

# Effect of two different oral hygiene motivation methods on gingival health of patients with fixed orthodontic appliances

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## Abstract

**Introduction:** Oral hygiene instructions play a vital role in the maintenance of oral hygiene in patients with orthodontic appliances. The purpose of this study was to compare written instructions and verbal instructions using models with fixed orthodontic appliances.

**Material and Methods:** The sample comprised of 217 subjects divided into 2 groups (Group A, 110 and Group B 107). The mean gingival Index difference between baseline and one month was computed and analyzed through independent t tests.

**Results:** Mean gingival scores of patients in group A were more as compared to Group B. Results revealed that p-value was significant when mean gingival indices of both groups were compared.

**Conclusions:** Subjects receiving verbal instructions using demonstrations on models have significantly better oral hygiene when compared to those receiving only written instructions.

**Keywords:** Oral hygiene; Orthodontic Appliances; Gingival Index

## Introduction

Oral hygiene is an important health concern especially in patients with fixed orthodontic appliances.<sup>1, 2</sup> Prevalence of malocclusion advocates the need of fixed orthodontic treatment.<sup>3</sup> Malocclusion causes poor oral hygiene and components of orthodontic appliances complicate the use of conventional oral hygiene measures even more.<sup>4</sup> This often results in significant plaque accumulation around the brackets and braces.<sup>5</sup> Bleeding on probing and increased periodontal pocket depth has been reported shortly after placement of fixed orthodontic appliances.<sup>6</sup>

Traditionally dentists have attempted to promote their patient's home care activities with instruction and counseling.<sup>7</sup> There have been a few studies in literature which evaluated oral hygiene motivation in patients using various methods. These methods can be classified as verbal, written or video-based.<sup>8</sup> The comparison of effectiveness between written, verbal and videotaped oral hygiene instructions was evaluated by Lees et al.<sup>9</sup> The orthodontist's role is to promote daily use of dentifrices with proper brushing technique and rinses containing fluoride. Effective cleaning of tooth surfaces can be accomplished by electric or manual toothbrushes.<sup>10</sup> Oral hygiene can be assessed clinically by gingival index, plaque index and bleeding Index.<sup>11</sup> Berlin, Broner et al found a positive co-relation between proper instructions by the orthodontist explaining the patient the importance of tooth brushing and various other variables.<sup>12</sup> A linear relationship between proper instructions and oral hygiene was established in study by Acharya et al.<sup>13</sup> Attasi F and Awartani F concluded in their study that oral home care of the orthodontic patients was not at optimal

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level and oral hygiene maintenance program needs to be established.<sup>14</sup>

Effective oral hygiene is ensured when proper oral hygiene instructions are given followed by compliance of the patient.<sup>15</sup> There have been very few studies on effective oral hygiene methods in Pakistan. The oral hygiene instructions given to orthodontic patients have been evaluated but there is a lack of study of the effect of different motivation methods on patients with fixed orthodontic appliances.<sup>15</sup> This study was conducted to compare the effect of written instructions and verbal instructions using models in patients with fixed orthodontic appliances presenting to orthodontics department of Islamic International Dental Hospital. This study aims to ensure proper oral hygiene instructions to keep orthodontic patients motivated during the course of their active orthodontic treatment.

## Material and Methods

After the approval from the Ethics committee, informed consent of 217 patients reporting to the Department of Orthodontics at Islamic International Dental Hospital was taken. Only those patients were selected who were aged 12 years and above and had received fixed orthodontic treatment for less than 1 year at Islamic International Dental Hospital. Baseline recordings of mean gingival index were made according to Löe H, Silness criteria<sup>11</sup>. Selected patients had a mean gingival index of 0 or 1. Patients having trauma, systemic disease, severe periodontal disease, mentally handicapped patients and patients with craniofacial anomalies were excluded from the study.

Patients were randomly divided into 2 groups. Group A received written instructions (Figure 3) and Group B received verbal instructions using models (Figure 3 & 4). The same type of toothbrush (Oral B orthodontic toothbrush, Proctor and Gamble Pakistan) toothpaste (Sensodyne, GlaxoSmithKline Pakistan) mouthwash

(Sensodyne, GlaxoSmithKline Pakistan) and dental floss (Oral Proctor and Gamble Pakistan) was instructed to the patient. Bass method<sup>16</sup> of tooth brushing and interdental cleaning was instructed to the patients using models (3M Typhodont) with fixed orthodontic appliances.

Gingival Index was calculated by measuring buccal, lingual, mesial and distal surfaces of all teeth except for third molars. Individual tooth scores were added and then divided by four. Mean gingival index for individual was recorded by adding values of each tooth and dividing by the number of teeth examined. After baseline recordings of the Gingival Index, patients were recalled after one month and the Gingival Index of the two groups were compared. The data was analyzed in SPSS 16.0. Mean and standard deviations were calculated for age mean gingival index. The mean gingival Index difference between baseline and one month was computed and analyzed through independent t tests.

## Results

The results of the study showed that there is a statistically significant difference between the two oral hygiene motivation methods in patients with fixed orthodontic appliances. The mean gingival index scores one month after the baseline recordings were less in patients receiving verbal instructions with models when compared with patients receiving written instructions only (Figure 1). Independent t test were applied and p value was significant ( $p=0.00$ ) Table I. Distribution of age and gender in both groups is depicted in Table II-V.

## Discussion

The treatment of malocclusion requires orthodontic therapy.<sup>3</sup> The placement of fixed orthodontic appliances changes the microbiological environment of the oral cavity.<sup>5</sup> This may result in significant accumulation of plaque and calculus if oral hygiene is not maintained. Increased in

periodontal pocket depth and bleeding on probing have been demonstrated shortly after placement of orthodontic appliances.<sup>17</sup>

In this study we evaluated the mean gingival Index scores of patients with fixed orthodontic appliances who received different types of oral hygiene instructions. The hypothesis of our study was that patients receiving verbal instructions using models have better oral hygiene when compared with written instructions in terms of mean gingival index scores. The results supported the hypothesis and there was a significant difference between the two methods. After one month patients receiving verbal instructions using models had lower mean gingival index scores as compared to those who received written instructions. The results were statistically significant ( $p < 0.05$ ).

The results of our study are similar to Lees et al. The gingival scores were improved when compared with the written instructions. In their study the gingival scores fell when compared with the baseline recordings but the results were not significant.<sup>9</sup> Other studies also report a significant improvement in oral hygiene after preventive and motivation interventions were undertaken.<sup>11</sup> Marini et al reported a statistically significant decrease in plaque index scores in groups who received repeated oral hygiene instructions and motivation sessions.<sup>18</sup>

There is an increase in gingival index scores after the orthodontic therapy is started. The exact cause of the periodontal disease could not be established in our study. Studies have reported various factors responsible for the increase in gingival index scores such as malocclusion, poor oral hygiene maintenance, and retentive components of fixed orthodontic appliances and lack of repeated motivation sessions.<sup>9, 14, 16, 19-22</sup>

Despite the interventions taken for the maintenance of oral hygiene most of the patients undergoing orthodontic therapy develop gingivitis. The development of periodontal disease is time dependent. Most

studies document elevated plaque index scores within 1-3 months after appliance placement.<sup>6, 23-25</sup>

Our study revealed the periodontal status after one month as measured by Gingival Index. The Gingival Index is a qualitative assessment of the oral health however it provides the possibility of measuring selected areas or teeth when a large material is examined. It also can assess all areas of all teeth in small samples.<sup>26</sup> The Gingival Index baseline recording of the patients were 0 or 1. Some studies have demonstrated that the timeline for microbial changes are 12 days after the orthodontic appliances are placed.<sup>27, 28</sup> At this time more cocci and rods are present when compared to non-orthodontic patients.<sup>27</sup> Keeping the above timeline in view, the duration of follow-up in our study was one month.

In the present study, patients were divided into 2 groups based on the type of oral hygiene instructions. In both methods the deterioration in the periodontium was not severe. The mean gingival index was 1.04 for Group A and 0.2 for Group B. According to the Loe H and Sillness criteria<sup>11</sup> the gingival score for Group B was normal, with healthy gingiva and for Group 2 the score depicted that there was mild inflammation with no bleeding on probing. Such results suggest the maintenance of good oral hygiene in Group 2 and fair oral hygiene in in Group 1. In our study we only measured the mean gingival index to measure the extent of gingival disease in orthodontic subjects. Literature also reports inconsistent findings regarding probing depths. Some report that there is no effect of orthodontics on probing depths.<sup>6, 29</sup> Other studies have demonstrated deeper pocket depths due orthodontic therapy.<sup>23, 27</sup> With respect to attachment loss, Alstad and Zachrisson found no significant loss in clinical attachment, however greater bone loss in orthodontic subjects was observed.<sup>30, 31</sup> Orthodontic therapy can evoke severe adverse responses in patients with gingival

recessions or other high risk patients.<sup>32</sup> In our study we excluded all patients with existing severe periodontal conditions. Oral hygiene instructions improved oral hygiene efficiency despite the proposed consequences of orthodontic therapy. According to Huber frequent oral hygiene instructions during orthodontic therapy improves oral hygiene efficiency better than pretreatment level.<sup>1</sup> Other studies also support the importance of oral hygiene motivation at every orthodontic appointment to minimize the deterioration of the periodontium.<sup>8, 12, 13</sup>

The distribution of males and females were 20% and 80% respectively. This may be due to the fact that females are more concerned with their aesthetics and seek orthodontic treatment more than males.<sup>33</sup> Mean age of the patients in group A was 18 and Group B was 17.4. It is established that oral hygiene is more compromised in adolescents as compared to adults. At this age patients tend to be less acquiescent and less observant to oral hygiene measures.<sup>34</sup> This difference in response to orthodontic therapy is attributed to the hormonal changes in adolescents.<sup>35</sup> Moreover adults are more likely to develop gingival recessions thus allowing the orthodontic appliances being placed further away from the existing gingival attachment. Research proposes that adults are less likely to orthodontic consequences as long as they are periodontally stable when orthodontic therapy is started.<sup>36</sup>

In contrast to our findings some studies have reported a positive influence on the periodontal structures followed by orthodontic therapy. Glans et al reported an improved gingival status in their crowded group of patients receiving orthodontic therapy as compared to non-crowded group.<sup>37</sup> This positive influence on the gingival status of the patients was attributed to the repeated oral hygiene instructions given to the patients over 2 years. They however did not report the immediate response to orthodontic therapy. Their first

clinical recordings were performed at 12 weeks after the orthodontic appliances were placed. Other studies document that despite an initial increase in plaque, bleeding and inflammation, these parameters usually improve during the treatment. According to Ristic et al there was an increase in the plaque accumulation and other parameters at 3 months followed by a decrease from 3 to 6 months.<sup>6, 36</sup> In other studies plaque scores remained stable or decreased during the course of treatment. According to Sinclair et al there was no change in plaque scores over the period of 1 year.<sup>38</sup> A significant increase in plaque index scores was reported by Lo et al. There was a significant increase in PI scores at 12 weeks but a significant decrease than baseline at 12 weeks.<sup>39</sup> Paolantonio et al also documented a stable number of plaque-positive sites over 3 years but a decrease in sites with a positive GBI.<sup>40</sup> This improvement was attributed to the oral hygiene instructions given to the patients by the dental practitioner.

Oral hygiene instructions are very important in maintaining the oral health especially in patients undergoing orthodontic therapy. Patients should not only receive instructions at the start of the treatment but should be repeated frequently. The mode of instructions also plays a very important role. In our study the oral hygiene as measured in terms of mean gingival index was superior in patients receiving written instructions as compared as well as demonstration on models as compared to written instructions only. We recommend that the dental practitioner should demonstrate the appropriate method of tooth-brushing and flossing to the patient. The instructions should be one-to-one with the emphasis on the fact that the patient realizes the importance of oral hygiene during his or her orthodontic therapy. Adolescents should be given special attention regarding the instructions as they produce a more aggressive response to orthodontic therapy. Once the baseline instructions are

given, gingival and periodontal parameters should be monitored frequently to ascertain the compliance of the patient. In case of severe gingival disease the appropriate management should be provided together with oral hygiene prophylaxis and instructions.

We evaluated the gingival index at 1 month. The recordings can also be made at 2 and 3 months of baseline recordings to better assess the efficiency of the oral health motivation program.

### Conclusions

Oral hygiene motivation method incorporating the use of verbal instructions along with demonstration on model is more effective as compared to written instructions. Orthodontic patients should receive oral hygiene instructions frequently. The dental practitioner should demonstrate the appropriate method effectively.

It is recommended that evidence-based educational programs with a scientific background and comprehensible terminology should be established which are able to meet the needs of the target group are likely to produce desired results.

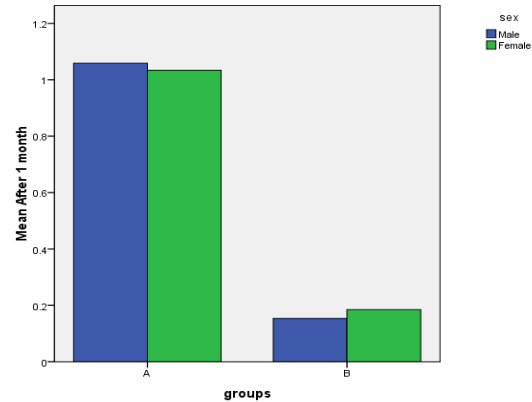


Figure 1: Mean Gingival Index of Groups A and B after 1 month

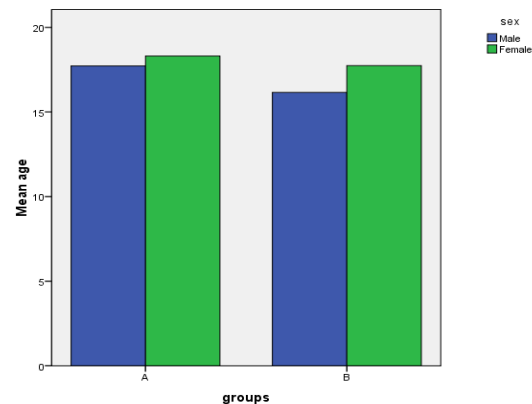


Figure 2: Gender and Age Distribution in both Groups

Table I: Results of Independent t tests

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
After 1 month	Equal variances assumed	75.684	.000	8.559	211	.000	.860	.100	.662	1.058
	Equal variances not assumed			8.538	165.443	.000	.860	.101	.661	1.059

**Table II Frequency and percentages of gender in group A**

Sex Group A

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	18	16.4	16.4	16.4
	Female	92	83.6	83.6	100.0
	Total	110	100.0	100.0	

**Table III Frequency and percentages of gender in group B**

Sex Group B

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	26	24.3	24.3	24.3
	Female	81	75.7	75.7	100.0
	Total	107	100.0	100.0	

**Table IV Distribution of age in group A**

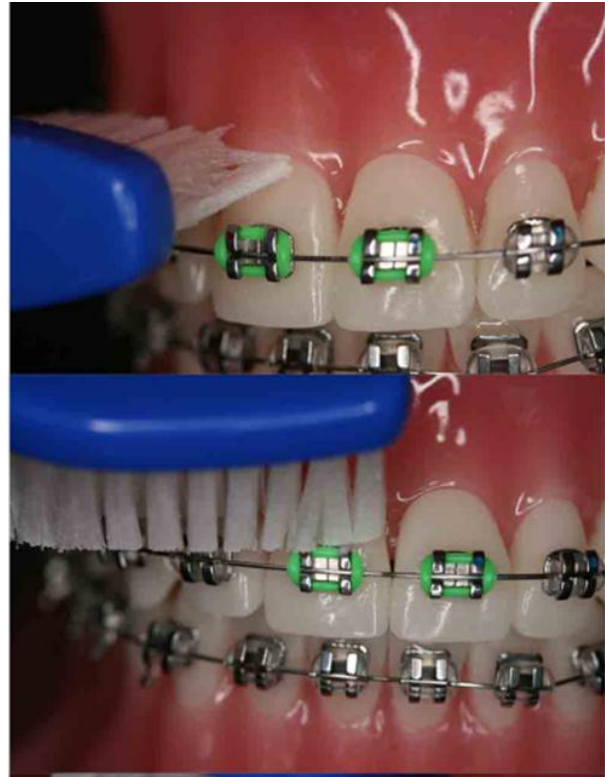
Descriptive Statistics Group A

	N	Minimum	Maximum	Mean	Std. Deviation
Age	110	12	29	18.21	4.641
After 1 month	106	0	3	1.04	.904
Valid N (listwise)	106				

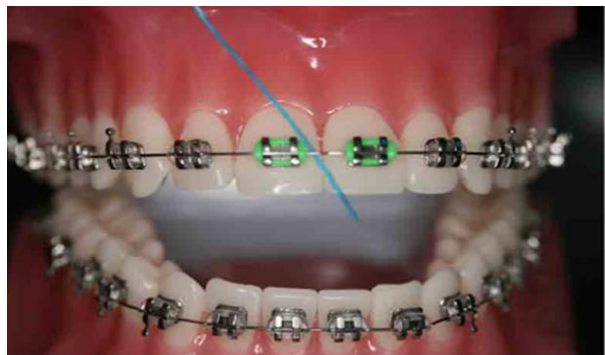
**Table V: Distribution of age in group B**

Descriptive Statistics Group B

	N	Minimum	Maximum	Mean	Std. Deviation
age	107	11	30	17.36	3.830
After 1 month	107	0	2	.18	.511
Valid N (listwise)	107				



**Figure 3**



**Figure 4: Demonstration of Oral Hygiene Instructions using models**

### Oral hygiene instructions

1. Brush your teeth 2 times a day for 3 minutes.
2. Hold your toothbrush at a tilted towards the braces when brushing the bracket surface of the teeth.
3. Brush both above and below the braces.
4. Then brush tilted towards the gum.
5. Spend equal amounts of time with all the teeth
6. Use moderate pressure when pushing the toothbrush against the tooth.
7. Use Mouthwash 1 cap full every night after brushing. Rinse for 1 minute and then spit. Do not drink or eat for 1 hour after using mouthwash.
8. Teeth should be flossed after the final brushing of the day. Starting with about 18 inches of floss, wind most of the floss around each middle finger, leaving an inch or two of floss to work with.
9. Hold the floss between your thumbs and index fingers; slide it gently up-and-down between your teeth.
10. Thread your floss under the wire that connects your brackets.
11. Wrap the floss around the tooth on one side and push up towards the gum line and then pulled down toward the wire. Repeat this step 5 times. Repeat process for every tooth.

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