

Influence of Orthodontic Treatment on Oral Hygiene Routine

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Abstract: Patients with orthodontic appliances are at risk of acquiring periodontal disease and caries . Our aim is to improve oral hygiene during orthodontic treatment with instructions given before and during brackets appliance with special techniques used to clean their teeth. Five hundred questionnaires has been distributed to patients undergoing fixed orthodontic treatment in order to investigate oral hygiene habits and diet analysis before and during the treatment. **Result:** The data was analyzed by comparing the responses of study subjects towards the influence of orthodontic treatment on their brushing pattern, dietary habits, teeth & gingival problems, and oral hygiene care. There is a significant difference in the number of subjects who have responded that they have given proper oral hygiene instruction on the day of bonding , when compared at before (62.7%) and during (87.4%) treatment($p<0.0001$). **Conclusion:** Patients who have been given orthodontic instructions for oral hygiene routine showed improvement in their cleaning habits. We recommend giving patients proper oral hygiene instructions and reinforcing it on each visit by the orthodontist or hygienist.

Keywords: Patients, dietary habits, orthodontic treatment, periodontal disease.

1. INTRODUCTION

The demand for orthodontic treatment is on a rise in the Kingdom of Saudi Arabia from all ages. Oral health care influences the overall health of an individual therefore It's important to maintain maximum oral health ., while the presence of fixed orthodontic appliances can complicate the process of oral hygiene , patients with orthodontic appliances must elevate their oral hygiene practice methods and ways in order to maintain higher standards. During orthodontic treatment it is the responsibility of the orthodontist to provide oral hygiene and dietary instructions at each visit. Several studies have shown that orthodontic appliances are associated with greater plaque buildup due to difficulty in cleaning teeth. Plaque can lead to several adverse conditions such as periodontal breakdown, enamel decalcification, and white spots caused by highly acidic plaque leading to carious lesions 15,19,20 .these consequences can be prevented by effective plaque removal The importance of providing a strong motivational program for the mechanical control of dental plaque has been emphasized by several authors

Orthodontic appliances do not usually cause gingival inflammations but they can contribute to periodontal disease due to increase in microorganisms. However, plaque accumulation and gingival inflammation both can be equally controlled in well-motivated patients.Heintze (1996) demonstrated that effective cleaning of teeth in patients with fixed appliances takes at least ten minutes .. Hygiene situations in orthodontics are really challenging. If the patients follow the oral hygiene instructions given by the orthodontist carefully, periodontal damage during treatment can be prevented. . Therefore, it's very important to emphasize oral hygiene instructions to orthodontic patients with fixed appliances.

This study was designed to investigate whether home oral hygiene practice during orthodontic treatment differed from pre treatment and to identify if providing instructions by the orthodontist before and during orthodontic treatment in addition to educating patients in special techniques used to clean their teeth will act as a triggering factor in improving their oral hygiene .

2. MATERIALS AND METHODS

A questionnaire was distributed in Riyadh Colleges of Dentistry and Pharmacy, government hospitals, private clinics and schools to patients undergoing fixed orthodontic treatments, that covers oral hygiene habits, tools, frequency of cleaning, dental hygiene visits and diet analysis before and during the orthodontic treatment. The questionnaire included questions about age, gender, marital status, level of education and smoking habits. Participant also were asked about their oral hygiene practice: (tooth brush type, interdental brush, dental floss, meswak and mouth wash) .The aim of this study was fully explained to the patients and consent form was obtained. There was no specific age group, participants were chosen randomly.

Statistics:

- Mean.
- Frequency.
- P value.
- McNemar’s Chi Square.

Statistical methods:

Data was analyzed using SPSS PC+ 21.0 statistical software. Descriptive statistics (mean, standard deviation and %) were used to describe the categorical and quantitative study variables. MacNemar’s chi-square test was used to compare the categorical responses of study subjects before and during treatment. Student’s t-test was used to compare the mean values of quantitative variable. A p-value ≤ 0.05 was considered as statistically significant.

3. RESULTS

Five hundred questionnaires were collected .The distribution of age groups of study subjects were in ≤ 15 years (17.6%), 16 to 25 years (67.2%) and > 25 years (15.2%) with a higher proportion of female subjects 364(72.9%). The university level educational status was 54.5%, high school was 24.2%, secondary in 19.9% and elementary in 1.4%. About 87.7% were single and prevalence of smoking was 15.3%.

(Table 1)

Characteristics	No.(%)
Age groups (n=488)	
< =15 years	86(17.6)
16 to 25 years	328(67.2)
>25 years	74(15.2)
Gender (n=499)	
Male	135(27.1)
Female	364(72.9)
Educational Level(n=492)	
Elementary	7(1.4)
Secondary	98(19.9)
High School	119(24.2)
University	268(54.5)
Marital status(n=495)	
Single	434(87.7)

Married	61(12.3)
Smoking status(n=472)	
Yes	72(15.3)
No	400(84.7)

The data was analyzed by comparing the responses of study subjects towards the influence of orthodontic treatment on their brushing pattern, dietary habits, teeth & gingival problems, and oral hygiene care.

Brushing pattern:

There is highly statistically significant difference between before and during orthodontic treatment in relation to number of times the study subjects’ brushes teeth per day. We recorded that before treatment only 17.3% were brushing three times/ day, whereas 54.3% were brushing three times per day after treatment which is statistically significant. (p<0.0001). And the type of tooth brush also changed statistically significantly between before and after orthodontic treatment, in which 40% were using soft brush, 54.2% were using medium brush after treatment when compared to 30.6% and 64.7% before treatment which is statistically significant (p<0.0001). In relation to the use of additional hygiene items during brushing the teeth, there is a statistically significant increase in the use of mouth wash and interproximal brush, before and after treatment. The use of these two items has increased from 54.5% to 66% for mouth wash, and from 35.9% to 80.6% for interproximal brush when compared to before and after treatment. And the use of Meswak has reduced from 29.8% at before treatment to 15.7% during treatment, which is highly statistically significant. Whereas regarding the use of dental floss and tooth pick, there was no statistically significant difference between before

(Table 2)

Questions	Before				During				p-value
	0	1	2	3	0	1	2	3	
How many times you brush your teeth per day? N(%)	28(5.7)	75(15.2)	304(61.8)	85(17.3)	8(1.6)	24(4.9)	193(39.2)	267(54.3)	<0.0001
Tooth brush type N(%)	Soft	Medium	Hard		Soft	Medium	Hard		
	123(30.6)	260(64.7)	19(4.7)		161(40)	218(54.2)	23(5.7)		<0.0001
Do you use: N(%)	Yes		No		Yes		No		
● Meswak	108(29.8)		254(70.2)		57(15.7)		305(84.3)		<0.0001
● Dental Floss	178(47.1)		200(52.9)		185(48.9)		193(51.1)		0.59
● Mouth Wash	210(54.5)		175(45.5)		254(66)		131(34)		<0.0001
● Tooth Pick	184(49.1)		191(50.9)		184(49.1)		191(50.9)		1.0
● Interproximal Brush (between teeth)	142(35.9)		254(64.1)		319(80.6)		77(19.4)		<0.0001

Dietary habits:

The data shows, the study subjects had changed their dietary habits during orthodontic treatment when compared to before treatment, where the proportion has increased from 16.1% to 46.4%, which is highly statistically significant (p<0.0001). And the eating habits towards the consumption of nuts, gummy bear, chocolates, and soft drinks of study subjects have changed significantly when compared before and during orthodontic treatment. where we found that the consumption of nuts has reduced from 85.9% to 51%, gummy bears from 80.9% to 51.6%, chocolates from 95.2% to 87.5% and soft drinks from 89.2% to 81%.

(Table 3)

Questions	<u>Before</u>		<u>During</u>		p-value
	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	
Did you change your dietary habits? N(%)	58(16.1)	302(83.9)	167(46.4)	193(53.6)	<0.0001
Do you eat any of					
● Nuts	379(85.9)	62(14.1)	225(51)	216(49)	<0.0001
● Gummy bears	356(80.9)	84(19.1)	227(51.6)	213(48.4)	<0.0001
● Chocolate	433(95.2)	22(4.8)	398(87.5)	57(12.5)	<0.0001
● Soft Drinks	403(89.2)	49(10.8)	366(81)	86(19)	<0.0001

Teeth and Gingival problems:

There is highly statistically significant difference in the proportion of study subjects who reported problems in their teeth and gingival tissues before and during orthodontic treatment. About 23.2% complained of bad breath during treatment when compared to 13.7% before treatment which is highly statistically significant ($p < 0.0001$). And 20.1% were suffering from gingival recession during treatment when compared with 9.4% before treatment, which is highly statistically significant ($p < 0.0001$). Whereas the suffering of dental caries has highly statistically significantly reduced from 52.8% to 28.6% when compared at before and during orthodontic treatment ($p < 0.0001$). And the three symptoms: gingival enlargement, gingival redness and gingival bleeding have significantly increased from 10.9% to 20.2%, 11.9% to 23.8% and 26.7% to 34.5% when compared at before and during treatment, which are statistically significant.

(Table 4)

Questions	<u>Before</u>		<u>During</u>		p-value
	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	
Do you visit the dental hygienist regularly?					
Mean (Sd.,)	3.20(2.3)		1.82(1.6)		<0.0001
If yes, how many times?					
Mean (Sd.,)	177(41)	255(59)	372(86.1)	60(13.9)	<0.0001
Did your oral hygiene change					
If, yes	149(89.2)		151(90.4)		0.75
Better	18(10.8)		16(9.6)		
Worse					
Mean (Sd.,)	259(62.7)	154(37.3)	361(87.4)	52(12.6)	<0.0001
Were you given proper oral hygiene instruction the day of bonding?					
Mean (Sd.,)	189(93.5)	13(6.5)	190(94.5)	11(5.5)	0.62
If yes?					
Did you follow these instructions?					

Oral Hygiene care:

There is highly statistically significant difference in the mean number of times the study subjects visit dental hygienist regularly, between before and during treatment ($p < 0.0001$). And 86.1% reported that they have change their oral hygiene during treatment when compared to 41% at before treatment which is highly statistically significant ($p < 0.0001$) and the distribution of better oral hygiene is not statistically significantly different at before and after treatment ($p = 0.75$). There is a significant difference in the number of subjects who have responded that they have given proper oral hygiene instruction on the day of bonding, when compared at before (62.7%) and during (87.4%) treatment ($p < 0.0001$).

(Table 5)

Questions	<u>Before</u>		<u>During</u>		p-value
	<u>Yes</u>	<u>No</u>	<u>Yes</u>	<u>No</u>	
Do you complain from bad breath?	64(13.7)	402(86.3)	108(23.2)	358(76.8)	<0.0001
Do you suffer from gingival recession?	42(9.4)	406(90.6)	90(20.1)	358(79.9)	<0.0001
Do you suffer from dental caries?	229(52.8)	205(47.2)	124(28.6)	310(71.4)	<0.0001
Do you have :					
Gingival Enlargement					
Gingival Redness	50(10.9)	410(89.1)	93(20.2)	367(79.8)	<0.0001
Gingival bleeding	55(11.9)	408(88.1)	110(23.8)	253(76.2)	<0.0001
	123(26.7)	338(73.3)	159(34.5)	302(65.5)	0.001

4. DISCUSSION

Recently there is a rise in patients seeking orthodontic treatment to achieve maximum esthetic satisfaction. To achieve these results their orthodontic treatment should be accompanied with a well reinforced oral hygiene regimen. We found in our study 48.9% of the patients were using dental floss and 80.6% were using interdental brush where as in the study by (Sheiham a, netuveli,G. 2000-2002) “32.5% of patients using either interdental brush or dental floss”.

Sheiham A, Netuveli,Gs. showed in his study that patients used tooth brush twice/day. We had a different result, 54.3% of our patients started to brush their teeth 3 times/day after orthodontic appliance bonding.

Wilcoxon Db et al. 1991, Balaklicts N, Balakticts T. 1991 both reported the difficulty of oral hygiene during fixed orthodontic appliances. But we found that 90.4% of our patients reported better oral hygiene after orthodontic brackets bonding. Unfortunately, we couldn't verify this clinically due to shortage of time however; it is our opinion that these percentages are over estimated.

Compliance with oral hygiene instructions during orthodontic treatment may also be explained by the improvement in alignment of the teeth thus facilitating better cleaning in a study by Thikriat S. 49 % of the patients showed a statistically and clinical change in compliance from poor to good between T1 and T3 their that the repeated plaque and gingival index scoring may have served as a motivational factor 34.5% gingival bleeding was reported in our study. A study reported that the affective removal of plaque is impaired during orthodontic treatment leading to carries and gingival inflammation (Anthony LN et al. 2001).

Because women are more concerned about esthetics they use more dental auxiliaries and undergo orthodontic treatment more than men. Reported by (Stadelmann P. et al 2012). We achieved the same results in our study.

(Lees A., Rock W. P. 2007) reported video taped instructions were more effective method in improving patient's oral hygiene. In our study we found out that one to one oral hygiene instructions was effective in a very significant manner, but we think if we can provide video taped oral hygiene instructions it will increase the patient's awareness toward their oral health.

Our study supports the observation found in the literature regarding the importance of oral hygiene in achieving successful orthodontic treatment (Kharsa M. 2007) while any negligence in maintaining oral hygiene may have a negative impact on orthodontic treatment results, aesthetic appearance, and lead to decayed teeth, gingivitis, periodontitis and other sequellae.

5. CONCLUSION

Patients who have been given orthodontic instructions for oral hygiene routine showed improvement in their cleaning habits. We recommend giving patients proper oral hygiene instructions and reinforcing it on each visit by the orthodontist or hygienist.

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