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COMPARATIVE EVALUATION OF PH CHANGES OF SALIVA USING PROBIOTIC AND CHLORHEXIDINE MOUTHWASH IN CHILDREN – A SHORT TERM CLINICAL STUDY

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ABSTRACT

Objectives: The aim of the study is to evaluate and compare effect of Probiotic mouthwash and Chlorhexidine containing mouthwash on salivary pH in children. **Method**: The study was conducted over a period of one month among 40 healthy school children aged between 6-12 years. The subjects who fulfilled inclusion criteria were selected and randomly divided into 2 groups namely probiotic and chlorhexidine groups. Saliva was collected immediately after rinse (baseline), 15 mts after rinse, 30 mts after rinse and pH of each salivary sample was recorded using pH meter. Statistical analysis was done using unpaired t test. P-value <0.05 was considered statistically significant. **Result**: There was a significant increase in the pH of salivary sample in both Group A and Group B after the mouth rinses. Group A shows minimum increase in the salivary pH after the immediate, 15 and 30 min when compared to Group B. Comparing 2 groups, there was statistically significant difference between Probiotic mouth wash and Chlorhexidine gluconate mouth wash. **Conclusion**: The study conducted shows beneficial effects of probiotics in providing an alkaline environment which is conducive to oral health of children.

KEYWORDS: dental caries; probiotics; salivary pH.

INTRODUCTION

The maintenance of oral hygiene is one of the key elements of oral health. The oral cavity harbors bacteria and is exposed to environmental stimuli such as foods, chemicals, and temperature which remain in a balanced state during healthy state of mouth. However, imbalances in equilibrium of defense mechanisms and various stimuli lead to various oral diseases such as dental caries and periodontal diseases.[1]

Dental caries is the most common chronic oral disease that affects 60–90% of the young population. It has multifactorial etiology.[2] Interaction of bacteria, diet and host response play a major role in initiation and progression of dental caries. Salivary pH has a direct effect in maintaining oral health. Acidic pH results in demineralization and gingival inflammation. It has been well documented that the dissolution of enamel occurs when the pH falls below critical pH of 5.5.[3]

A mouth rinse is advantageous home care measure to augment oral hygiene and to prevent dental caries. A variety of synthetic mouthwashes are available in the market to prevent dental caries.[4] The most common benefit of mouth rinsing is that it increases the salivary pH. Chlorhexidine is one of the most popular mouth rinses. It is considered as a gold standard, but it has few disadvantages such as tooth staining, unpleasant taste, alters taste sensation, and increased calculus formation.[5] Hence, there is a need for alternative to chlorhexidine.

Recently, various economical and efficacious agents have been tried out in combating dental caries. Among these, probiotics are also being used. Probiotics are useful microorganisms which when administered in adequate amounts confer beneficial effects on the health of host. Commonly used probiotic strains are Lactobacillus rhamnosus GG, Lactobacillus casei, Lactobacillus reuteri, Lactobacillus plantarum, Lactobacillus brevis CD2, and Bifidobacterium species.[6] Probiotics inhibit pathogenic biofilm formation, induction of cytoprotective proteins, reduction of inflammation, stimulation of the host immune response, and killing of pathogens through production of bacteriocins along with altering the local environment pH.[7]

Therefore, the aim of the present study is to evaluate and compare effect of Probiotic mouthwash and Chlorhexidine containing mouthwash on salivary pH in children.

MATERIALS AND METHOD

The study was cleared by Institutional Ethical Committee of KMCT Dental College, Mukkam, Calicut, India. Informed oral and written consent was obtained from the parents of the children.

To carry out this study, chlorhexidine 0.2% mouthwash, probiotic mouthwash (Fig.1), graduated polyethylene tube, and digital pH meter (Fig.2) were used.

PREPARATION OF MOUTHRINSES

CHLOREXIDINE MW: 10 ml of chlorhexidine 0.2% mouthwash with 1:1 dilution in water.

PROBITIC MW: prepared using commercially available probiotic product Darolac (Aristo Pharmaceuticals, India). 1g Darolac powder contains 1.25 billion freeze-dried bacterial combination comprised of Lactobacillus acidophilus, Lactobacillus rhamnous, Bifidobacterium longum, and Saccharomyces boulardii. The sachet contents were dissolved in 10 ml of distilled water which was used as a mouthrinse.[8]

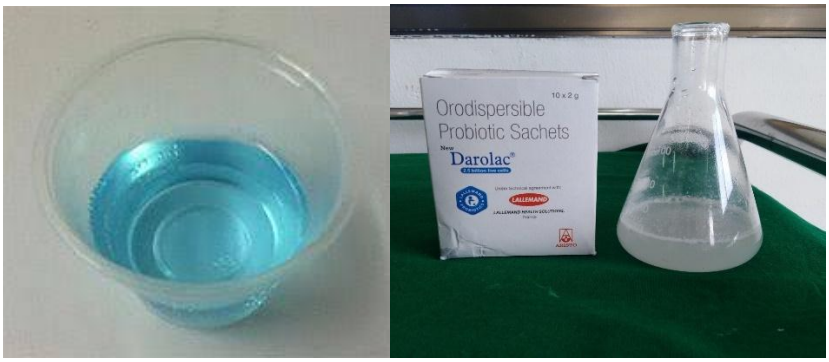


Figure 1: Chlorhexidine 0.2% mouthwash (left) and probiotic MW (right).

Figure 2: digital pH meter.

SELECTION OF STUDY SAMPLE

40 school children aged 6–12 years, who reported to Dept. of Pediatric Dentistry, KMCT Dental College, were included in the study. All the recruiters fulfilled the eligibility criteria. Inclusion criteria for the study were: Healthy children without any known systemic condition, children with no active carious lesions, no history of use of antimicrobial agents or any other drugs (up to within 4 weeks).

Children with abscess, draining sinus, cellulitis, or other conditions requiring pulp therapy or extraction were excluded. Furthermore, children with known history of allergy to any mouthrinse or drug; suffering from any systemic illness; using any other commercially available probiotic products; using any other oral hygiene aids other than routine teeth brushing were not included in the study.

PROCEDURE

Children were randomly divided into two groups.

- Group A had 20 children for 0.2% chlorhexidine mouth rinse
- Group B had 20 children for probiotic mouth rinse

Before saliva collection, patients were kept seated for 5 min, relaxed and silent. Following an initial swallow, 5 ml of unstimulated saliva was collected in a sterilized container. The pH of saliva samples were noted using a digital pH meter. Children of Group A were given 10 ml of chlorhexidine 0.2% mouthwash and Group B were given 10ml of probiotic mouthrinse and asked to rinse for 2 min.

Saliva was collected immediately after rinse (baseline), 15 mts after rinse, 30 mts after rinse and pH of each salivary sample was recorded. (Fig.3)

Figure 3: saliva sample collection.

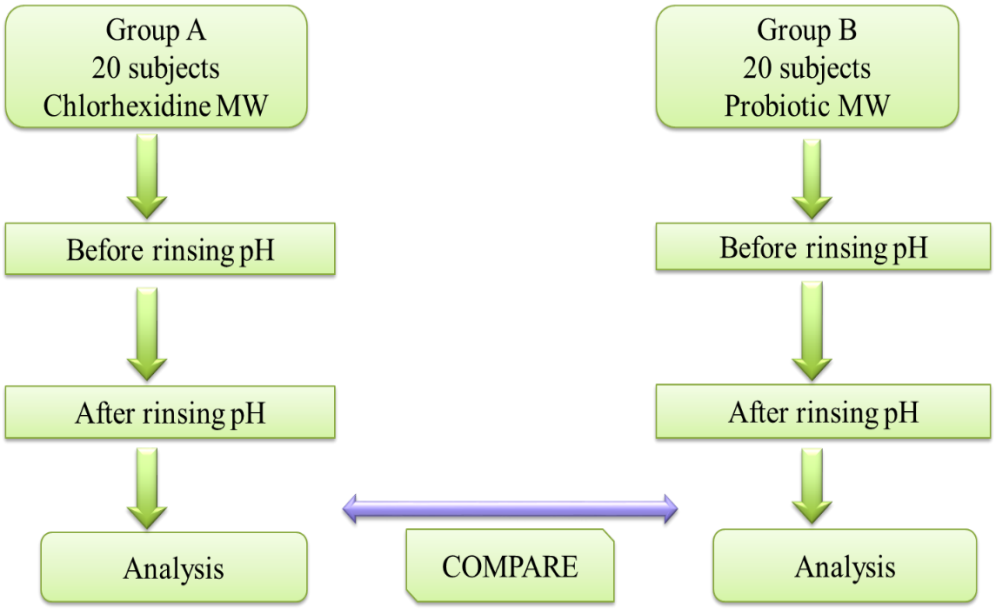


Figure 4: Flowchart depicting the methodology employed.

STATISTICAL ANALYSIS

Statistical analysis was done using SPSS software version 20.0 using unpaired t-test. The comparison of salivary pH at different time intervals was noted.

RESULTS

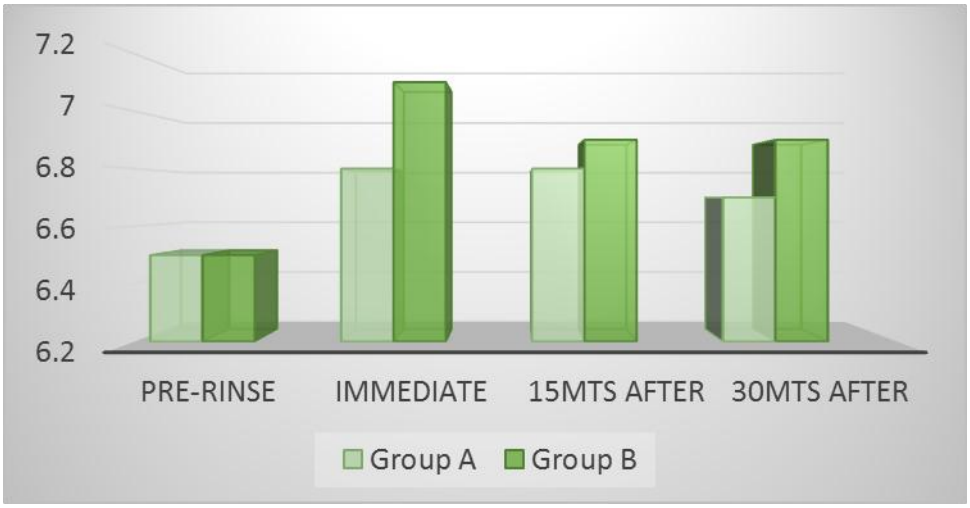
The comparison of different time intervals of both the groups was recorded. [Table 1]

Table 1: Comparison of salivary pH scores in terms of mean (standard deviation) at different time intervals in chlorhexidine and probiotic group.

TIME INTERVAL	GROUP A		GROUP B		P VALUE
	Mean	SD	Mean	SD	
Pre-rinse	6.55	0.68	6.51	0.49	0.83
Immediate	6.78	0.42	7.15	0.36	0.005*
15mts after	6.82	0.39	6.88	0.32	0.597
30mts after	6.57	0.38	6.92	0.27	0.002*

*P<0.001 highly significant along with SD: Standard deviation

There was a significant increase in the pH of salivary sample in both Group A and Group B after the mouth rinses. Group A shows minimum increase in the salivary pH after the immediate, 15min and 30 min when compared to Group B, which is appreciable in Graph 1. In the probiotic mouthrinse group, salivary pH was increased compared to baseline, but the result was not statistically significant within the group. Comparing 2 groups, there was statistically significant difference between Probiotic mouth wash and Chlorhexidine gluconate mouth wash.



Graph 1: Comparison of salivary pH of both the groups at different time intervals.

DISCUSSION

Salivary pH is one of the key indicators of carious process.[9] The average pH of saliva at rest is 6.8 and it varies between 6.5 and 7.0. Research suggests that it is pH, rather than sugar, which is the selective factor for caries initiation and progression. When the salivary pH is low, it promotes the growth of aciduric bacteria which allows the acidogenic bacteria to proliferate, thereby creating an inhospitable environment for the protective oral bacteria. This allows for a shift in the environmental balance in favor of cariogenic bacteria, which further lowers the salivary pH. By controlling pH, it is possible to alter the plaque biofilms, remineralize the existing lesions, and perhaps prevent the disease altogether.[10]

However, it should be noted that pH alone is not a good indicator for the erosive potential of any substance. The degree of saturation of the solution with respect to dental hard tissue and consistency of the agent (duration of the contact with the tooth surface) play an important part in the erosion process. Demineralization depends, among other things, on host factors such as the fluoride concentration of the hard tissues, pellicle and plaque formation, and also calcium fluoride precipitation on the surfaces of the teeth (acting as a fluoride reservoir)[11-12]

Probiotic mouthwash contains living microbes, which beneficially influence the health of the host when used in adequate numbers. Consumption of products containing probiotic bacteria such as Lactobacilli or Bifidobacterium could reduce the level of S. mutans in saliva.

Zahradnik RTet al. (2009) assessed the safety and effectiveness of a probiotic mouthwash and concluded that the product was safe for daily use as an aid in maintaining dental and periodontal health.[13] A study conducted by Jindal et al. also reported a statistically significant reduction in mutans streptococcus count in saliva when probiotic powder containing combination of bacteria was used as mouthrinse for 14 days.[14]

Similarly, in the present study, here probiotic powder containing combination of bacteria was used as mouthrinse and alkalinity of saliva was maintained compared to baseline.

By controlling pH, it is possible to alter the plaque biofilms, remineralize the existing lesions, and perhaps prevent the disease altogether.[15]

CONCLUSION

The study conducted shows beneficial effects of probiotics in providing an alkaline environment which is conducive to oral health of children. However, further studies are needed to be conducted to arrive at definitive conclusions regarding the beneficial actions of probiotic rinses.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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