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Comparison of Antiplaque Efficacy of Commercially Available HiOra (Herbal) Mouthwash with Listerine Mouthwash: A Clinical Study

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Abstract

Background. Herbal mouthwashes nowadays are gaining popularity because they contain naturally occurring ingredients that achieve the desired antimicrobial and antiinflammatory effects. The aim of this study was to compare the efficacy of a commercially available herbal mouthwash (HiOra) with that of an essential oil-containing mouthwash, Listerine.

Methods. A single-blind cross-over study was conducted on 30 dental students aged 18–25 years. The subjects were randomly divided into two groups: A and B (n=15) and the study was divided into two phases. In phase 1, Listerine mouthwash was given to group A and HiOra mouthwash to group B. The plaque score was recorded with Turesky modification of the Quigley–Hein plaque index consecutively for 10 days. After 15 days of wash-out period, in phase 2 both groups were given the other mouthwash.

Results. The plaque scores were compared and the difference between the HiOra and Listerine mouthwash was determined using Wilcoxon and Mann-Whitney tests. The differences between plaque scores were statistically insignificant (P>0.05). The results showed that HiOra and Listerine mouthwashes yielded comparable results in plaque reduction.

Conclusion. Herbal mouthwash was found to be a potent plaque inhibitor, yielding results comparable to those of Listerine mouthwash. These formulations may be more appealing because they do not contain alcohol, artificial preservatives, flavors or colors.

Key words: **Dental plaque, gingivitis, herbal, essential oil, mouthwash.**

Introduction

Periodontal diseases are chronic inflammatory conditions characterized by loss of connective tissue, alveolar bone resorption and formation of periodontal pockets as a result of the complex interaction between pathogenic bacteria and the host's immune response.[1] Dental plaque is the primary etiologic factor in periodontal diseases and therefore, plaque control represents the cornerstone of good oral hygiene practice.

Oral hygiene is the practice of keeping the oral cavity clean and healthy by brushing and flossing to prevent tooth decay and gingival disease. Mechanical plaque control is the most dependable oral hygiene measure, but mechanical oral hygiene methods of plaque control require time, motivation and manual dexterity.[2] The mechanical method of plaque control is indisputably the easiest and most effective measure to prevent periodontal disease.[3,4] There are mechanical and chemical approaches for controlling the plaque; however, because of the dependence of mechanical methods on individuals' hand skill it cannot be reliable all the time. Therefore the use of chemical methods as a complementary way has been demonstrated to result in adequate plaque control.[5] Mouthwashes, as a safe and effective delivery system for antimicrobials, can play an important role in plaque control.

Chlorhexidine (CHX) and Listerine are two very popular brands of mouthwashes that have always been prescribed by clinicians. Chlorhexidine (CHX) is regarded as the 'gold standard' antiplaque treatment and is particularly effective against gingivitis;[6] however, most practitioners do not recommend the long-term and daily use of CHX as a mouthwash. This is mainly because of its side effects, such as objectionable taste, tooth discoloration, desquamation and soreness of the oral mucosa.

Listerine (List) is an essential oil-containing mouthwash that is available over the counter. Listerine (List) has been reported since the 1890s.[6] It has antiplaque and antigingivitis effects similar to chlorhexidine but does not have the unwanted side effects of chlorhexidine, although there have been some complaints about its taste. Short-term and long-term clinical studies have indicated that the daily use of Listerine, a mouthwash that contains phenolics such as thymol, euclyptol, menthol, and methyl salicylate, may retard plaque buildup and reduce gingivitis.[7,8] However, the alcohol content of essential oil rinses and their unpleasant taste is unacceptable to some patients. Thus, none of these chemical agents is without shortcomings. Therefore the search for an ideal and safe antiplaque agent continues.

With the continuous need to counter the adverse effects, improve the antiplaque and antigingivitis potential, and to reduce the increasing microbial resistance to conventional antiseptics and antibiotics, attention is now turning to the use of natural antimicrobial compounds (herbal extracts). Herbal products have been used in India since ancient times for the treatment of various ailments. Some of the natural or herbal products and their extracts, such as guava, pomegranate, neem, propolis, tulsi, green tea, cranberry and grapefruit, when used in mouthwashes, have shown significant advantages over the chemical ones.[9]

HiOra is a herbal mouthwash (manufactured by the Himalaya Drug Company Makali, Bangaluru, India); each gram contains 5.0 mg of *Pilu (Salvadora persica),* 10 mg *of Bibhitaka (Terminalia bellerica),* 10 mg of *Nagavalli (Piper betel),* 1.2 mg of *Gandhapura taila,* 0.2 mg of *Ela,* 1.6 of *Peppermint satva* and 0.4 mg of *Yavanisatva.* It is claimed that it acts as an oral antiseptic and prevents tooth decay. It is also claimed to prevent bad breath and reduces plaque and gingivitis.

Therefore, the present study was conducted to verify the effect of herbal mouthwash HiOra on reduction of plaque and to compare its effectiveness with Listerine (phenolic compounds) mouthwash.

Methods

Thirty students of Gian Sagar Dental College and Hospital, Rajpura, aged 18–25 years, who were living under similar environmental conditions in the hostels of the institution, were included in the study. After obtaining ethical clearance from the Ethics Committee of Gian Sagar group of Institutions, the study was conducted.

Eligibility criteria

Students having a full complement of teeth (excluding 3rd molars), normal occlusion, absence of caries and a healthy periodontium were included in the study. Subjects wearing fixed or removable orthodontic appliances or prosthesis, having any type of restorations, taking antibiotics or other medications since the last three months, having any systemic disease and not willing to comply with the study protocol were excluded. Informed consent was taken.

Study procedures

A total of 30 selected students were divided into two groups (groups A and B) (n=15). Before starting

with the first phase, professional oral hygiene, which included scaling and root planing with polishing, was undertaken and plaque score was brought to zero. Group A was given Listerine mouthwash first and then HiOra mouthwash, while Group B was given HiOra mouthwash first and then Listerine mouthwash (Figure 1). Each subject was instructed to use 15 mL of the first mouthwash for 1 min twice daily (morning and evening) for 10 consecutive days, followed by a wash-out period of 15 days and then the second mouthwash for 10 consecutive days. The subjects were instructed not to drink coffee, wine or tea 1 h before or after using the mouthwash. The plaque score was recorded daily for 10 days for both mouthwashes.

Before starting with the second mouthwash after the wash-out period, plaque score was again brought to zero. During the study period, the students were provided with Colgate super soft toothbrush and Colgate total toothpaste and the standardized oral hygiene instructions were given. All the measurements were carried out under the same conditions by the same investigator who was unaware of the allocation of the mouthrinse to the participants.

The plaque score was recorded every day for 10 days by using basic fuchsin dye as a disclosing agent. The scoring of plaque was performed using Turesky et al modification of the Quigley–Hein plaque index.[10] Data thus collected was subjected to statistical analysis.

Statistical analysis

Data were analyzed using SPSS 15 (SPSS, Chicago, IL, USA). Frequency was calculated. Wilcoxon and Mann-Whitney tests were used to find the statistical difference in the means of antiplaque efficacy between HiOra and Listerine mouthwashes at $P<0.05$.

Results

All the 30 subjects completed the study. The mean plaque score for group A with Listerine mouthwash was 1.26±0.34 and with HiOra mouthwash it was 1.22±0.28. On the other hand, in group B when HiOra mouthwash was used first, the mean plaque score was 1.17±0.28, while for Listerine mouthwash it was 1.12±0.08 (Figures 2 and 3). Intergroup comparison of the two groups showed insignificant results (P=0.21).

Discussion

The present study was designed to determine the efficacy of a herbal mouthwash (HiOra) with Listerine mouthwash. Saliva is continually refreshed, rinsing away the active ingredients of mouthrinses. But plaque remaining after mechanical cleaning absorbs mouthrinse antimicrobials, serving as a reservoir to prolong the product's substantivity. The classic experiments of Loe et al (1965) demonstrated that accumulation of microbial plaque results in the development of gingivitis and its removal and control results in the resolution of the lesions in humans, thereby proving plaque as the microbial etiology of the disease as mentioned by Page (1986).[11,12]

Herbal remedies traditionally used to help combat gingival bleeding and gingivitis include mouthwashes, dental oils and herbal supplements.[13] HiOra is a herbal preparation, made from natural herbs and because of its unique combination it has various beneficial properties like antiseptic, antibiotic, antioxidant, antiinflammatory, etc. Archana et al (2014) evaluated the antiplaque and antigingivitis effects of HiOra in the treatment of plaque-induced gingivitis and found that it can be effectively used as an adjunct to mechanical therapy with less side effects.[14] Likewise, Listerine mouthwash also proved to be effective as an adjunct to mechanical home care methods with significant reduction in plaque accumulation and gingivitis levels in studies by Fine et al in 2007[15] and Al Habashneh et al in 2014.[16]

The results of the present study showed that the herbal mouthwash HiOra has antiplaque effects over a period of 10 days comparable to those of essential oil mouthwash Listerine. HiOra is a herbal preparation, made from natural herbs with their beneficial

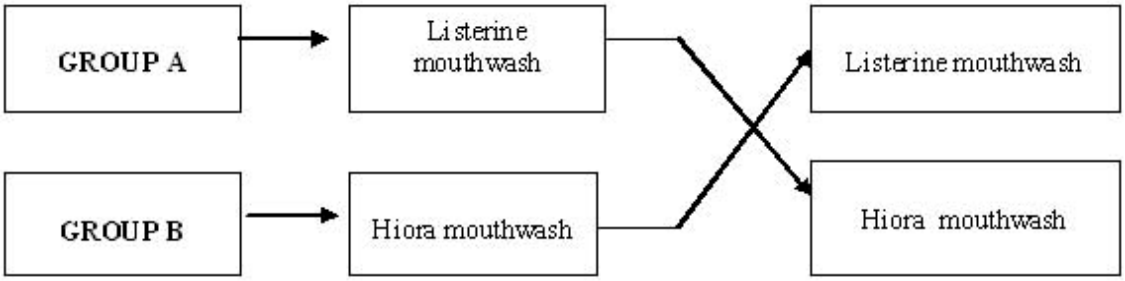

Figure 1. Study design.

Figure 2. Group A.

Figure 3. Group B.

properties like anticariogenic and antiplaque (due to *S. persica*, which contains trimethyl amine, salvadorine, chlorides, high amounts of fluoride and silica, sulphur, vitamin C, small amounts of tannins, saponins, flavonoids and sterols),[17] antibiotic (due to the presence of *Piper betle* and *Elettaria cardamomum*) and antiinflammatory and immunity booster (due to the presence of Terminalia bellerica). It also contains *Mentha* and *Trachyspermum ammi*, which are natural flavoring agents. A herbal mouthwash is a nonalcoholic preparation, with no added sugar, no artificial preservatives, no artificial flavors and colors and absolutely no side effects. A study conducted in 2013 reported that HiOra herbal mouthwash exhibited good potential as an anti-plaque agent in comparison to chlorhexidine mouthwash and has proven to be equally effective.[18]

On the other hand, Listerine is an essential oil-containing mouthwash 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.[16] In the present study, four subjects reported burning sensation and bad taste of Listerine as compared to HiOra mouthwash which has a pleasant taste. In many controlled clinical trails, Listerine showed plaque reductions in 22–36% range and gingivitis reductions ranging from 23% to 36%, with the longest study being 9 months.[19] Listerine fulfills the consensus criteria for an effective antigingivitis and antiplaque product; because of the ethanol content, the concern over its safety for long term remains to be clarified.[8] During this study, no side effects were observed in any of the patients.

The present study was a short-term study for 10 days only, which was in accordance to the studies by Lotufo et al[20] and Quirynen et al,[21] who also studied the efficacy of mouthrinses on *de novo* plaque formation in 7 and 11 days, respectively. The subjects in the study were instructed to brush their teeth twice daily with a super soft Colgate toothbrush and Colgate total toothpaste immediately after breakfast and before going to bed, followed by prescribed mouthwashes. To eliminate bias, crossover design was planned between the subjects.

One shortcoming of this study was the small sample size. More studies using a longer duration and regarding substantivity of HiOra mouthwash can be performed. Studies of longer duration, in which the product in question is compared to other control (positive or negative) or placebo products and where safety and microbiological parameters are assessed, are necessary to establish the effectiveness of this product and its position among the other agents used for chemical support of daily mechanical plaque control.

Conclusion

The results of the study indicated that HiOra mouthwash has antiplaque efficacy comparable to Listerine mouthwash when used for a period of 10 days. However, it was preferred by the patients for its taste, convenience of use and taste duration (after taste) in their mouth after rinsing. Further, it should be explored as a long-term antiplaque rinse with prophylactic benefits.

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