

Association between Fixed Orthodontic Retainers and Gingival Health among Southern Region Population in Saudi Arabia-Cross sectional Study

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Abstract

Context: Periodontal diseases are made out of an enormous scope of inflammatory conditions that influence the supporting structures of the teeth. Fixed retainers are progressively utilized since they are aesthetic, require less patient participation, and give more prominent dependability in the long-term, hence being increasingly predictable. **Aim:** To assess the gingival health status of subjects' maxillary and mandibular anterior teeth retained with fixed bonded retainers. **Settings and Design:** Cross sectional Study. **Materials and Methods:** Thirty-three and 30 individuals were selected in the study and control group respectively. The gingival index, plaque index, presence of calculus, and periodontal parameters were recorded. A five-question oral hygiene survey was developed to assess each subject's oral hygiene habits. Data have been analysed and compared to determine the association between periodontal disease and fixed orthodontic retainers. **Statistical analysis used:** The Statistical Package for Social Sciences (version 18.0) was used for statistical analysis. Descriptive statistics were presented as frequency and percentage for categorical data and mean and standard deviation for quantitative data. Chi-square test was applied for the association between categorical variables. Student's independent variable t-test was applied to compare quantitative variables. **Results:** Although the result reveals no significant differences according to PI, GI, or presence of calculus. However, significant differences were present according to the gingival contour ($p=0.001$), stippling ($p=0.002$), bleeding on probing ($p<0.001$), presence of exudation ($p<0.001$). **Conclusion:** A long-term usage of fixed retainers might affect periodontal tissue. Long-term studies that would assess a wide range of outcomes and correlations that might affect periodontal well-being is recommended.

Keywords: Orthodontic Retainer; Gingival Health; Periodontal Status

Introduction

Periodontal diseases are made out of an enormous scope of inflammatory conditions that influence the supporting structures of the teeth (the gingiva, bone and periodontal ligament), which could prompt tooth loss and add to systemic inflammation. [1] Fixed retainers are progressively utilized these days since they are aesthetic, require less patient participation, and give more prominent dependability in the long term, hence being increasingly predictable. [2,3] Be that as it may, these retainers make oral hygiene progressively troublesome as the lingual surface turns out to be increasingly vulnerable to the development of calculus. [4-6] Moreover, they may deliver gingival recessions, loss of insertion, gingivitis, and the ensuing periodontal destruction. [5-11] Tooth decay may likewise show up on the lingual surfaces neighboring the retainer. [12] The impact of these retainers on periodontal health had shown a different result. [4,5,7,12] Some studies did not notice any damage to bone level and hard tissue with long-term use of fixed retainers around mandibular incisors, while soft tissue inflammation was noticed. [13,14] On the other hand, other studies have found that

fixed retainers can lead to several complications which include gingival recession, bleeding on probing and plaque retention. [8,15] A recent study stated that there are insufficient research data on which to base clinical decisions regarding retention. [13] In like manner, the potential increment in span of retention makes it essential to assess the result of long-term retention on encompassing tissues, with a specific emphasis on periodontal disease. Therefore, this study aims to assess the periodontal health status of maxillary and mandibular anterior teeth retained with fixed bonded retainers. In addition, to highlight the possible adverse effects of fixed bonded retainers on clinical parameters correlated to the health conditions of periodontal tissues. Results of the current study will be reflected on better understanding of

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the relationship between periodontal health and fixed retainers, effective management of periodontal health, and optimal usage of fixed orthodontic retainers.

Subjects and Methods

The present cross-sectional study was conducted from February 2018 to 26 December 2018. A total of 63 participants (33 study group, 30 control group) were randomly selected from the various governmental and private dental clinics across Abha city Asser province KSA. People with fixed orthodontic retainer recruited from governmental and private dental specialty hospitals and clinics in Abha city were selected and allocated in the study group according to the following inclusion criteria:

- Post-orthodontic patients wearing fixed bonded retainers for a period between 12 and 60 months while maintaining visits for routine dental treatment.
- Aged between 13-35 years.
- No history of smoking.
- No preexisting periodontal disease.
- No current pregnancy.

Control group match the study group receiving orthodontic treatment without fixed retainer. An intra-oral examination of maxillary and mandibular anterior teeth was done. The gingival index, plaque index, presence of calculus, probing depth, presence of gingival recession, and bleeding on probing were recorded and statistically compared between the two groups to determine if there is any association between periodontal disease and fixed orthodontic retainers.

A self-explanatory questionnaire comprising of five questions was designed to assess each subject's oral hygiene habits, it includes the frequency of brushing and flossing, use of mouth rinse, ease of flossing, comfort of retainers and time to complete oral hygiene.

Ethical clearance was obtained from the Institutional Ethics Committee (IEC), after comprehensive review of the proposal. The importance of the study was explained verbally to the participants and written informed consent was obtained before commencement of the study. Every attempt was made to maintain the confidentiality of the participants. The clinical examination and questionnaire distribution among the participants was conducted during their regular visit to dental clinic.

All the hypotheses were formulated using two-tailed alternatives against each null hypothesis (hypothesis of no difference). The entire data is statistically analyzed using the Statistical Package for Social Sciences (SPSS version 21.0, IBM Corporation, USA) for MS Windows. Descriptive statistics were presented as frequency and percentage for categorical data and mean and standard deviation for quantitative data Chi-square test was executed to compare the comparative data. Student's independent variable t-test was applied to compare quantitative variables. P values <0.05 were taken as statistically significant.

Results

A total of sixty-three subjects have been included in this study. Forty-six (46.1%) were Female and seventeen (53.8%) were males. The age ranged between 18-35 years old. The subjects have been divided into two groups (study and control 33, 30 participants respectively). The control group consisted of 22 females and 8 males. The study group consisted of 24 females and 9 males. The majority of the subjects was students and housewife's (No significant difference existed between the two groups according to the socio-demographic characteristics [Table 1].

Considering the oral hygiene practice by the participant only 6.1% and 3.3% of study and control group stated that they never brush their teeth, meanwhile the majority do brush once per day (78.85% and 76.7% for study and control group respectively). Slightly higher percentage among the study group use the dental floss as a daily routine in compare to control group (45.5% and 30%). A slightly higher than half of the study group consider the rinsing necessary in adjunct to brushing and flossing. The majority of the study group found their retainer uncomfortable 87.9% although 36.4% declared that the discomfort is not annoying. Only one third of the study groups brush their teeth for 2 min, and none of the control group does [Table 2]. When considering the clinical topographies of the gingiva, the study group showed a statistically significant difference in relation to the gingival contour ($p=0.001$), stippling ($p=0.002$), bleeding on probing ($p<0.001$) [Table 3].

Discussion

The current study revealed no significant differences between the control and retainer groups according to the frequency of brushing, frequency of flossing and the duration of brushing and flossing. Different findings were reported in an American study by Corbett et al. [16] where a statistically significant difference in the frequency and ease of flossing was found, while retainer comfort and frequency of brushing had no significant difference between groups. Subjects in the American study were slightly younger than subjects in the current study (13-22 years of age), and therefore the difference in the study population may account for the difference in the study results. In the current study, bleeding on probing was found to be significantly different between the two groups ($p<0.001$). Similar and different results were reported in a number of studies. Our findings are in accordance with those of Al-Jundi, [17] who conducted a study to evaluate the periodontal health status of Saudi patients scheduled for fixed orthodontic treatment, and a significant difference was observed for the gingival bleeding index ($p=0.033$). Moreover, findings of Levin et al. [8] are also in accordance with ours whose results showed bleeding on probing significantly greater in teeth with fixed retainers compared with no fixed retainers. However, findings of Neto et al. [7] who evaluated the periodontal status of patients with bonded retainers as compared to a non-treated control group were different. No significant difference for gingival recession and bleeding on probing was observed between groups ($p>0.05$). This could be due to the fact that

Table 1: Socio-demographic data of participant.

Socio-demographic data	Control Group		Study Group	
	No.	%	No.	%
Gender				
Female	22	73.3	24	72.7
Male	8	26.7	9	27.3
Total	30	100	33	100
Age				
18-25	14	46.7	23	69.7
26-35	16	53.3	10	30.3
Occupation				
Student	16	53.3	19	57.6
Housewife	14	46.7	7	21.2
Teacher	0	0.0	4	12.2
others	0	0.0	3	9.0

Table 2: Hygiene survey among study participants.

Hygiene Survey	Control Group		Study Group	
	No.	%	No.	%
Do you brush your teeth and if so, how often?				
Never	1	3.3	2	6.1
2-3 times/week	6	20.0	5	15.1
1 time/day	23	76.7	26	78.8
Do you floss your teeth and if so, how often?				
Never	18	60.0	11	33.3
2-3 times/week	3	10.0	7	21.2
1 time/day	9	30.0	15	45.5
Is rinsing necessary after brushing and flossing?				
Yes	10	33.3	18	54.5
No	20	66.7	15	45.5
How would you rate the comfort of your fixed retainers?				
Very uncomfortable	0	0.0	17	51.5
Somewhat Comfortable	0	0.0	12	36.4
Comfortable	0	0.0	4	12.1
How long does it take to floss and brush your front teeth?				
30-60 seconds	10	33.3	15	45.5
1-2 minutes	20	66.7	7	21.2
More than 2 minutes	0	0.0	11	33.3

Table 3: Clinical topographies of the gingiva.

Gingival Status	Control Group		Study Group		P-value
	No.	%	No.	%	
Color					
Pink	7	23.3	13	39.4	0.1
Red	19	63.3	20	60.6	
others	4	13.4	0	0.0	
Contour					
Scalloped	26	86.7	14	42.4	0.001
Non-Scalloped	4	13.3	19	57.5	
Consistency					
Firm & Resilient	10	33.3	10	30.3	0.5
Soft and Edematous	20	66.7	23	69.7	
Size					
Enlarged	16	53.3	14	42.2	0.3
Not enlarged	14	46.7	19	57.6	
Stippling					
Present	20	66.7	9	27.3	0.002
Absent	10	33.3	24	72.7	
Bleeding					
Present	0	0.0	26	78.8	<0.001
Absent	30	100.0	7	21.2	

all participants were dentistry students, and therefore aware of their oral hygiene. The current study results revealed that the

study group had significantly more accumulation of plaque than the control group (p=0.01). Several studies report similar

findings. Our findings are in concordance with those of Artun,^[18] who reported a presence of accumulated plaque to retainers. Similarly, Levin et al.^[8] reported an association between fixed retainers and increased plaque retention, while Rody et al.^[13] and Al-Nimri et al.^[9] report a higher percentage of sites with visible plaque observed among the retainers groups. Moreover, Heier et al.^[4] also reported more plaque present on the lingual surfaces in the fixed retainer group. In the current study, no significant differences were found between the two groups according to the gingival color, consistency, size, PI, GI, and the presence of calculus. This result is on the same line with results obtained by Al-Nimri et al.^[9] also reported no significant differences between the PI ($p=0.165$) and GI ($p=0.150$) of the two groups. Similar results were reported in a Swiss study conducted by Dietrich et al.^[19] to assess the long-term success of maxillary fixed retainers, investigate their effect on gingival health, and analyze the survival rate after a mean period of 7 years in retention. Results showed that PI was not a significant predictor of GI. These findings are in concordance with ours. However, different findings were reported by Juloski et al.^[20] in a Serbian study to investigate the long-term influence of fixed lingual retainers on the development of mandibular gingival recession and calculus accumulation. Significantly more calculus accumulation was observed in the retainer group compared with the group without retainers. In addition, it was also concluded that long-term presence of fixed lingual retainers does seem to increase calculus accumulation. Difference in materials and methods may account for the difference in study findings. Moreover, Heier et al.^[4] also reported slightly more calculus present on the lingual surfaces in the fixed retainer group. This could be due to the difference in study setting and population.

Conclusion

The fixed orthodontic retainers have an impact on the gingival bleeding and the amount of plaque accumulation. Nevertheless, there is not enough scientific evidence to support an association between advanced periodontal disease and fixed orthodontic retainers. Considering the small sample size of this study this may indicate a further studies with large sample size and long-term studies that would assess a wide range of outcomes and correlations that might affect periodontal well-being.

Recommendations

Further study which include the GCF amount and composition is required to evaluate the effect of orthodontic retainers on the amount and composition of GCF as well as inflammatory biomarkers that present in GCF.

Competing Interests

The authors declare that they have no competing interests.

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