

# International Journal of Research in Health and Allied Sciences

Journal home page: [www.ijrhas.com](http://www.ijrhas.com)

Official Publication of "Society for Scientific Research and Studies" [Regd.]

ISSN: 2455-7803

Index Copernicus value [ICV] = 68.10;

## Original Research

### Efficacy of chlorhexidine in patients with orthodontic brackets

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#### ABSTRACT:

**Background:** The present study compared effectiveness of two chlorhexidine mouth rinses on oral hygiene of patients wearing two different types of orthodontic brackets. **Materials & Methods:** The present study was conducted on 40 patients requiring fixed orthodontics. Patients were divided into 2 groups. Group I patients received metal-stainless steel brackets and group II patients received ceramic brackets. Both groups were subdivided into 2 subgroups. Subgroup I received a conventional, alcohol-free chlorhexidine solution (0.2% CHX) and subgroup II received a chlorhexidine solution with anti-discoloration system (0.2% CHX-ADS). **Results:** In group I, mean GI at baseline, 6 weeks and 16 weeks in subgroup I was 0.44, 0.32 and 0.36 respectively and in subgroup II was 0.42, 0.26 and 0.34 respectively. OHI in subgroup I, the value was 0.74, 0.52 and 0.66 and in subgroup II was 0.72, 0.46 and 0.52 at baseline, 6 weeks and 16 weeks respectively. The difference was non-significant ( $P > 0.05$ ). In group II, mean GI at baseline, 6 weeks and 16 weeks in subgroup I was 0.37, 0.24 and 0.34 respectively and in subgroup II was 0.36, 0.10 and 0.34 respectively. OHI in subgroup I, the value was 0.67, 0.41 and 0.67 and in subgroup II was 0.62, 0.35 and 0.44 at baseline, 6 weeks and 16 weeks respectively. The difference was non-significant ( $P > 0.05$ ). **Conclusion:** Authors found that ceramic brackets were better as compared to metallic brackets and CHX-ADS was more effective than CHX alone.

**Key words:** Ceramic brackets, Metallic brackets, Chlorhexidine

**Received:** 22/06/2020

**Modified:** 18/08/2020

**Accepted:** 22/08/2020

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**This article may be cited as:** Jain G, Ali S, Ansari F, Singhai V. Efficacy of chlorhexidine in patients with orthodontic brackets. Int J Res Health Allied Sci 2020; 6(5):106-109.

#### INTRODUCTION

Dental plaque is the major etiologic factor in the development of dental caries and gingivitis which typically accumulated during the orthodontics. Orthodontic metallic attachments cause alterations in the oral microflora by PH decreasing, bacteria affinity to the metallic surfaces due to the electrostatic reactions, and creating new plaque retentive areas which in turn predisposes to increased microbes carriage.<sup>1</sup> Generally orthodontic patients are unable to maintain adequate oral hygiene by mechanical means alone due to the failure of plaque removal from difficult to access areas that are hindered by orthodontic attachments.<sup>2</sup>

Multibracket orthodontic appliances increase dental plaque retention and make oral hygiene more difficult for patients.<sup>3</sup> It is hard to effectively educate patients to reduce plaque solely by mechanical means as mechanical methods of plaque removal require motivation, manual dexterity and dedication. Chlorhexidine (CHX) mouthrinse, as antimicrobial agent is considered the gold standard in preventing the dental plaque formation and gingival inflammation due to its anti-gingivitis effects.<sup>4</sup> It is a cationic composition that can bind to bacterial plaque, enamel hydroxyapatite and mucous membranes. Some studies have shown that CHX has side effects, like extrinsic tooth and tongue staining. In recent times in dental clinical practice, there has also been an advanced

version of CHX with anti discoloration system (CHX-ADS). Besides maintaining its antiseptic qualities, CHX-ADS avoids the side effect of staining.<sup>5</sup> The present study compared effectiveness of two chlorhexidine mouthrinses on oral hygiene of patients wearing two different types of orthodontic brackets.

**MATERIALS & METHODS**

The present study was conducted in the department of Orthodontics. It comprised of 40 patients requiring fixed orthodontics. The study was explained to all and their written consent was obtained. Ethical clearance was obtained before starting the study.

Demographic profile was recorded. Patients were divided into 2 groups. Group I patients received

metal-stainless steel brackets and group II patients received ceramic brackets. They were provided with mouthrinses after 2 weeks of fixed orthodontics. Both groups were subdivided into 2 subgroups. Subgroup I received a conventional, alcohol-free chlorhexidine solution (0.2% CHX) and subgroup II received a chlorhexidine solution with anti-discoloration system (0.2% CHX-ADS). Ten millilitres of each mouthrinse was used twice daily. In all groups, gingival index and oral hygiene index was evaluated before orthodontic treatment, after 6 weeks and after 16 weeks. Results were tabulated and statistically analysed. P value less than 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Subgroups	Group I (Metallic Bracket)		Group II (Ceramic bracket)	
	Subgroup I	Subgroup II	Subgroup I	Subgroup II
Agent	CHX	CHX- ADS	CHX	CHX- ADS
Number	10	10	10	10

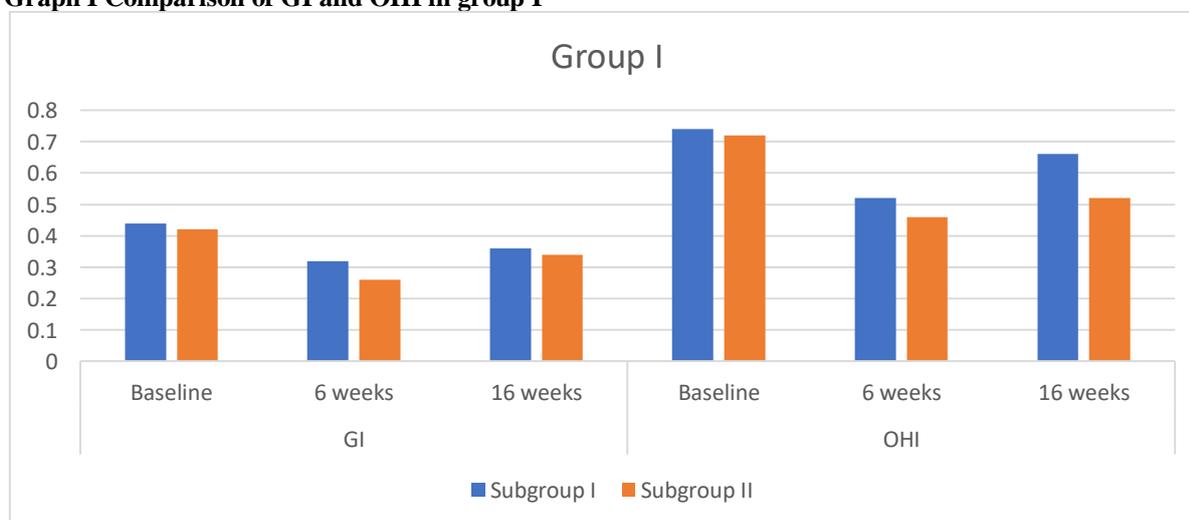
Table I shows distribution of patients based on type of brackets used. Each subgroup had 10 patients in both groups.

**Table II Comparison of GI and OHI in group I**

Parameter	Period	Subgroup I	Subgroup II	P value
GI	Baseline	0.44	0.42	0.92
	6 weeks	0.32	0.26	0.81
	16 weeks	0.36	0.34	0.95
OHI	Baseline	0.74	0.72	0.98
	6 weeks	0.52	0.46	0.91
	16 weeks	0.66	0.52	0.05

Table II, graph I shows that in group I, mean GI at baseline, 6 weeks and 16 weeks in subgroup I was 0.44, 0.32 and 0.36 respectively and in subgroup II was 0.42, 0.26 and 0.34 respectively. OHI in subgroup I, the value was 0.74, 0.52 and 0.66 and in subgroup II was 0.72, 0.46 and 0.52 at baseline, 6 weeks and 16 weeks respectively. The difference was non- significant (P> 0.05).

**Graph I Comparison of GI and OHI in group I**

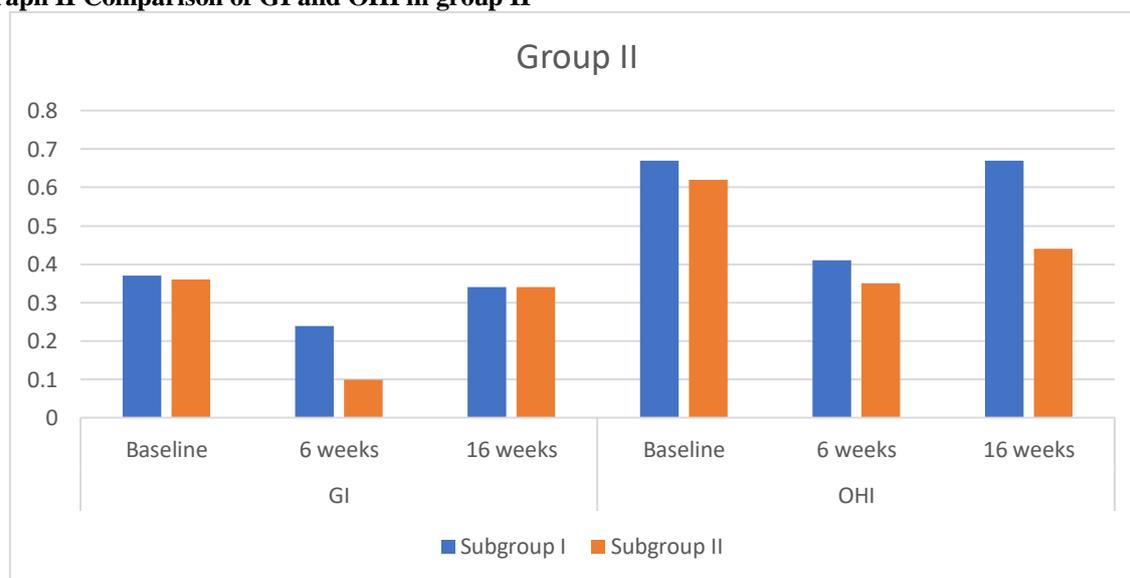


**Table III Comparison of GI and OHI in group II**

Parameter	Period	Subgroup I	Subgroup II	P value
GI	Baseline	0.37	0.36	0.96
	6 weeks	0.24	0.10	0.001
	16 weeks	0.34	0.34	1
OHI	Baseline	0.67	0.62	0.94
	6 weeks	0.41	0.35	0.91
	16 weeks	0.67	0.44	0.01

Table III, graph II shows that in group II, mean GI at baseline, 6 weeks and 16 weeks in subgroup I was 0.37, 0.24 and 0.34 respectively and in subgroup II was 0.36, 0.10 and 0.34 respectively. OHI in subgroup I, the value was 0.67, 0.41 and 0.67 and in subgroup II was 0.62, 0.35 and 0.44 at baseline, 6 weeks and 16 weeks respectively. The difference was non-significant ( $P > 0.05$ ).

**Graph II Comparison of GI and OHI in group II**



**DISCUSSION**

Generally orthodontic patients are unable to maintain adequate oral hygiene by mechanical means alone due to the failure of plaque removal from difficult to access areas that are hindered by orthodontic attachments.<sup>6</sup> A common strategy is to add a chemotherapeutic agent such as antimicrobial mouth rinses into mechanical oral hygiene regimen. Mechanical means remove bulk of plaque, while remaining plaque may be inactivated by antimicrobial mouth rinses. They act against plaque by either of preventing bacteria adhesion, disturbing bacterial vitality or disrupting existing plaque.<sup>7</sup> Streptococcus mutans and Lactobacilli are known as most closely bacteria associated with dental caries. Shortly after bonding orthodontic attachments, level of these bacteria in the oral cavity elevates due to plaque accumulation.<sup>8</sup> Reduction of these cariogenic bacteria is an important step to prevent caries. It has been shown that chlorhexidine (CHX) and fluoride mouth rinses have activity against oral pathogens.<sup>9</sup> CHX is the most popular antimicrobial mouth rinses. There is strong evidence to support antiplaque and anti-gingivitis effects of CHX. It has antimicrobial effects against the periodontal and cariogenic

pathogens streptococcus mutans (S. mutans) and Lactobacilli. Previous studies have shown a significant reduce in the amount of plaque and also gingivitis in orthodontic patients who received CHX mouth rinse.<sup>10</sup> The present study compared effectiveness of two chlorhexidine mouth rinses on oral hygiene of patients wearing two different types of orthodontic brackets. In present study, Group I patients received metal-stainless steel brackets and group II patients received ceramic brackets. Subgroup I received a conventional, alcohol-free chlorhexidine solution (0.2% CHX) and subgroup II received a chlorhexidine solution with anti-discoloration system (0.2% CHX-ADS). Jurisic et al<sup>11</sup> assessed efficacy of two formulations of chlorhexidine 0.2% (CHX) mouth rinses in terms of oral hygiene and gingival health status in adolescents with fixed orthodontic appliances wearing two different types of brackets during 18 weeks. Assessment was carried out according to gingival index (GI) and oral hygiene index-simplified (OHI-S) performed prior to the placement of the appliance (t1), 6 weeks (t2), and 18 weeks (t3) after the placement. Statistically significant decrease in GI and OHI-S indices after 6 weeks and then increase after 18 weeks

for all groups was found. Both GI and OHI-S values were lower in subjects wearing ceramic brackets, with statistically significant difference for GI after the usage of the mouthrinse for 14 days, at t2.

We found that in group I, mean GI at baseline, 6 weeks and 16 weeks in subgroup I was 0.44, 0.32 and 0.36 respectively and in subgroup II was 0.42, 0.26 and 0.34 respectively. OHI in subgroup I, the value was 0.74, 0.52 and 0.66 and in subgroup II was 0.72, 0.46 and 0.52 at baseline, 6 weeks and 16 weeks respectively. In group II, mean GI at baseline, 6 weeks and 16 weeks in subgroup I was 0.37, 0.24 and 0.34 respectively and in subgroup II was 0.36, 0.10 and 0.34 respectively. OHI in subgroup I, the value was 0.67, 0.41 and 0.67 and in subgroup II was 0.62, 0.35 and 0.44 at baseline, 6 weeks and 16 weeks respectively. Dehghani et al<sup>12</sup> included 60 fixed orthodontic patients aged 14-25 years which were randomly assigned to one of four mouthrinses groups: 1- combined CHX /NaF 2- CHX 0.06% 3- NaF0.05% 4-placebo. Following baseline examination patients were instructed to use the assigned mouthrinse twice daily for 21 days. Bleeding index (BI), modified gingival index (MGI) and plaque index (PI) were determined at the baseline and after three weeks of rinsing. Samples from supragingival plaque were obtained for the assessment of total bacterial, *Streptococcus mutans* and *Lactobacilli* colony counts. All three active mouth rinses induced significant improvements of BI, MGI, and PI ( $P<0.05$ ). Results of CHX/NaF were slightly, but not significantly, better than CHX. CHX/NaF and CHX induced significantly more changes than NaF and placebo. Microbiological measurements; Except placebo, other mouthrinses reduced total bacterial, *Streptococcus mutans* and *Lactobacilli* counts significantly ( $P<0.05$ ). CHX/NaF acted against *Lactobacilli* significantly more than others. Adding CHX0.06%/NaF0.05% combined mouth rinse to daily oral hygiene regimen of orthodontic patients significantly improved oral hygiene status. Effect of this combined mouth rinse on dental plaque *Lactobacilli* was remarkable.

The shortcoming of the study is small sample.

## CONCLUSION

Authors found that ceramic brackets were better as compared to metallic brackets and CHX- ADS was more effective than CHX alone.

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