Comparative Evaluation of Efficacy of Probiotic, Chlorhexidine and Flouride Mouthrinses in Children: A Short-Term Clinical Study

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ABSTRACT

INTRODUCTION
To clinically evaluate the efficacy of Probiotic, Chlorhexidine and Fluoride mouthrinse on plaque accumulation and gingival inflammation in children.

METHODOLOGY
The trial design was a double-blinded parallel group, 28 days comparative study between Probiotic mouthrinse, Chlorhexidine mouthrinse and Fluoride mouthrinse, which included 40 healthy children in age-group of 6-10 yrs.

RESULTS
The Probiotic, Chlorhexidine and Fluoride groups had less plaque accumulations compared with the control group at the end of 28 days (P < 0.001, P< 0.001 and P< 0.001, respectively). There was no significant difference in the mean gingival inflammation between the Probiotic, Chlorhexidine and Fluoride mouthrinse on the 28th day. But there was significant decrease in the mean Gingival Index (GI) when compared with control group on the 28th day.

CONCLUSION
The Probiotic mouth-rinse tested was effective in reducing plaque accumulation and gingival inflammation. However, data are not enough to prove its effectiveness and use in oral infections so further long-term trials are needed.

KEYWORDS: Chlorhexidine mouthrinses, Fluoride mouthrinses, Probiotics

INTRODUCTION
Problems arising from excessive use of antibiotics especially appearance of bacterial resistance has led to the concept of use of probiotic therapy for various applications in oral health. Oral problems that have been targeted are dental caries, periodontal disease and halitosis. An essential condition for a microorganism to represent a probiotic of interest for oral health is its capacity to adhere to and colonize various surfaces of the oral cavity.1,2

The definition that has been approved by the United Nations Food and Agriculture

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Organization (FAO) and the World Health Organization (WHO) define probiotics as living microorganisms, principally bacteria, that are safe for human consumption and, when ingested in sufficient quantities, have beneficial effects on human health, beyond basic nutrition.³

Mechanisms of action which explains the beneficial effects of probiotic include:⁴

- Stimulation of nonspecific immunity and modulation of humoral and cellular immune response which leads to strengthening of the resistance to pathogenic challenge.

- Alteration of the composition and metabolic activity of host microbiota at the specific location by secreting various antimicrobial substances such as organic acids, hydrogen peroxide and bacteriocins.

Studies indicate that probiotics may reduce side effects associated with treatment for *Helicobacter pylori* infection, the cause of most stomach ulcers. There is strong evidence that probiotics may reduce the risk of necrotizing enterocolitis, a severe intestinal condition of premature newborns. Various other potential future applications are reduction in cholesterol levels, treatment of obesity, and management of irritable bowel syndrome.⁵

However, data supporting the action of probiotic in oral cavity are still sparse. Numerous randomized clinical studies will be required to clearly establish the potential of probiotics in preventing and treating oral infections.

The purpose of the present study is to evaluate and compare the efficacy of a Probiotic, Chlorhexidine and Flouride mouth rinses on plaque and gingival accumulation in children.

**OBJECTIVES**

To clinically evaluate and compare the efficacy of a Probiotic, Chlorhexidine and Flouride mouth rinses on

- Plaque accumulation
- Gingival inflammation.

**MATERIAL AND METHODS**

**Patient selection criteria**

A group of 40 healthy children aged 6-10yrs were recruited from the outpatient department of the Department of Pediatric & Preventive Dentistry, Government Dental College & Hospital, Jaipur, Rajasthan.

**Inclusive criteria:**

- Healthy children without any known systemic illness.
- No recent history of use of antimicrobial agents or any drugs (upto within 6 months).

**Exclusive criteria:**

- Children using any oral hygiene aid other than routine tooth brushing.

The trial design is a double-blind parallel group, 28 days comparative study between Probiotic, Chlorhexidine and Flouride mouth rinses. During the entire study, the participants continued to exercise their regular non-supervised, self-performed oral hygiene measures. The participants were assigned into four groups with 10 children in each group as follows:

- Group A: Probiotic Group
- Group B: Chlorhexidine group
- Group C: Flouride group
- Group D: Control Group

Since the study has a double-blind trial design the mouth rinses were dispensed through other
staff of the department. Baseline measurements of Plaque Index (PI) (Turesky et al., 1970) and Gingival Index (GI) (Löe and Silness, 1963) were taken from all the participants followed by full mouth prophylaxis. (Figure No.1a,b,2,4a,4b,5).

They were instructed to continue with their routine tooth brushing methods. The designated mouth rinses were dispensed according to the groups of the subjects. They were instructed to rinse twice daily about 30 minutes after tooth brushing with 15 ml of the solution for 60 seconds, followed by expectoration of the residual mouth rinse and not eat, drink, or rinse their mouths for at least 30 minutes after using the solution. On day 28, all subjects returned for clinical measurements (Figure No.3,6a,6b). This was followed by full mouth prophylaxis again.

RESULTS

The mean baseline score for PI and GI were similar in all the four groups. The mean PI values for all the 3 groups were 0 after scaling and polishing was done for all tooth surfaces. A PI score of 0 represented a tooth surface that was entirely free of clinically detectable plaque.

Tests of within subjects’ effect for PI for the four groups showed a p value of < 0.001. Thus, the differences in the mean PI for all the four groups were significant. The degree of increment in mean plaque scores were more pronounced in control group when compared with other groups (Figure No.7).

Tests of within subjects’ effect for GI for the four groups showed a p value of < 0.001. Thus, the differences in the mean GI for all the four groups were significant. On the 28th day of examination there was a significant decrease in the mean GI score of Probiotic, Chlorhexidine and Fluoride group when compared with the control group (Figure No.8).

However, there were no significant differences in the mean plaque accumulations and gingival inflammation between the Probiotic, Chlorhexidine and Fluoride group on the 28th day.

In this study, there was a significant difference found between mean PI and mean GI of the control group when compared with Probiotic, Chlorhexidine and Fluoride rinse after 28 days in comparison to the baseline (p< 0.001). Therefore, the findings of this study showed that Probiotic mouthrinse had potential therapeutic value in the prevention of plaque formation and reducing gingivitis and can be good alternative to other antibacterial mouthrinses.
DISCUSSION

Shah RK: Efficacy of Probiotic, Chlorhexidine and Flouride Mouthrinses in Children.

Plaque plays a major role in the development of dental caries, gingivitis and periodontal disease. The most effective way to prevent dental caries and periodontal problems like gum bleeding and gingival inflammation is the mechanical removal of plaque through effective brushing followed by flossing. Mouth rinsing provide additional benefits in controlling gingivitis and preventing the formation of supra-gingival plaque, but it should always be used along with mechanical plaque control measures.

The most tested and effective anti-microbial agent known today is chlorhexidine digluconate. It is not recommended for long-term use due to its numerous adverse effects. These include tooth and restoration staining, soft tissue staining, increased calculus deposition, unpleasant taste, taste alteration, burning sensation, desquamation and mucosal irritation. Chlorhexidine may also potentiate oral discomfort in patients with chemotherapy-induced mucositis, xerostomia or ulcerative oral mucosal conditions.

Fluoride assists in the prevention of dental caries by promoting remineralisation with fluorapatite and fluoro-hydroxyapatite, thereby increasing enamel resistance to acid attack. Fluoride is available in different concentrations as either acidulated phosphate fluoride or sodium fluoride. The side effects associated with topical fluoride are discoloured teeth and a deterioration of tooth enamel.

The side-effects associated with various available mouthrinses have stimulated the search for alternative antiplaque agents.

The potential application of Probiotics for oral health has recently attracted the attention of several teams of researchers as they helps in maintaining oral health by utilizing natural beneficial bacteria commonly found in healthy mouths to provide a natural defence against pathogenic micro-organisms.

Ideal properties of a probiotic to be used for preventing oral infections are:
- Production of antimicrobial substances against oral pathogens.
- Alteration of environmental conditions of the mouth.
- Reduction of the inflammatory response.
- Competitive blocking of adhesion sites at epithelial and mucosal surfaces.

Probiotics and Chlorhexidine mouthrinses has been demonstrated to reduce the incidence of plaque formation and gingivitis in 6-8 year old children.

The use of probiotic tablets in the treatment of gingivitis and different degrees of periodontitis, the effect of probiotics to the normalization of microflora was found to be higher in comparison to the controls. Probiotic *bifidobacterium* species reduced gingival and periodontal inflammation.

The presence of two species, *Streptococcus oralis* and *S. uberis* has proved to inhibit both *in vitro* and *in vivo* growth of periodontopathogens. Their presence has been demonstrated as an indicator of good periodontal health.

In this study, it was observed that there was a significant difference between mean PI and mean GI score of the control group when compared with Probiotic, Chlorhexidine and Flouride rinse after 28 days in comparison to the baseline ($p < 0.001$).
However, there were no significant differences in the mean plaque accumulations and gingival inflammation between the Probiotic, Chlorhexidine and Fluoride groups on the 28th day examination.

**CONCLUSION**

The Probiotic mouth rinse in the present study was effective in reducing plaque accumulation and gingival inflammation in 6-10 year old children. It can be used an effective alternative for other traditional mouthrinses in reducing plaque accumulation and gingival inflammation. They have turned out to be very promising in ensuring oral health and wellbeing but numerous randomized clinical studies will be required to clearly establish the potential of probiotics in preventing and treating oral infections.

**REFERENCE**


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