*, *Pentastus* have been studied. For the

with consequent inhibition of their action [5].

ability of probiotics to reduce the production of inflammatory cytokines and inhibit metallo- proteinases [9] they have also been proposed as a treatment of Oral Lichen Planus [11]. An interesting work highlights how the bacterial population in patients with lichen lesions is very different from a patient who does not show these lesions. Probiotics could create a new balance in the treatment of oral lesions introducing a new concept in the treatment of this disease [12]. Recent studies demonstrated that the probiotic milk powder containing *L. paracasei* SD1 could reduce mutants streptococci counts [13]. and was apparently able to colonize the oral cavity of the orthodontically treated cleft lip and palate patients [14]. Probiotics are tested also in an in vitro study for endodontic treatment. The authors concluded that probiotic groups showed inhibitory activity against *E. faecalis* [15,16]. In another work with 45 patients with Recurrent Aphthous Stomatitis (RAS) enrolled probiotics have determined an improvement of the pain [17]. *In vitro* study conducted on herpes simplex virus type 1 (HSV 1) demonstrated that *Lactobacillus Rhamnosus* was effective in decreasing HSV-1 infectivity [18]. Probiotics are very useful also for halitosis [19,20]. The inhibitory effect of volatile sulfur compounds production (VSC) performed by *Fusobacterium nucleatum* could explain the effectiveness of probiotics, but more clinical studies needed for this phenomenon [21].

4. CONCLUSIONS

In conclusion, we can say that, given the side effects of some drugs and the ever-increasing bacterial and fungal resistance, probiotics can be considered a valid alternative to conventional

treatments. However, more clinical trials must be performed to better understand the type of use and their effectiveness [22,23].

5. REFERENCES

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