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Efficacy of Chlorhexidine vs Herbal mouthwash mouth wash in college students: A comparative study

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Abstract
Background: Chlorhexidine is regarded as the "gold standard" anti-plaque agent and many herbal extracts are now available as mouthwash for maintaining the good oral hygiene. The purpose of this study was to determine the effects of two oral rinses-one 0.12% chlorhexidine rinse (CHX) and one herbal rinse (HBR)-on gingival health status over time.
Materials and methods: Total 90 students in college aged 30±10 years were randomly divided into three groups: A (Chlorhexidine), B (Herbal) and C (Distilled water as placebo). These groups were asked to rinse with their respective mouthwash two times daily for 30 days after brushing and flossing. Individuals were given the same type of soft bristle toothbrush and whitening toothpaste. No attempt was made to modify participants routine oral care, except they were advised to refrain from use of any other oral rinse for the duration of the study. Data is analysed utilizing the Gingival Index (GI), Plaque Index (PI), and bleeding on probing (BOP).
Result: There was statistically significant reduction in plaque and gingival scores after 30 days in both the groups A and B. Though herbal mouthwashes has the ability to maintain good oral hygiene on daily basis, but still it is less effective than chlorhexidine mouthwash during treatments like gingivitis, periodontitis, trauma, etc.
Conclusion: Although chlorhexidine group proved to be the best anti-plaque and antigingivitis agent, it was found that Herbal group also showed gradual improvement in reducing plaque and gingivitis. Due to some side effects of chlorhexidine mouthwash like dryness of mouth and burning sensation, Herbal mouthwash can be used alternatively.

Keywords: dental plaque, gingivitis, chlorhexidine, oral rinse, herbal, mouthwash

1. Introduction
Susceptibility to dental and periodontal disease depends on risk factors includes genetics, systemic factors, and oral hygiene [1]. Plaque is the primary cause for gingivitis. Most of the chemical products contain an antiseptic that plays an important role in controlling plaque accumulation [2]. However, mostly accepted method of delivering the anti-microbial agents after toothpaste is mouthwashes [3]. A mouthwash is a medicated liquid which is held in the mouth and swished by the action of perioral musculature to eliminate the oral pathogens.
Mouth rinses have the ability to deliver the therapeutic effect all over the tooth surface including interproximal areas in which even toothpastes are not much effective [4]. Even though, chlorhexidine mouthwash is more effective in plaque control, it cannot be used for long duration because some of its unpleasant side-effects after long duration usage. Plants and plant extracts demonstrate effects that are immune enhancing, anti-inflammatory, anti-cancer, etc. [5] Mouthwashes are liquids which contain anti-inflammatory, antimicrobial, and analgesic action. There are two types of mouthwash - chemical and herbal. Chlorhexidine mouthwash comes under chemical mouthwash. Many of the plant extracts has an anti-microbial property which is effectively used in maintaining good oral hygiene. Natural herbs such as triphala, tulsi patra, jyestiamadh, neem, clove oil, pudina, and many others are used as single or in combination have been scientifically proven to be safe and effective medicine against oral health problems such as bleeding gums, halitosis, mouth ulcers, and preventing tooth decay without side effects [6]. The main purposes of using mouthwashes are it can be used at home as routine to maintain good oral hygiene, mouthwash provides anti-inflammatory, anti-microbial activity [7]. The aim of the study was to evaluate the efficacy of a commercially available herbal mouthwash as an anti-plaque and antigingivitis agent.

2. Materials and Methods
The study sample consisted of 90 students aged 30±10 years. Students were divided into three groups (30 in each group): A (Chlorhexidine), B (Herbal) and C (Distilled water as placebo). These groups were asked to rinse with their respective mouthwash two times daily after meals for 30 days after brushing and flossing.
Subjects were selected having a minimum of 22 teeth. Criteria for exclusion were history of systemic diseases, antibiotic and periodontal therapy in past month, 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. The study was carried out by a single investigator who was trained and calibrated. In order to bring the plaque and gingival scores to baseline, thorough oral prophylaxis was performed on all the subjects before the start of the study. This enabled the examiner to ensure that any presence of mild gingival and the periodontal problem would subside during this period. The dentist measured the gingival index, Plaque Index and Bleeding on Probing of all the patients

before and after the intervention [8, 9]. The clinical design was approved, and all private data of patients remained confidential. All participants provided written informed consent.

At each appointment, the health history was reviewed and a soft tissue oral examination was performed. At the conclusion of the study, participants were evaluated for the need of a dental prophylaxis. Study continued for a month to evaluate the effects of 0.12%chlorhexidine, Herbal, and placebo mouthrinses on gingival health and plaque accumulation.

The Plaque Index (PI) was used to measure plaque accumulation. A score of 0-3 was assigned to six sites per tooth using the following criteria [8].

0 = No plaque on gingival margin.
1 = A film of plaque is supragingival, and adheres to the free gingival.
2 = Moderate plaque is present supragingivally and subgingivally.
3 = Heavy plaque is present supragingivally and subgingivally.

The Gingival Index (GI) was used to determine severity and location of gingivitis. A score from 0-3 was assigned to six sites per tooth, using the following criteria [8].

0 = Normal gingiva. Pale pink color, normal stippling, gingiva firm when probed. Gingival margin located on enamel or apical to CEJ.
1 = Mild inflammation. Slight changes in color of gingiva- more reddish than normal, slight edema. No bleeding on probing.
2 = Moderate inflammation. Gingiva is red to reddish-blue with moderate edema present and glazing. Bleeding on probing is present.
3 = Severe inflammation. Marked redness, edema, and ulceration. Tendency towards spontaneous bleeding.

Bleeding on probing is an objective way to assess for clinical, bacteriologic, and histopathologic
changes, hence BOP was independently scored as positive when bleeding was detected after 10 seconds, when stimulated by a periodontal probe [9].

3. Result

Comparison of the two groups with respect to demographic conditions showed no significant difference between the two groups at the baseline. Furthermore, the subjects in both groups were the same for age, gender, smoking and medical history. The results of the present study demonstrated that the use of chlorhexidine rinse and herbal extract mouthwash along with mechanical methods both reduced the GI in patients, but this reduction in GI was more considerable in chlorhexidine than the herbal mouthwash group, and their differences were statistically significant. Demographic details of student under study is given in table no. 1.

Table 1: Demographic details of student

Variables		A. Chlorhexidine Group (n=30)	B. Herbal group	C. Distilled water(placebo)
Sex	Males	18	21	14
	Females	12	9	16
Mean age		26.5± 5.3	28.1±4.2	27.4±3.8
Positive Medical history		5	2	3
Smoking history	Yes	6	7	9
	No	24	23	21

In the groups A and B, there was highly significant reduction in mean plaque and gingival scores along with bleeding on probing, however no visible change was seen in group C (placebo). Regarding taste acceptability in all the thirty subjects in Group B reported the taste of herbal mouthwash as Good. Regarding reported burning sensation of the mouth, Group B subjects did not experience any such symptom but few subjects in group A reported dryness of mouth along with some burning sensation after two weeks. Full mouth periodontal probing measurements were obtained. Analysis showed no statistically significant change in PPD in any of the groups. Comparison of Gingival and Plaque index among three groups is given below in table.

Table 2: Comparison of Gingival and Plaque index among three groups

		Group A	Group B	Group C
Gingival index	Before intervention	3.2± 0.54	3.6±0.71	3.4±0.62
	After intervention	1.6 ±0.4	2.01±0.6	3.2±0.72
Plaque index	Before intervention	2.35± 0.22	2.21±0.26	2.15±0.18
	After intervention	0.78±0.08	1.03±0.13	2.09±0.39
Taste		Acceptable	Group	N.A
Burning sensation		2	-	-
Dryness of mouth		3	-	-

4. Discussion

Bacterial plaques have been proven to have a role in the etiology of dental caries and periodontal diseases. The use of mouthwashes as disinfectants can help mechanical methods to reduce plaques [10]. Mouthwashes with antimicrobial effects perform this task using three methods, which include apoptosis, inhibition of bacterial growth and/or cell metabolic inhibition; and depending on their concentration their bactericidal and/or bacteriostatic properties vary [11].

Although chlorhexidine has anti-microbial activity and good choice for effective plaque control by dentist in clinics, it cannot be used for long duration because it has various side effects such as taste alteration, supragingival calculus formation and desquamation of oral mucosa and also restricted usage in pediatric patients [12, 13]. It also causes extrinsic staining while using beverages like tea and coffee [14]. Numerous studies have been conducted in comparison of chlorhexidine with herbal mouthwash. Although the herbal

mouthwashes is less effective than chlorhexidine mouthwash, it can be used as a good oral prophylaxis as it does not has any adverse effects. Many herbal mouthwashes contains anti-inflammatory, anti-microbial, and anti-oxidant properties which enhances oral hygiene comparatively with chlorhexidine mouth wash [15]. Chlorhexidine mouthwash is more effective in reducing S. mutans in plaques indicates the high antimicrobial activity of chlorhexidine mouthwashes [16].

Chlorhexidine (0.2%) as the gold standard for oral health care has been accepted. Although, there are some studies that confirmed the beneficial effects of Herbal extracts [19, 20, 21] and A. vera gel on oral cariogenic bacteria *in vitro* and *in vivo* conditions, separately, but our literatures survey did not show any research on the efficacy of A. vera on Gingival or plaque index [22]. Studies done by Gupta *et al*., shows that aloe vera mouth rinse are equally effective in reducing gingivitis and plaque chlorhexidine [23]. Study done by Rahman *et al*., supports the use of tea tree oil which is an essential oil, as an anti-plaque agent in comparison with chlorhexidine [24]. Chlorhexidine as with other drugs is not devoid of side effects, it includes increased staining of the natural teeth and altered taste sensation associated with prolonged use [25].

Though this study supports the use of chlorhexidine mouth rinses it should be taken into account that the side effects of chlorhexidine are well documented but the same is not so in the case of herbal mouth rinses. Hence it is warranted that further studies need to be undertaken with a more emphasis on a gold standard comparison of herbal products in order to show the effectiveness and hence prove its merit. More clinical trials are to be carried out to show the side effect of the tested product.

5. Conclusion

Both Chlorhexidine and Herbal mouthwashes can be effectively used for plaque control in the prevention of plaque and gingivitis. However, owing to the side effects reported due to the use of chlorhexidine mouthrinse and biocompatibility and well acceptance of Herbal mouthwash by the subjects, it can be effectively used as an alternative to chlorhexidine mouthrinse.

6. References

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