

COMPARISON OF EFFECT OF HIORA MOUTHWASH VERSUS CHLORHEXIDINE MOUTHWASH IN GINGIVITIS PATIENTS: A CLINICAL TRIAL

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ABSTRACT

Objective: The aim and objective of this study was to evaluate the effect of Hiora mouthwash versus Chlorhexidine mouthwash for the treatment of gingivitis.

Methods: The study population was comprised 30 gingivitis patients. The patients were randomly categorized into two groups of 15 patients in each group. Group A was given Chlorhexidine mouthwash and Group B was given Hiora mouthwash. Pre-operative measurements such as plaque index (PI), gingival index (GI), and probing depth (PD), and loss of attachment (LA) were measured. Oral prophylaxis followed by the prescription of mouthwash was done. The patients were recalled for a review after 15 days, and post-operative measurements were recorded.

Results: From the statistical analysis in the experimental Group A and Group B, the mean values of PD, LA, GI, and PI were found to be significantly lower in the post-operative period than the pre-operative mean values. At the end of 15 days, almost comparable reduction in the amount of plaque and gingivitis was found in both Group A and Group B. Hence, the differences in efficacy of these two mouthwashes were non-significant.

Conclusion: Hiora and Chlorhexidine mouthwashes were equally effective in the treatment of gingivitis.

Keywords: Probing depth, Loss of attachment, Gingival index, Plaque index, Mouthwash.

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INTRODUCTION

Gingivitis is an inflammatory reaction to a dental plaque that is reversible, affecting the gingival tissue. It is the most common human disease of the oral cavity [1]. Periodontitis is a destructive inflammatory disease of the supporting tissues of the teeth, resulting in the progressive destruction of the periodontal ligament, alveolar bone with pocket formation and gingival recession caused by specific or group of specific microorganisms [2]. Periodontal diseases are induced by bacterial infections, in which the microbial plaque plays a key role [3,4].

Plaque control and removal of bacterial biofilm are essential components in the prevention and treatment of periodontal and gingival diseases [5,6]. Dental plaque composed of numerous living species of microorganisms, attached to the extracellular matrix [7]. Dental plaque biofilm cannot be eliminated permanently. The pathogenic nature of dental plaque biofilm can be reduced by reducing the total microbial load [8]. Mechanical plaque control can be achieved by proper tooth brushing technique with the help of toothbrush and interdental aids. Lack of dexterity and individual motivation are the factors that affect the effectiveness of tooth brushing technique. Tooth brushing helps to maintain preventive oral health care [9].

Chemical antiplaque agents such as varnishes, dentifrices, and mouthwashes are used to improve oral health care. The use of mouthwash affects both the bacterial and plaque growth. Bacterial adhesion, colonization, and metabolic activity are inhibited using mouthwashes. Among the various mouthwashes, the most persistent reduction of bacteria has been achieved by chlorhexidine mouthwash [10]. Chlorhexidine gluconate has a broad spectrum of antibacterial effect because of its bactericidal and bacteriostatic activity and its high oral substantivity. Chlorhexidine is unpleasant in taste and

alters taste sensation. Chlorhexidine is non-toxic but affects the mucous membrane, tongue, and causes brown stains on the teeth [11].

METHODS

This study was undertaken in the outpatient at the Department of Periodontics, Saveetha Dental College, Saveetha University Chennai, India. The study sample consisted of 30 patients. The patients who were diagnosed as having gingivitis were randomly divided into two groups, Group A and Group B. Group A patients were prescribed with Chlorhexidine mouthwash and Group B patients were prescribed with Hiora mouthwash. Patients having systemic disease, pregnancy, and undergoing antimicrobial therapy are excluded from the study. The study was presented to the Institutional Scientific Review Board and got approved. Informed consent was obtained from the patients after explaining the details of the study.

Both the groups consisted of 15 patients each respectively for the study. The demographic data such as name, age, and sex were collected for each patient in both the groups. Clinical assessments were performed in the clinic by a single examiner using mouth mirror and probe. Oral prophylaxis was not performed so that the study could begin with the existing oral hygiene status of the subjects.

Pre-operative measurements were recorded which included Probing depth (PD), Loss of Attachment (LA), gingival index (GI), and plaque index (PI). Oral prophylaxis was performed after the initial clinical assessment. After oral prophylaxis, the patients were then prescribed a mouthwash based on their respective categorized group.

Group A (n=15): Patients were prescribed to use 10 ml of Chlorhexidine gluconate mouthwash twice daily in the interval of 12 h for 15 days, and instruction was given not to rinse their mouth for half an hour.

Group B (n=15): Patients were prescribed to use 10 ml of Hiora mouthwash twice daily in the interval of 12 h for 15 days, and instruction was given not to rinse their mouth for half an hour. The patients were asked to report to the clinic after 15 days from the date of the initial examination.

Clinical assessment of PD, LA, GI, and PI was evaluated and pre-operative and post-operative measurements were recorded. The collected data were subjected to statistical analysis. The collected data were analyzed with IBM SPSS Statistics Software 23.0 Version. To describe about the data descriptive statistics frequency analysis was used for categorical variables and the mean and standard deviation was used for continuous variables. To find the significant difference between the bivariate samples in paired groups the paired sample *t*-test was used and for independent groups the unpaired sample *t*-test was used. In both the above statistical tools the probability value 0.05 is considered as significant level.

RESULTS

The study sample consisted of 30 patients, 15 patients in each Group A and B, respectively.

Intragroup comparison - Group A

The mean value of PD before interventions was 1.4467, whereas the mean value after interventions was 1.2820. The mean value of LA before interventions was 0.6180 and after interventions were 0.5560. The mean value of pre-operative GI was found to be 1.3567, whereas the mean value of post-operative was 1.1673. The mean value of pre-operative PI was 2.1167 and post-operative mean value was 1.5333 as shown in Table 1.

Intragroup comparison - Group B

The mean value of pre-operative PD was 1.4427 and post-operative was 1.3633. The mean value of pre-operative LA was 0.6307 and post-operative was 0.5980. The mean value of pre-operative GI was 1.4213 and post-operative mean value was 1.3053. The mean value of pre-operative PI was 1.8833 and post-operative was 1.1617 as shown in Table 2.

Intergroup comparison (A and B)

Intergroup comparison was performed between Group A and Group B to compare the efficacy of Chlorhexidine mouthwash and Hiora mouthwash, which showed there was no significant difference in the mean value of PD, LA, GI, and PI between the two experimental groups before and after the interventions as shown in Table 3.

The mean values of Group A pre-operative PD are 1.4467 whereas Group B is 1.4427. The mean value of Group A post-operative PD is 1.2820 and Group B is 1.3633 as shown in Fig. 1.

The mean values of Group A pre-operative LA are 0.6160 and Group B is 0.6307. The mean values of Group A post-operative LA are 0.5560 and Group B is 0.5980 as shown in Fig. 2.

The mean values of Group A pre-operative GI are 1.3567 and Group B is 1.4213. The mean values of Group A post-operative GI are 1.1673 and Group B is 1.3053 as shown in Fig. 3.

The mean values of pre-operative PI in Group A are 2.1167 and Group B is 1.8833. The mean values of post-operative PI in Group A are 1.5333 and Group B is 1.1617 as shown in Fig. 4.

Hence, in the experimental Group A and Group B, at the end of the study, the mean values of PD, LA, GI, and PI were found to be significantly lower than the pre-operative mean values. At the end of 15 days, almost comparable reduction in the amount of plaque and gingivitis was found in Group A and Group B. The differences in efficacy of these two mouthwashes were non-significant.

DISCUSSION

Maintenance of a good oral hygiene is the key to the prevention of dental disease. Several researchers have suggested the application of chemotherapeutic agents as adjuncts to mechanical plaque control at home. According to some *in vitro* microbiological studies, antimicrobial agents are capable of penetrating into the bacterial biofilm and exerting their bactericidal properties. Furthermore, chemical agents have the ability to reach the interproximal areas that are difficult to clean and inhibit bacterial growth and subsequent biofilm formation on the soft tissue. Application of these chemical agents is safe and seems to have no effect on increasing resistant species.

Among all the mouthwashes, chlorhexidine is considered to be the "gold standard" antiplaque mouthwash due to its prolonged broad-spectrum antimicrobial and plaque inhibitory potential [12,13]. It is active against a wide range of Gram-positive and Gram-negative organisms, fungi, facultative anaerobes, and aerobes [14]. Gram-positive cocci especially *Streptococcus mutans* seems to be sensitive to chlorhexidine which acts by binding to the bacterial cell wall and affects its function [15,16].

Complete inhibition of bacterial accumulation by chlorhexidine mouthwash has been reported by Schiott [17]. The reduction in amount of plaque found to be statistically significant ($p=0.000$) well corroborates with the results obtained in the previous studies carried out by Loe [18], and Lang *et al.* [19], and Sharma *et al.* also found significant amount of plaque reduction in the children who used 0.2% chlorhexidine mouthwash [20]. Chlorhexidine has an excellent antiplaque activity and substantivity property [21]. Haq *et al.* [22,23] reported that Cetylpyridinium chloride mouthwash in combination

Table 1: The comparison of pre-operative and post-operative mean values of PD, LA, GI, and PI in Group A

Variables Comparison	Mean	N	SD	SEM
Pair 1				
Pre PD	1.4467	15	0.34261	0.08846
Post PD	1.2820	15	0.35331	0.09123
Pair 2				
Pre LA	0.6180	15	0.41415	0.10693
Post LA	0.5560	15	0.38230	0.09871
Pair 3				
Pre GI	1.3567	15	0.48625	0.12555
Post GI	1.1673	15	0.42823	0.11057
Pair 4				
Pre PI	2.1167	15	0.31149	0.08043
Post PI	1.5333	15	0.35187	0.09085

PD: Probing depth, LA: Loss of attachment, GI: Gingival index, PI: Plaque index, SD: Standard deviation, SEM: Standard error of the mean

Table 2: Comparison of pre-operative and post-operative differences in the PD, LA, GI, and PI of Group B

Paired samples statistics ^a				
Variables Comparison	Mean	N	SD	SEM
Pair 1				
Pre PD	1.4427	15	0.35495	0.09165
Post PD	1.3633	15	0.33247	0.08584
Pair 2				
Pre LA	0.6307	15	0.42106	0.10872
Post LA	0.5980	15	0.40248	0.10392
Pair 3				
Pre GI	1.4213	15	0.50088	0.12933
Post GI	1.3053	15	0.47494	0.12263
Pair 4				
Pre PI	1.8833	15	1.20845	0.05382
Post PI	1.1617	15	0.24761	0.06393

PD: Probing depth, LA: Loss of attachment, GI: Gingival index, PI: Plaque index, SD: Standard deviation, SEM: Standard error of the mean

with sodium fluoride-containing toothpaste was the only antiplaque agents with a significant difference with the control group. Several studies have compared the effectiveness of different mouthrinses. Charles *et al.* [24] used a 2-week experimental gingivitis model and demonstrated that mouthwashes containing essential oils had superior anti-plaque/anti-gingivitis properties in comparison with that containing cetylpyridinium chloride.

According to an *in vitro* comparative study on the evaluation of the efficacy of chlorhexidine and a herbal mouthwash on dental plaque, 20 plaque samples were collected from periodontitis patients, and healthy patients were streaked on blood agar. Well diffusion method was used to compare chlorhexidine gluconate, herbal mouthwash, and normal saline which were then incubated at 37° for 24 h and examined

for zones of inhibition. From the study, it was concluded that the herbal and the chlorhexidine mouthwash were equally effective *in vitro* suggesting that the herbal mouthwash may be used therapeutically in the future to inhibit oral microbial growth [25]. According to another study where the evaluation of the efficacy of commercially available herbal mouthwash on dental plaque and gingivitis was done by double-blinded parallel randomized controlled trial technique. In this study 90, nursing students were randomly divided into three groups: A - Chlorhexidine, B - Hiora, and C - distilled water, respectively. The groups were asked to rinse their respective mouthwash twice daily for 21 days. Plaque and gingivitis were evaluated using Turesky *et al.* modification of Quigley hein PI (1970) and modified GI by Lobene *et al.* (1986), respectively. The results of this study showed a statistically significant reduction in plaque and gingival score from the baseline to 21 days. Chlorhexidine was proved to be the best and Hiora mouthwash also showed gradual improvement from baseline to 21 days and no improvement was seen in Group C which was done using distilled water [26].

Table 3: Represents the Group A and Group B pre-operative and post-operative mean values of PD, LA, GI, PI

Group statistics				
Groups	N	Mean	SD	SEM
Age				
Group A	15	36.40	9.379	2.422
Group B	15	43.93	11.304	2.919
Pre PD				
Group A	15	1.4467	0.34261	0.08846
Group B	15	1.4427	0.35495	0.09165
Pre LA				
Group A	15	0.6180	0.41415	0.10693
Group B	15	0.6307	0.42106	0.10872
Pre GI				
Group A	15	1.3567	0.48625	0.12555
Group B	15	1.4213	0.50088	0.12933
Pre PI				
Group A	15	2.1167	0.31149	0.08043
Group B	15	1.8833	0.20845	0.05382
Post PD				
Group A	15	1.2820	0.35331	0.09123
Group B	15	1.3633	0.33247	0.08584
Post LA				
Group A	15	0.5560	0.38230	0.09871
Group B	15	0.5980	0.40248	0.10392
Post GI				
Group A	15	1.1673	0.42823	0.11057
Group B	15	1.3053	0.47494	0.12263
Post PI				
Group A	15	1.5333	0.35187	0.09085
Group B	15	1.6167	0.24761	0.06393

PD: Probing depth, LA: Loss of attachment, GI: Gingival index, PI: Plaque index, SD: Standard deviation, SEM: Standard error of the mean

In this study of 15 samples, an intra- and inter-comparison of the groups was done. In comparing the differences in the PD, LA, GI, and PI within Group A it was found that the mean value of PD before interventions was 1.4467, whereas the mean value after interventions was 1.2820. The mean value of LA before interventions was 0.6180 and after interventions was 0.5560. The mean value of pre-operative GI was found to be 1.3567, whereas the mean value of post-operative was 1.1673. The mean value of pre-operative PI was 2.1167 and post-operative mean value was 1.5333. Group B comparison of pre-operative and post-operative differences in PD, LA, GI, and PI was found that the mean value of pre-operative PD was 1.4427 and post-operative was 1.3633. The mean value of pre-operative LA was 0.6307 and post-operative was 0.5980. The mean value of pre-operative GI was 1.4213 and post-operative mean value was 1.3053. The mean value of pre-operative PI was 1.8833 and post-operative was 1.1617.

Intergroup comparison was performed between Group A and Group B to compare the efficacy of Chlorhexidine mouthwash and Hiora mouthwash, which showed there was no significant difference in the mean value of PD, LA, GI, and PI between the two experimental groups before and after the interventions. The mean values of Group A pre-operative PD are 1.4467 whereas Group B is 1.4427. The mean value of Group A post-operative PD is 1.2820 and Group B is 1.3633. The mean values of Group A pre-operative LA are 0.6160 and Group B is 0.6307. The mean values of Group A post-operative LA are 0.5560 and Group B is 0.5980. The mean values of Group A pre-operative GI is 1.3567 and Group B pre-operative GI is 1.4213. The mean values of Group A post-operative GI are 1.1673 and Group B post-operative index is 1.3053.

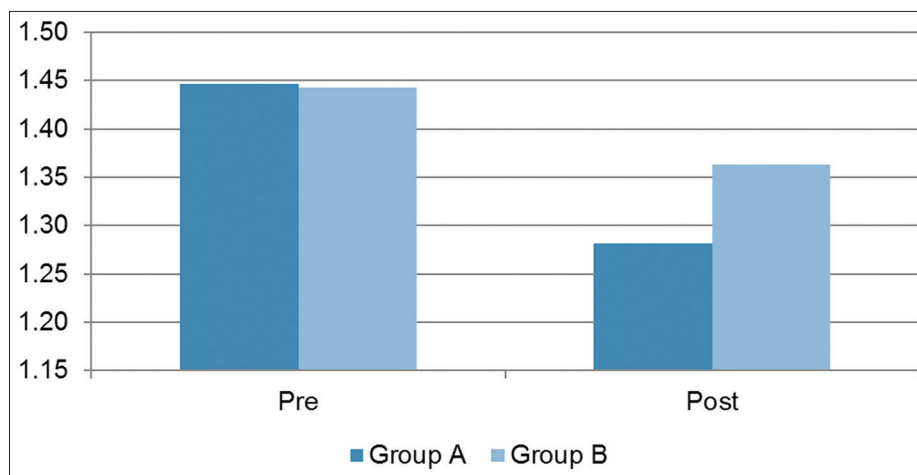


Fig. 1: Mean value of pre-operative and post-operative probing depth in Group A and Group B

The mean values of pre-operative PI in Group A are 2.1167 and pre-operative PI in Group B is 1.8833. The mean values of post-operative PI in Group A are 1.5333 and Group B post-operative PI is 1.6167.

Hence, in the experimental Group A and Group B, at the end of the study, the mean values of PD, LA, GI, and PI were found to be significantly lower than the pre-operative mean values. At the end of 15 days, almost comparable reduction in the amount of plaque and gingivitis was found in Group A and Group B. The differences in efficacy of these two mouthwashes were non-significant. Similar results were obtained

in a study conducted by Parwani *et al.* where 90 patients divided into three groups, 30 patients in each group, namely: Normal saline group, Chlorhexidine group, and Hiora mouthwash group. Results showed Chlorhexidine and Hiora mouthwash were superior to normal saline, but between Chlorhexidine and Hiora group there was non-significant improvement [27].

Chlorhexidine and other antimicrobials are also delivered in local drug delivery form. It can be delivered as gel, microchip to deliver the ingredients into the gingival sulcus itself for effective plaque reduction [28]. Nanotechnology has been used in the delivery of antimicrobial agents for effective treatment [29]. Long-term cohort studies are required to assess the effectiveness of antimicrobial agents.

CONCLUSION

To maintain an effective oral hygiene along with mechanical plaque removal, chemical agents like mouthwashes are used. Both Chlorhexidine and Hiora mouthwashes can be effectively used as an adjunct to mechanical plaque control in the prevention of plaque and gingivitis. To conclude the results of this study, no significant difference in the efficacy of the different mouthwashes was seen, and both are effective in the treatment of gingivitis.

CONFLICTS OF INTEREST

Authors hereby declare that they have no conflict of interest regarding this study.

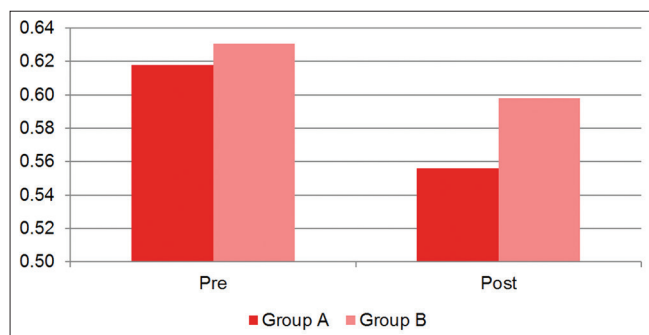


Fig. 2: Mean values of pre-operative and post-operative loss of attachment in Group A and Group B

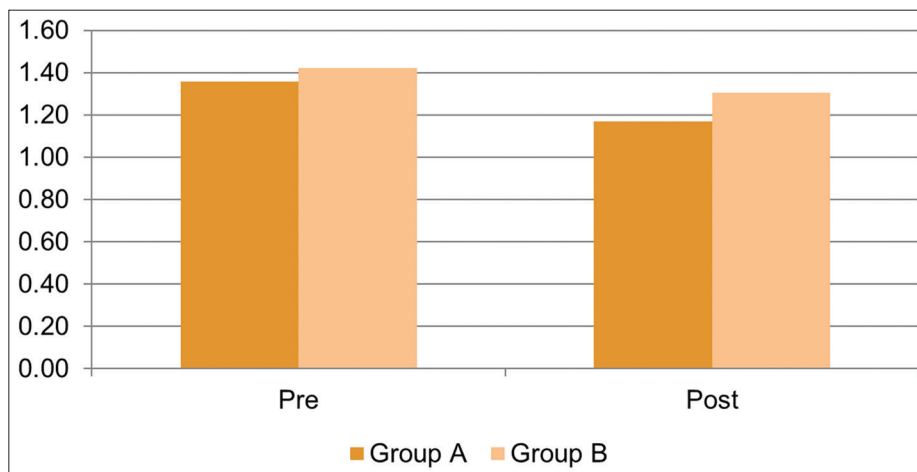


Fig. 3: Mean values of pre-operative and post-operative gingival index in Group A and Group B

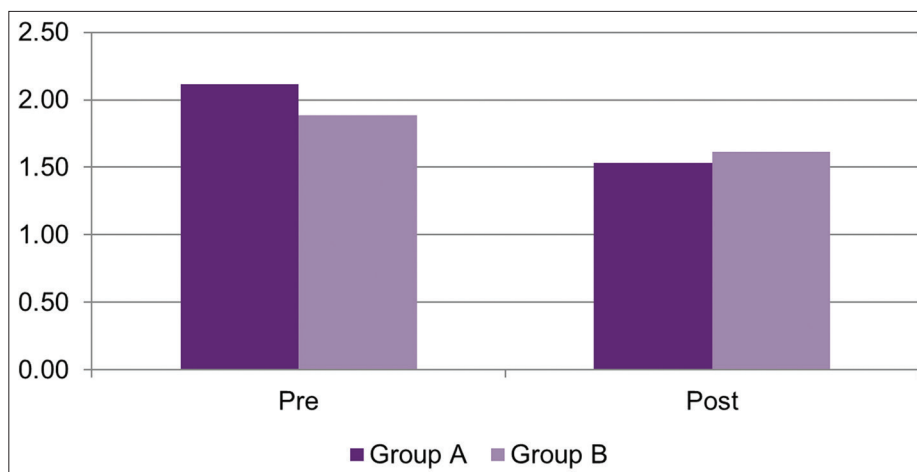


Fig. 4: Mean values of pre-operative and post-operative plaque index in both the groups

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