

Original Research

Assessment of different antiplaque agents on patients undergoing fixed orthodontic treatment

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ABSTRACT:

Background: To study the effect of different antiplaque agents on patients undergoing fixed orthodontic treatment.

Materials & methods: A total of 100 subjects were enrolled. Subjects were divided into test group and control group. Mean age of patients undergoing the orthodontic treatment was 18 to 25 years. The number of individuals were 80 in the test group and 20 in the control group. The number of female patients were 60 and 40 were male. Test group individuals were further divided into according to the mouthwash prescribed to them as- salvadora persica, chlorhexidine and cetyl pyridinium.

Results: Test group and control group were taken under consideration. Plaque index was measured at baseline and after 1 month follow up. At baseline, the plaque index for test group and control group was 1.39 and 1.52 respectively. At 1 month, the plaque index was 1.23 for control group whereas for test group was 0.68. P- value was <0.001. **Conclusion:** Salvadora persica miswak-based mouthwash showed a maximum reduction in the plaque scores among orthodontic patients.

Keywords: antiplaque agents, dental plaque, chlorhexidine, salvadora persica.

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INTRODUCTION

Dental plaque is an example of a microbial biofilm with a diverse microbial composition; it is found naturally on teeth and confers advantages to the host, for example, by preventing colonization by exogenous, and often pathogenic, micro-organisms. In individuals with a high frequency sugar diet, or with a severely compromised saliva flow, the levels of potentially cariogenic bacteria (acid-producing and acid-tolerating species) can increase beyond those compatible with enamel health.¹

Plaque formation begins with the formation of a glycoproteinaceous pellicle layer, constituted from components of saliva, crevicular fluid, host and bacterial cells. Though the pellicle layer primarily serves as a protective barrier, it also acts as a substrate for bacterial accumulation which invariably forms dental plaque. Prevention or removal of pellicle layer formation is the targeted approach towards limiting accumulation of plaque.² A plethora of options ranging from professional, mechanical removal to home based chemical control of plaque exist, but

patient friendly methods are practical and more favorable than clinical procedures.

The pellicle layer being proteinaceous also has the propensity to absorb pigments causing extrinsic stains on teeth.^{3,4} Certain chemical dentifrices extensively aimed at extrinsic stain removal by altering the surface environment of the teeth which limited plaque adherence. Similarly, miswak and bromelain are proteolytic enzymes which have proven to remove stains by dissolving the proteinaceous pellicle layer.⁵ Enamel demineralization after placing orthodontic appliances can affect more than 50% of patients. The process is found most frequently in cervical and middle thirds of the buccal surfaces of upper lateral incisors, lower canines, and first premolars.⁶ These changes in the oral environment deteriorate further by the use of attachments such as elastic chains, loops, and springs. Elastomeric ligatures have been found to harbor many microorganisms.⁷ Researchers have attempted to consistently evaluate the efficacy of these materials and several studies have been conducted on these ligatures to assess for microbial colonization.

Chlorhexidine in mouthwash form is used to reduce oral bacterial load. Chlorhexidine used in different forms has bacteriostatic effects and is effective in decreasing plaque by limiting adhesion between bacteria and enamel and in term affecting the formation of enamel film.⁸ Hence, in this study antiplaque effects of one herbal mouthwash containing *Salvadora persica*, with two synthetic mouthwashes containing either chlorhexidine or cetylpyridinium were compared.

MATERIALS & METHODS

A total of 100 subjects were enrolled. Subjects were divided into test group and control group. Mean age of patients undergoing the orthodontic treatment was 18 to 25 years. The number of individuals were 80 in the test group and 20 in the control group. The number of female patients were 60 and 40 were male.

Test group individuals were further divided into according to the mouthwash prescribed to them as *salvadora persica*, chlorhexidine and cetyl pyridinium whereas control group was prescribed with flouridated mouthwash. Complete history was taken. Scaling was done prior to the prescription of mouthwashes. Data was collected and results were analysed using SPSS software. P- value less than 0.001 was taken under consideration.

RESULTS

Pre plaque indice and post plaque indice was measured for test groups. For *salvadora persica*, the value of pre plaque indice was 1.36 and post plaque indice was 0.52. The higher decrease can be seen. For chlorhexidine mouth wash, the pre plaque score was 1.42 and post plaque score was 0.98.

Table1: comparing plaque index in test group

Test group	Pre-plaque indice	Post- plaque indice
Salvadora persica	1.36	0.52
Chlorhexidine	1.42	0.98
Cetyl pyridinium	1.38	1.01

Test group and control group were taken under consideration. Plaque index was measured at baseline and after 1 month follow up. At baseline, the plaque index for test group and control group was 1.39 and 1.52 respectively. At 1 month, the plaque index was 1.23 for control group whereas for test group was 0.68. P- value was <0.001.

Table2: Intergroup comparison of plaque index

Group	Baseline	1 month	P - value
Control	1.52	1.23	<0.001
Test	1.39	0.68	<0.001
P - value	0.5		

DISCUSSION

The retentive nature of appliances in patients undergoing fixed orthodontic therapy and difficulty in accessing certain areas severely affects the ability to maintain a good oral hygiene. Maintenance of oral hygiene in orthodontic patients can be carried out by both clinical and supplementary methods of care. While the effectiveness of the clinical procedures are inimitable the importance of adjuncts to clinical care in this patient group cannot be underscored. Thus, additional home based oral health care must be a mainstay in upholding good oral health levels. A variety of products such as mouth rinses, dentifrices, etc have been used as agents to prevent plaque accumulation and gingivitis.⁹ In our study, pre plaque indice and post plaque indice were measured for test groups. For *salvadora persica*, the value of pre plaque indice was 1.36 and post plaque indice was 0.52. The higher decrease can be seen. For chlorhexidine mouth wash, the pre plaque score was 1.42 and post plaque score was 0.98.

In one of the study by Niazi FH et al, a randomised controlled trial, 100 patients undergoing orthodontic treatment underwent scaling and polishing at baseline to obtain a plaque score of zero. In the first phase,

they were given oral hygiene instructions and were provided with a standard toothpaste to be used twice daily for a period of three weeks. In the second phase, following scaling and polishing, they were randomly allocated to 4 groups according to 4 different types of mouthwash (A: chlorhexidine; B = cetylpyridinium; C = extracts of *Salvadora persica* miswak; D: extract of *Azadirachta indica* miswak) along with previously taught toothbrushing protocol for three more weeks. Analysis of mean differences of post-plaque indices between and within groups was performed using the post-hoc Tukey test. There was a statistically significant decrease in mean plaque scores after using mouthwashes in all four groups at follow-up when compared to the baseline plaque score (p = 0.001). The greatest reduction of plaque score was found in group C (extract of *Salvadora persica*) when compared with group A, chlorhexidine (p = 0.016).¹⁰ In our study, test group and control group were taken under consideration. Plaque index was measured at baseline and after 1 month follow up. At baseline, the plaque index for test group and control group was 1.39 and 1.52 respectively. At 1 month, the plaque index was 1.23 for control group whereas for test group was 0.68. P- value was <0.001.

Another study by Tadikonda A et al, single center randomized controlled clinical trial with an allocation ratio of 1:1 was conducted. Evaluation of plaque and gingivitis was done using Williams modification of Silness and Loe Plaque Index (PI) for use in orthodontic subjects and Loe and Silness's Gingival Index (GI) at baseline and one month. Inter-group comparison showed there was significantly lower mean plaque index in test (0.88 ± 0.05) than in control group (1.17 ± 0.05) after adjusting for the baseline plaque index ($p < 0.001$). Similarly, there was significantly lower mean gingival index in test (0.87 ± 0.04) than in control group (1.14 ± 0.04) after adjusting for the baseline gingival index ($p < 0.001$). The efficacy of the test dentifrice in limiting plaque and gingivitis suggests that it can be used as a home based adjunct to clinical therapy in orthodontic patients.¹¹

Miswak extracts in mouthwashes have also shown beneficial effects on oral health though it was restricted to improvement in gingival health and bleeding.¹² Recent systematic reviews on Neem and Miswak clearly elucidate the numerous beneficial effects of these agents.¹³

CONCLUSION

Salvadora persica miswak-based mouthwash showed a maximum reduction in the plaque scores among orthodontic patients.

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