

# Clinical Effects of Chlorhexidine Mouth Washes on Patients Undergoing Orthodontic Treatment

Original Article

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## Summary:

### Background

Chlorhexidine mouth wash one of the effective chemical plaque control method that is used to prevent plaque accumulation and subsequent gingivitis.

### Aim of study

To determine the effect of chlorhexidine mouth wash in patients undergoing orthodontic treatment at 30,60 and 90 days on oral hygiene status.

### Materials and methods

This study compared the short-term clinical effect of 0.12% chlorhexidine gluconate and placebo mouthrinses in 28 adolescents (ages 12 to 16) undergoing orthodontic treatment. Subjects were randomized into study (chlorhexidine mouth wash) and control groups. Plaque Index (PI), Gingival Index (GI), Retention Index (RI), Discoloration Index (DI), and probing depths (PD) were recorded at base line ,30, 60 and 90 days , except for the DI and PD, which were only assessed at 3 months.

### Results

Study shows no statistical significant differences between groups were seen at baseline for any of the parameters. Results shows that means value of plaque and gingivitis of study group were lower than control group with statistically significant different after 90 days. For the retention index, the mean values of retention index of study were different than that of control group, with statically significant at the distal buccal (30 and 60 days ), and at the midbuccal (60 days).

After 3 months, the DI showed higher scores in the experimental group as compared with the control, but they were not statistically significant. Deeper PD were detected in the control group at 90 days, and they were statistically significant, except for the midlingual site. The RI did not show significant differences at 90 days, but higher values were recorded in the CHX group.

### Conclusion

The data indicate that the use of the CHX, in addition to regular oral hygiene habits, was effective in reducing plaque and gingivitis in adolescents undergoing orthodontic treatment.

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### **Introduction:**

Some of the earliest applications of chlorhexidine for the control of plaque and gingivitis go back to 1970, when the dental literature<sup>1</sup> reported on the use of 0.2% chlorhexidine gluconate rinses, twice a day, to prevent plaque accumulation and subsequent gingivitis. It is known that adequate plaque control is difficult in patients undergoing orthodontic treatment, especially in the cases of children and adolescents. According to Lundström and Hampton<sup>2</sup>, it is particularly difficult to maintain an acceptable hygiene when

### **Aims of study**

The purposes of this clinical study were the following:

1. To determine the short-term gingival changes in an adolescent population with healthy gingiva, undergoing orthodontic treatment and using chlorhexidine (CHX) rinses

### **Materials And Methods**

Twenty eight person were involved in this study, after examination of 30 person ( 2 individual were excluded , because they were unable to come back for the 90 days of period study). They were selected from those undergoing orthodontic treatment at the department of orthodontics, College of Dentistry, University Baghdad, from December 2005 – December 2006.

The participants did not suffer from any systemic complications, nor were they taking any medications that may have had an effect on the oral tissues. All the participants had banding of at least one molar per quadrant. Once the patients were accepted in the study, they received a dental prophylaxis, which included the removal of plaque, calculus, and stains from the teeth by scaling and polishing (plaque control detected by disclosing agent ). The patients in our study were prevented from consumption of caffeine-containing beverages.

Sample were divided into two groups: the study group and the control group. After 8 to 10 days (baseline), the observer recorded the following clinical parameters for all teeth: Plaque, gingivitis, calculus ( supra or subgingival) recorded according to the criteria of

bands, wires, and ligatures are involved. Authors have reported on the development of hyperplastic gingivitis within 1 to 2 months after placement of appliances<sup>3</sup> and even the detection of slight attachment loss 2 years after removal of the appliances<sup>4,5</sup> when patients have not been continually motivated regarding oral hygiene. However, if a thorough home care program is established, the inflammatory changes that may happen in the gingival tissues during orthodontic treatment can be reversed.<sup>6</sup>

as an adjunct to regular oral hygiene practices, as compared with control group.

2. To assess any discoloration or staining in the structure of the teeth, as well as presence of calculus.

plaque index, gingival Index and retention respectively<sup>7</sup>. Discoloration Index was used to determined discoloration for two aspects of each tooth ( buccal and lingual).

For the Probing Depths ( The distance from the free gingival margin to the sulcus/pocket depth was measured at six points (distal buccal, midbuccal, mesial buccal, distal lingual, midlingual, and mesial lingual) around each tooth by means of a periodontal probe).

After the recording of parameters( Base line data), the study group as well as the control group received oral and written tooth brushing instructions with the same toothpaste (Sanino), to be performed twice daily. The method used was the Modified Bass technique. Soft, rounded toothbrushes were supplied to all patients.

Furthermore, the study group received supplies of 0.12% chlorhexidine gluconate (Al-Mansoor). They also received oral and written instructions, which included rinsing twice a day after breakfast and before bedtime (at the same time) for 30 seconds with 15 ml of CHX. The control group received exactly the same instructions with a flavored placebo solution, which was identical to the experimental solution, except for the active ingredient that was 0.12

chlorhexidine gluconate, this solution is prepared at the College of Pharmacy, University of Baghdad.

Evaluations of the plaque, gingival, and retention indexes were performed at base line, 30, 60 and 90 days, except for the DI and PD, which were only assessed at 90 days. The

#### Results

At base line stage, Table 1,2,3 illustrates that the mean values of plaque, gingival and retention indices of study group were different than control group with no statistically significant difference ( $P > 0.05$ ).

Similarly, table 4 shows that there were no significant differences ( $p < 0.05$ ) between the mean probing depth measurements recorded at any of the sites of either group (experimental and control) recorded. The same was observed with regard to the discoloration index (Table 5).

After 30- and 60-day, data shows that the mean values of plaque and gingivitis in study group were lower than that of control group, with no statistically significant differences ( $p > 0.05$ ). While the differences were recorded between retention index score in distal buccal (30 and 60 days) and midbuccal (60 days), with statistically significant differences ( $p < 0.05$ ).

After 90-day, there were decrease in the mean values of plaque and gingival indices, with

#### Discussion

The results of the current study indicate that the use of the experimental solution, in addition to regular oral hygiene habits, was effective in reducing the plaque and gingivitis levels during the experimental trial (90 days). These results seem to agree with the results of previous studies where chlorhexidine gluconate was used<sup>8,9</sup>.

As explained in the results section, the discoloration was more evident in the experimental group, but it was not statistically significant, similarly to the finding of other studies<sup>10-11</sup>. In addition, this staining may also affect composite restorations and sometimes it may cause discoloration on the dorsum of the tongue<sup>12</sup>. The patients in our study were warned about the possibility that stains could be emphasized by the consumption of caffeine-containing beverages<sup>11</sup>.

No significant differences between the two groups were found with regard to calculus

participants also received a prophylaxis at the end of the trial.

The Statistical Analysis System (SAS) was the computer program used in the analyses of the data, by means of the Student's *t* test and the paired *t* test.

statistically significant difference ( $P < 0.05$ ). The retention index scores in study group were different than that of control group, no statistically significant difference ( $P > 0.05$ ).

At 90 days, there were significant differences ( $p < 0.05$ ) between the means of the probing depths recorded in the control and experimental groups for all the sites where probing was performed, except for the midlingual areas, where there were no significant differences. The higher mean values were always observed in the placebo group, even in the areas (midlingual) where no significant differences were found. The same trend was evident when the changes in the means were analyzed.

Table 5 shows that the stain found in the control group was less than the amount of stain detected in the experimental group. However, this was not statistically significant ( $p < 0.05$ ).

accumulation, after the 3-month experimental trial. Nevertheless, the higher mean values were always found in the experimental group. This is in agreement with previous studies, where the use of chlorhexidine has been related to a more abundant calculus accumulation<sup>13,8</sup>.

It is also known that people who use chlorhexidine may experience an additional side effect such as a bitter taste sensation<sup>12</sup> after rinsing with the agent. In this study, however, no side effects were reported as a result of the use of either the experimental or the control solutions, except for one patient who acknowledged a burning sensation on the mucosa, after the use of the experimental solution.

Finally, the use of chlorhexidine may be used as a motivating factor for patients, as Ainamo<sup>14</sup> has suggested. It would make the patients aware of the sensation of cleanliness so they could make applications and develop their mechanical abilities for controlling plaque.

**Conclusions**

The results of this experiment indicate that the use of chlorhexidine mouthrinses can be beneficial to orthodontic patients in maintaining better oral hygiene. Reduced plaque retention in those patients who use the chlorhexidine rinse was noted. The gingival indexes taken show a reduced amount of bleeding.

Because of the reduced amount of plaque retention and subsequent reduction in gingival indexes values, the expected results of less inflammation, and therefore decreased probing depths, were seen.

The results also indicate that the discoloration, and the presence of calculus that may appear as a result of the use of the experimental solution, were not clinically or statistically significant in this study.

**Table (1): Plaque index (Mean and SD) study (CHX) and control groups at different time intervals.**

		surface	Lingual		Mesial buccal		Midbuccal		Distal buccal	
		N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline	Control	15	0.95	0.34	0.84	0.45	0.94	0.41	0.75	0.46
	CHX	13	1.21	0.44	1.14	0.44	1.16	0.46	0.89	0.49
30 days	Control	15	0.80	0.33	0.76	0.37	0.78	0.37	0.57	0.30
	CHX	13	0.64	0.33	0.57	0.30	0.65	0.33	0.49	0.39
60 days	Control	15	0.70	0.40	0.66	0.44	0.68	0.40	0.41	0.37
	CHX	13	0.50	0.36	0.40	0.32	0.50	0.40	0.26	0.31
90 days	Control	15	0.97*	0.38	0.83*	0.40	0.95*	0.43	0.62*	0.34
	CHX	13	0.38*	0.19	0.22*	0.17	0.47*	0.22	0.22*	0.21

\*Significantly different,  $p < 0.05$  (Student's t test)

**Table (2): Gingival index (Mean and SD) in study (CHX) and control groups at different time intervals.**

		surface	Lingual		Mesial buccal		Midbuccal		Distal buccal	
		N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline	Control	15	0.91	0.39	0.79	0.37	0.93	0.34	0.61	0.44
	CHX	13	1.16	0.44	1.04	0.44	1.15	0.54	0.80	0.44
30 days	Control	15	0.79	0.38	0.70	0.35	0.78	0.42	0.43	0.33
	CHX	13	0.74	0.36	0.65	0.36	0.76	0.30	0.42	0.34
60 days	Control	15	0.72	0.44	0.68	0.46	0.73	0.47	0.32	0.32
	CHX	13	0.52	0.28	0.46	0.26	0.49	0.25	0.22	0.19
90 days	Control	15	1.03*	0.40	0.87*	0.50	1.05*	0.38	0.63*	0.30
	CHX	13	0.42*	0.21	0.25*	0.20	0.49*	0.23	0.22*	0.23

\*Significantly different,  $p < 0.05$  (Student's t test)

**Table (3): Retention index (Mean and SD) in study (CHX) and control groups at different time intervals.**

		surface	Lingual		Mesial buccal		Midbuccal		Distal buccal	
		N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Baseline	Control	15	0.09	0.12	0.04	0.11	0.09	0.12	0.10	0.10
	CHX	13	0.14	0.16	0.05	0.11	0.15	0.18	0.11	0.10
30 days	Control	15	0.04*	0.09	0.02	0.05	0.06	0.08	0.08	0.10
	CHX	13	0.12*	0.11	0.07	0.01	0.16	0.09	0.09	0.09
60 days	Control	15	0.02*	0.05	0.01	0.05*	0.07	0.09	0.09	0.12
	CHX	13	0.13*	0.12	0.06	0.15*	0.17	0.12	0.09	0.11
90 days	Control	15	0.05	0.06	0.00	0.06	0.07	0.10	0.11	0.11
	CHX	13	0.12	0.11	0.03	0.10	0.17	0.11	0.10	0.09

\*Significantly different,  $p < 0.05$  (Student's t test )

**Table (4): Probing depths (mm) (Mean and SD) at baseline and 90 days.**

		surface	Distal-buccal		Midbuccal		Mesial Buccal		Distal lingual		Midlingual		Mesial lingual	
			N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean
Baseline	Control	5	2.61	0.32	2.13	0.34	2.61	0.37	2.45	0.26	1.99	0.35	2.45	0.31
	CHX	3	2.68	0.55	2.25	0.32	2.27	0.53	2.24	0.45	2.14	0.49	2.45	0.47
90 days	Control	5	2.83*	0.27	2.20*	0.24	2.82*	0.32	2.71*	0.25	1.99	0.24	2.77*	0.24
	CHX	3	2.47*	0.32	2.04*	0.13	2.54*	0.35	2.40*	0.33	1.85	0.32	2.42*	0.33

\*Significantly different,  $p < 0.05$  (paired t test )

Table (5): Discoloration index (Mean and SD) at baseline and 90 days.

Surface	Group	N	Baseline		90 days	
			Mean	SD	Mean	SD
Buccal	Control	15	0.54	0.5	0.53	0.52
	CHX	13	0.65	0.5	1.39	0.65
Lingual	Control	15	0.44	0.5	0.6	0.51
	CHX	13	0.56	0.5	1.54	0.66

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