

COMPARISON OF CHLORHEXIDINE AND PROBIOTIC MOUTHWASH IN THE TREATMENT OF GINGIVITIS : A STUDY FROM THE HILLY STATE OF HIMACHAL

Dental Science

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ABSTRACT

Objective: To compare the changes in gingival health in subjects treated with chlorhexidine and probiotic containing mouth rinse.

Materials and Methods: Fifty volunteers between 20 and 35 years were randomly divided into two groups. Group I was given 0.2% chlorhexidine and Group II was given probiotic mouth rinse for a period of 14 days. The subjects were instructed to swish 10ml of the mouth rinse undiluted for 1 min twice daily, 30 min after brushing. Parameters as plaque score and gingival scores were compared (baseline-14days).

Results: Statistically significant difference was observed in the mean plaque scores between the probiotic (0.14) and chlorhexidine group (0.42) and in the mean gingival scores between the probiotic group (0.9) and the chlorhexidine group (0.38) with ($p \leq 0.05$).

Conclusions: Substantial improvement in gingival health of subjects was observed in the study in comparison to chlorhexidine mouth rinse. Thus, the probiotic mouthrinse was found to have a greater therapeutic potential.

KEYWORDS

Chlorhexidine, Probiotics, Gingivitis, Placebos, Clinical efficacy

INTRODUCTION

Dental plaque is considered as a prime etiological factor in gingivitis.^[1] Further gingival inflammation in response to bacterial plaque accumulation (microbial biofilms) is considered the key risk factor for the onset of periodontitis. In this background managing gingivitis is a primary preventive strategy for periodontitis and for maintaining a healthy oral environment.^[2] Considering the surging levels of multidrug resistance among pathogenic organisms^[3], particularly in hospitals, the increasing demands of consumers for natural substitutes for drugs, and the emergence of scientific and clinical evidence showing the efficacy and effectiveness of some probiotic strains, the use of probiotics and its comparative evaluation with existing gold standards^[4] to prevent gingivitis and maintain healthy state of equilibrium milieu in oral cavity needs to be explored.

The idea of Probiotics use in medicine is not a novel concept and dates back to the first decade of 1900s by Ukrainian bacteriologist and Nobel Laureate Metchnikof (1908). While studying the flora of the human intestine he developed a theory that senility in humans is caused by poisoning of the body by bacterial products. To prevent the multiplication of these organisms he proposed a diet containing milk fermented by lactobacilli, which produce large amounts of lactic acid that could increase the life span of humans. The concept of probiotics was thus born and a new field of bacteriology was opened.^[5] The term probiotics, which literally means "for life," was later coined in the 1960s by Lilly and Stillwell.^[6] Various studies have been done since to explore the potential benefits of probiotics in mouth rinse to tilt the microbiological balance to a beneficial side and evaluate their efficacy as against existing agents.^[7]

MATERIALS AND METHOD

This comparative double blind prospective study was conducted on sample size of 50 gingivitis subjects. The subjects were selected from Himachal population. Approval for the study was obtained from the ethical committee. All data was reviewed to confirm criteria for inclusion and exclusion. The eligible subjects who satisfied the inclusion criteria of 20-35 years of age with no recent antibiotic therapy (within 4 weeks) were included in the study. The Exclusion criteria included patients suffering from any systemic illness, or using any other commercially available mouth rinse, probiotic products or any other oral hygiene aids other than routine teeth brushing. Patients undergoing orthodontic treatment were also excluded from the study. All subjects were informed about the nature of study and their informed consent was taken.

The subjects and the examiner were blinded regarding the product allocation to the groups. Similar 50 ml dark glass bottles of both Chlorhexidine mouth wash (0.02% Hexidine® ICPA, bottles changed to remove bias) and probiotic mouth wash as prepared below, were

prepared by the co-ordinator who marked the code number of each bottle and kept the record. Commercially available probiotic product Darolac (Aristo pharmaceuticals, India, 23 A, Shah Industrial Estate, Off Veera Desai Road, Andheri West, Mumbai, Maharashtra 400053) containing 1 gm powder of 1.25 billion freeze dried combination, of a mixture of *Lactobacillus acidophilus*, *Lactobacillus rhamnosus*, *Bifidobacterium longum* and *Saccharomyces boulardii* was used. Each sachet powder was dissolved in 20ml of distilled water measured with a measuring cup and used as a mouth wash. The mouthwash was prepared using distilled water obtained from chemistry laboratory. When the subjects volunteered for the study and before they received a bottle containing mouthwash and instruction for use, baseline plaque index Silness and Loe (1964) and gingival index Loe H. and Silness P (1963) in which the gingivae are scored on a four-pointscale from 0 (absence of inflammation) to 3 (severe inflammation) were noted.

Each subject was given one of the test products with a given code according to the assigned group. Emphasis was made to explain to the subject that the solution had to be stirred thoroughly until all the contents were completely dissolved. The subjects were demonstrated and instructed how to use the mouth rinse. 20 ml of mouth rinse was dispensed for each individual using a measuring cup & subjects were instructed to swish the mouth rinse undiluted for one minute twice daily for half an hour^[8] after brushing & then expectorate. The procedure was performed twice daily, for the first time in the morning and repeated before retiring to bed at night for the next 14 days. During the intervention period, no influence on personal oral hygiene procedure was exerted, the subjects were encouraged to maintain routine oral hygiene & also instructed to maintain strict compliance. A day after the 14 days of intervention, gingival & plaque indices were recorded using same indices by same examiner. Clinical monitoring was performed by single examiner at baseline and 14th day.

The monitoring of compliance was assessed by instructing the subjects to return the old bottles containing mouthrinses who received a new bottle of mouthrinse. Record of the allocation list was kept with one of the study coordinators. The mouth rinses were decoded after the completion of the study. Data were collected and was analysed.

RESULTS

One hundred ten subjects between the ages of 21 and 34 years (mean age 28 years) were screened for their eligibility to participate in this study. Fifty two patients did not meet the inclusion criteria, and ten did not complete the study protocol. Twenty five subjects received chlorhexidine mouth rinse and twenty five subjects received placebo mouth rinse. At the end of the study a total of fifty subjects of both the groups could be evaluated for the results. After 14 days, the chlorhexidine (25/50) and the probiotic (25/50) groups were analysed for the various parameters.

On the basis of statistical analysis following results were drawn. Intragroup comparison of plaque scores from Baseline to 14th day showed an increase in the mean plaque score for the Chlorhexidine group that was not statistically significant, and a statistically significant reduction in the mean plaque score for the probiotic group. Intragroup comparison of gingival scores from baseline to 14 days showed there was no statistically significant increase in the mean gingival score in chlorhexidine group with mean differences of 0.1 ($p>0.05$) and a statistically significant reduction in the mean plaque score for the probiotic group.

On intergroup comparison of the plaque scores (baseline-14days) there was a statistically significant difference in the mean plaque scores between the chlorhexidine group 0.14 ($p\leq 0.05$) and the probiotic group 0.42 ($p\leq 0.05$) and there was a statistically significant difference in the mean gingival scores (baseline-14days) between the chlorhexidine group and the probiotic group as shown in Table 1 and Table 2 respectively.

Table 1: Comparison of difference in mean plaque score between Group 1 and Group 2 (Baseline-14 days)

Mean plaque score	Group1 (CHX)	Group2 (Probiotic)	p-value
Mean PI + SD Baseline	2.14+0.27	2.3+0.450	P=0.093
Mean PI +SD 14 days	0.81+0.22	0.72 +0.21	P=0.00*

* Statistically significant Independent t-test

Fig 1: Comparison of difference in mean plaque score between Group 1 and Group 2 (Baseline-14 days)

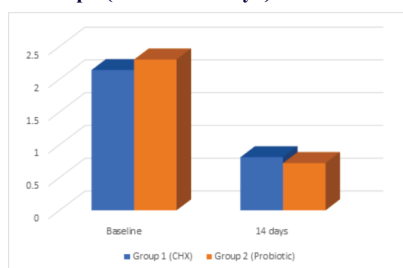
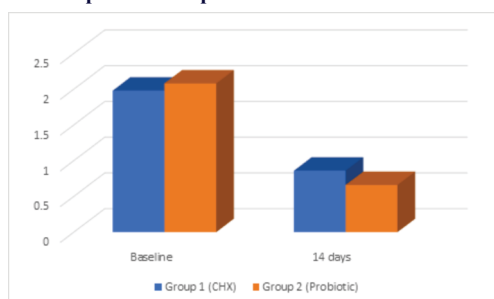


Table 2: Comparison of difference in mean Gingival index (GI) between Group 1 and Group 2

Mean Gingival index score	Group1 (CHX)	Group2 (Probiotic)	p-value
Mean GI + SD Baseline	1.98+0.31	2.08+0.46	P=0.005*
Mean GI +SD 14 days	0.86+0.24	0.66 +0.14	P=0.00*

*Statistically significant Independent t-test

Fig 2: Comparison of difference in mean Gingival score (GI) between Group 1 and Group 2



CONCLUSION

Substantial improvement in gingival health of subjects was observed in the study in comparison to chlorhexidine mouth rinse. Thus, the probiotic mouthrinse was found to have a greater therapeutic potential.

DISCUSSION

The present clinical study was done to analyse and compare the changes in gingival health in subjects treated with chlorhexidine and

probiotic containing mouth wash. The results of the study showed that the administration of probiotic containing *Lactobacillus acidophilus*, *Lactobacillus rhamnosus*, *Bifidobacterium longum* and *Saccharomyces boulardii*, when used as an adjunct to subjects mechanical oral hygiene procedures, provided a better clinical improvement compared with chlorhexidine over a period of 14 days. Parallel to the clinical improvements, plaque and gingival index scores also showed significant improvements in the test subjects. The outcome of the study revealed significant reductions in plaque and gingival index in the probiotic group at 14 days. A statistically significant reduction in the mean plaque score for the probiotic group was found on the 14th day when compared to baseline.

In our study the choice of the probiotic used was based on the constituent bacteria present in the product, and its beneficial effect on the gingival tissues. Among the various selection criteria for probiotic, adhesion of the beneficial bacterium to the tooth surface was considered of primary importance that further favoured the expression of probiotic activity. Various studies have been done in past to assess the adhesion by measuring the attachment of bacteria to saliva-coated hydroxyapatite (HA) and oral epithelium and these studies have revealed that among probiotics strains *L. rhamnosus* GG exhibited the highest values of adhesion, comparable to those of the early tooth colonizer *S. sanguinis*.^[8] Some probiotic bacteria were also found to have immunostimulatory activity on oral epithelial tissues. Studies in the gastrointestinal tract have revealed that active and heat inactivated *L. acidophilus* PZ, induced remarkable expressions of human β -defensin (hBD-2) in Caco-2 cells. In the oral cavity hBD-2 is expressed in oral epithelium in normal uninfamed gingival tissue presumably because of the high level of exposure to commensal microorganisms. Studies have also revealed positive affect and reduction in Periodontal inflammation by the administration of two probiotic tablet forms Bifidumbacterina and Acilact b available on the Russian market.^[9]

The data in our study compares favourably with a similar study conducted by Noordin and Kamin in which placebo, chlorhexidine, and probiotic groups were studied in 90 school children and plaque scores were observed on 0 day, 15th day and 3 weeks after discontinuation of intervention.^[10] The authors concluded that the Probiotic mouthrinse was more effective for inhibition of dental plaque accumulation after 14 days of intervention and also after 3 weeks of discontinuation of intervention than chlorhexidine mouth wash. Chlorhexidine gluconate had generated considerable interest in the dental community since its introduction as a 20% mouthrinse in an experimental gingivitis study since time immemorial^[11]. It virtually prevented plaque accumulation or development of gingivitis over the 21 day period of no oral hygiene. The many subsequent studies have been reviewed in numerous publications. The acceptance by the Council on Dental Therapeutics was based on 6-month studies that followed the Council's guidelines and employed a mouthrinse containing 0.12% chlorhexidine gluconate. The rinse has also been accepted by the FDA (Food and Drug Administration) for sale on a prescription basis. In one of the studies, in school children aged 10 to 12, plaque was reduced 16% and gingivitis 67% compared to placebo. In a second study, conducted on adults, plaque was reduced 61% and gingivitis 39%.^[12]

Given the above discussed background, one of the shortcomings of this study may be the short time period for which the effect of chlorhexidine and probiotics administration was assessed. Studies done in the past have supported the fact that to be able to have probiotic effects in the mouth, a bacterium must adhere to oral surfaces and become part of the biofilm^[13]. The results of one such study done for a time period of 14 days revealed that *Lactobacillus rhamnosus* (bacterium forming one of the constituents in the probiotic used in the present study) might not easily colonize the oral cavity.^[14] In this light it may be considered that for a probiotic to effect a shift away from periodontopathogens would require its continuous administration. A remarkable study performed by Teughels et al. (2007) on Beagle dogs reported a statistically significant lower bleeding upon probing for pockets that received multiple applications of probiotics for 12 weeks when compared with sealed and root-planed pockets alone (30% versus 45%, respectively). In this study no oral hygiene was provided to the dogs.^[15] Results of a systematic review suggested that chlorhexidine mouth wash had large effects in reducing plaque when used for at least four to six months.^[16]

As the use of probiotic mouth rinse for two weeks showed a significant

improvement of plaque and gingival status it seems plausible that prolonged administration of probiotic preparations may have a preventive role against development of plaque and gingivitis.

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