

Original Article

Comparative Evaluation of Anti-gingivitis and Anti-plaque Efficacy of Different Mouth Washes- A Clinical Study

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ABSTRACT:

Background: Chemotherapeutic agents have been shown to be useful adjuncts to daily oral home care in the control of plaque and gingivitis. The study was done to compare the anti gingivitis and antiplaque efficacy of HiOra with Chlorhexidine (CHX) and Listerine. **Materials and Methods:** 150 participants were equally divided into 3 groups: HiOra, CHX, and Listerine. These groups were asked to rinse with their respective mouthwash 2 times daily for 28 days. Gingivitis was evaluated by using Loe and Silness index (1963), and plaque was evaluated by using the Turesky modification of the Quigely Hein index (1970). The evaluation was carried out at the end of 7, 14, 21 and 28 days. Results obtained were statistically evaluated using SPSS software. **Results:** All the three mouth rinses were effective in reducing the mean gingival and plaque scores. Although HiOra (Herbal mouth wash) was observed to have better anti-plaque and antibiotic properties but there was statistical non significant difference between them. **Conclusion:** Chlorhexidine, Listerine and HiOra have been observed to be effective against plaque and gingivitis. Further, long-term clinical studies with larger sample size over extended period of time is recommended to have substantial evidences.

Key Words: Plaque, gingivitis, herbal extract, Herbal mouthwash.

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INTRODUCTION

The mouth is considered as the mirror of the body since the health of the oral cavity has been closely associated with systemic health. Periodontal disease is the most frequent oral disease in the world. It consists of a bacterial inflammatory process in the periodontal tissue that results from the accumulation of dental plaque on the external surface of the tooth.¹⁻³ Plaque is the primary etiological factor in gingival inflammation. Oral hygiene failure results inflammation of pathogenic plaque. Therefore, plaque control represents the cornerstone of good oral hygiene practice. The mechanical aids to control supragingival plaque include the toothbrush, floss, wood sticks, and interdental brushes. However, the degree of motivation and skill required for the effective use of these oral hygiene products may be beyond the ability of the majority of patients. Hence, a chemical plaque control approach is desirable to deal with the potential deficiencies of daily self-performed oral hygiene.^{4,5} Chlorhexidine (CHX) is regarded as the 'gold standard' antiplaque treatment and is particularly

effective against gingivitis. This mouthwash is widely used as an adjunct treatment for periodontitis. However, most practitioners do not recommend the long-term and daily use of CHX as a mouthwash.^{6,7}

Active agents shown effective in clinical trials include chlorhexidine and an oral rinse containing phenolic compounds (Listerine). Listerine (List) is an essential oil containing mouthwash that is available over the counter. Listerine (List) has been reported since the 1890s. Short-term and long-term clinical studies have indicated that the daily use of List (Pfizer), a mouthwash that contains phenolics such as thymol, eucalyptol, menthol, and methyl salicylate, may retard plaque build up and reduce gingivitis.⁶⁻⁸

In addition to these mouthrinses, herbal mouth rinses are also believed to promote better oral hygiene and health. Natural herbs such as triphala, tulsi patra, jyeestiamadh, neem, clove oil, pudina, ajwain, and many more used either alone or in combination have been scientifically proven to be safe and effective against various oral health problems such as bleeding gums, halitosis, mouth ulcers,

and preventing tooth decay.⁶⁻⁹ HiOra is a herbal liquid gargle prepared by Himalaya Drug Company, Bengaluru, Karnataka, India. It is composed of Belleric Myrobalan (Bibhitaki) which is an antimicrobial and antifungal agent that keeps infections at bay. Betel (Nagavalli) leaf effectively tackles halitosis, and its mild stimulating properties are beneficial for toothaches. Meswak (Salvadora Persica) tree twigs, known as meswak, are popular teeth-cleaning agents. Pilu prevents tooth decay and eliminates toothache and bad breath.⁸⁻¹⁰

So, present study is aimed to comparatively assess the efficacy of Chlorhexidine, Listerine and HiOra mouth rinses against plaque and gingivitis.

MATERIALS AND METHODS:

The present study was a double blind, parallel, randomised control trial, conducted in the Department of Periodontics, Adesh Institute of Dental Sciences & Research, Bathinda, Punjab, India. Ethical clearance was obtained from the Institutional Ethical Committee before the commencement of study. Informed consent was also taken from all the study participants.

Study was conducted among 150 patients of > 18 years age for a period of 2 months. Criteria for exclusion were history of systemic diseases, antibiotic and periodontal therapy in past 3 months, allergy to test products such as irritation and burning sensation, desquamation of oral mucosa, subjects suffering from destructive periodontal disease, using any other chemotherapeutic anti-plaque/antigingivitis products and having severe malalignment of teeth, orthodontic appliances, fully crowned teeth, and removable partial dentures.

In order to bring the plaque and gingival scores to baseline, thorough oral prophylaxis was performed on all the subjects 15 days before the start of the study.

The subjects were randomly divided into 3 groups. Group A, Group B and Group C.

Group A (n=50)- Rinsed with 0.2% Chlorhexidine Digluconate.

Group B (n=50)-Rinsed with Listerine

Group C (n=50)- Rinsed with HiOra mouth wash

All the subjects were instructed to rinse twice daily with 10 ml of the allocated mouthwash (undiluted) for 1 min, after brushing their teeth. Subsequent rinsing with water was not allowed. They were provided with measuring cups with 10 ml marking in order to use the correct volume of mouthwash. They were also asked to brush their teeth with a soft nylon toothbrush and a non therapeutic, low abrasive dentifrice. The mouth rinsing was performed at home without supervision. To check for compliance, the subjects were asked to note the times of day when they used mouthwash. The quantity of mouthwash given to the subjects was pre-recorded at every visit. At each recall, they were asked to bring the bottles to assess the quantity of mouthwash. This gave a view whether the subjects rinsed correctly with prescribed mouth rinse or not.

During first recall at 7th day, both the indices along with subjective (such as taste acceptability, burning sensation, dryness, or soreness of mouth) and objective (such as staining of teeth, staining of tongue, ulcer formation, and allergy) symptoms were recorded. The subjects were instructed to follow the routine plaque control measures and were recalled at an interval of 1-week. At 14th, 21st and 28th day, the subjects were again assessed for plaque and gingivitis and any reported side effects.

Examination was carried out by a single investigator. SPSS 11.0 statistical software was used for the analysis of the data.

RESULTS:

TABLE 1: Gingival index scores for different groups

	Group A	Group B	Group C	Anova test	
				F value	P Value
Baseline	1.78±0.32	1.88±0.18	1.80±0.28	0.071	(0.54)
7 th day	1.46±0.54	1.68±0.24	1.54±0.22	0.088	0.28
14 th day	0.26±0.28	0.82±0.56	0.22±0.24	6.48	0.00*
21 st day	1.68±0.40	1.56±0.48	1.24±0.44	4.56	(0.00*)
28 th day	1.52±0.25	1.32±0.32	1.08±0.34	3.164	(0.46)

At baseline and 7th day, all the three groups showed non significant difference in gingival index. At 14th and 21st day, there was a significant reduction in the gingival scores in all the 3 groups. Statistically, the HiOra showed lower gingival score than listerine and Chlorhexidine. (Table 1)

TABLE 2: Plaque scores for different groups

	Group A	Group B	Group C	Anova test	
				F value	P Value
Baseline	2.84±0.36	1.88±0.34	2.86±0.26	0.058	(0.68)
7 th days	1.94±0.65	1.88±0.44	1.84±0.82	0.0886	0.82
14 th days	1.96±0.54	1.84±0.24	1.44±0.22	8.062	0.00
21 st days	0.88±0.24	1.36±0.32	1.14±0.64	3.56	(0.00*)
28 th days	0.62±0.25	1.22±0.32	1.08±0.34	2.164	(0.56)

At baseline and 7th day, the 3 groups showed non significant difference in plaque index. At 14th and 21st day, there was a significant reduction in the plaque scores in all the 3 groups. Statistically, the HiOra showed lower plaque score than listerine and Chlorhexidine. (Table 2)

DISCUSSION:

Bacterial plaque is one of the major etiologic agents involved in the initiation and progression of periodontal disease.³⁻⁶ The association of organisms with periodontal disease has been established long ago. Based on the strong association between certain micro organisms and periodontal diseases, there has been an increasing interest in the use of antimicrobial agents in their management. Several antiplaque agents are being available in the market. However, with the rise in bacterial resistance to antibiotics, there is considerable interest in the development of other classes of antimicrobials for the control of infection.⁵⁻⁸ Current advancement in drug discovery technology and search for novel chemical diversity have intensified the efforts of exploring products from Ayurveda the traditional system of medicine in India. The major strength of these natural herbs is that their use has not been reported with any side effect till date. So, the present study was aimed to assess the efficacy of Chlorhexidine, Listerine and HiOra mouth rinses against plaque and gingivitis.^{5,8,9}

HiOra contain herbs which act on tooth and have protective antimicrobial activities. It is a herbal preparation, made from a combination of natural herbs with beneficial properties of anti-cariogenic and anti-plaque due to the presence of Pilu (*Salvadora persica*) 5 mg, antibacterial, anti-inflammatory, and immunity booster due to Bibhitaka (*Terminalia bellerica*) 10 mg, antioxidant, antimicrobial, and plaque inhibiting properties due to Nagavalli (*Piper betle*) 10 mg. Essential oils of Gandhapura taila (*Gaultheria fragrantissima*) 1.2 mg possess antimicrobial, anti-inflammatory, and analgesic properties. Oil extracted from Ela (*Elettaria cardamomum*) 0.2 mg is a potent antiseptic that is known to kill bacteria-producing bad breath. Peppermint satva (*Mentha* spp.) 1.6 mg acts as a natural mouth freshener. Yavani satva (*Trachyspermum ammi*) 0.4 mg also has antimicrobial properties. *S. persica* is one among the most commonly used antibacterial agent in traditional ayurvedic medicine. Its role as an anti-plaque agent has been reported extensively.⁸

Chlorhexidine till date is the proven most effective anti-plaque agent. Its efficacy can be attributed to its bacteriostatic and bactericidal properties. However, its prolonged use is limited due to local side effects including extrinsic tooth and tongue brown staining, taste disturbance, enhanced supragingival calculus formation, and desquamation of the oral mucosa. On the other hand, herbal mouthwash due to its natural ingredients has no reported side effects and can serve as a good alternative to patients who wish to avoid alcohol (e.g., Xerostomics), sugar (e.g., Diabetics), any artificial preservatives and colors in their mouth rinses.⁹

On the other hand, Listerine is an essential oil containing mouth rinse that has similar antiplaque and antigingivitis effects as chlorhexidine but does not have the unwanted side effects of chlorhexidine, although there have been some complaints about its taste. It consists of a mixture of three phenolic-derived essential oils: 0.064%

thymol, 0.092% eucalyptol and 0.042% menthol combined with 0.060 methyl salicylate. Its mechanism of action is through alteration of the bacterial cell wall. It has low substantivity and it is uncharged so it favors compliance because of no dentifrice interactions. One adverse effect reported during the use of Listerine is burning sensation.¹⁴

Present study revealed that all the three groups showed non significant difference in gingival index. Statistically, the HiOra showed lower gingival score than listerine and Chlorhexidine. (Table 2)

The findings of our study were similar to the studies conducted by Rahmani et al. And Mohammed SG et al.^{11,12} who compared the anti-plaque and antigingivitis effect of a mouthwash containing *S. persica* with 0.2% chlorhexidine and showed improvement in both plaque and gingival index (GI) scores. Singh A et al (2012)¹³, studied the effect of a new herbal, an essential oil mouthwash and the CHX mouthwash on de novo plaque formation. The results indicated that CHX was more efficacious than the new herbal and essential oil mouthwash, Listerine. In other studies, when the essential oil mouthwash was compared to the 0.05% cetylpyridinium chloride mouthwash, the former was more superior in reducing plaque and gingivitis. Although Listerine fulfills the consensus criteria for an effective antigingivitis or antiplaque product, because of the ethanol content, the concern over its safety for long-term use remains to be clarified.⁷⁻¹²

Regarding the subjective and objective symptoms, none of the subjects complained of stains on teeth and tongue, allergic reaction following use of their mouthwash. Four subjects reported feeling of dryness of mouth in group A. Ten subjects in group A and fifteen subjects in group B and eight subjects in group C complained of burning sensation. An important finding that is worth the mentioning is that, after the mouth rinsing had stopped, the plaque and gingival index scores increased reaching close to the baseline scores and further rising beyond this limit. This suggests that there is no carryover effect of the mouthwash after rinsing stops.

Our study results should be interpreted in the light of certain limitations that includes a small sample size and follow-up is not widely spaced and extensive. As the study was a concurrent parallel design no wash out period was considered. Further research to establish the level of substantivity, plaque inhibition, safety, and microbial parameters is necessary before the ayurvedic product finds a place among the other agents for daily plaque removal. The findings of the current study can be applied to other clinical settings and public health programs.

CONCLUSION:

Both Chlorhexidine and Hi-Ora are effective in reducing gingivitis and plaque. Further, long-term clinical studies with larger sample sizes are recommended to the scientific community to have substantial evidence.

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