SHORT TERM EFFECT OF FIXED ORTHODONTIC APPLIANCES ON THE PERIODONTAL HEALTH

1HIND F NSOUR, BDS, JDB
2IBRAHIM S KHRESAT, BDS, JDB
3JUMANA M TBEISHAT, BDS, JDB
4RANIA E RODAN, BDS, JDB
5JEHAD A AJARMEH, BDS, JDB

ABSTRACT

The objective of the study was to determine the effects of fixed orthodontic appliances on periodontal health.

This prospective longitudinal self-controlled study was conducted on 54 adolescents (14 males, 40 females) who were scheduled for fixed orthodontic treatment in January 2013. Dental plaque accumulation, gingival inflammation and periodontal health were assessed. These periodontal indices and plaque indices were determined prior to the placement of fixed appliances and two weeks after the beginning of orthodontic treatment. All clinical values started to increase after the placement of fixed appliances.

Treatment with fixed appliances in adolescents may transitionally increase the values of plaque and gingival indices. Oral hygiene measures, patient education and motivation are all very important after placement of fixed and removable appliances.

Key Words: Fixed orthodontics, Periodontal health.

INTRODUCTION

Periodontal disease is one of the major problems and concern during orthodontic treatment. It has very high prevalence among children and adults.\(^{1,2}\)

It is clear from experimental and epidemiological studies that microbial plaque is primary etiological factor in gingivitis.\(^{3}\)

It is generally stated that irregularly placed teeth are more likely to develop periodontal disease than teeth, which are in poor alignment.

Various investigators have reported reduced gingival health around crowded and rotated teeth.\(^{4-6}\) Placement of orthodontic bands and brackets influences plaque growth and maturation.

Significant differences in biofilm formation and bonded teeth compared with controlled teeth have been reported.\(^{7}\)

Most studies reporting on gingival changes after bracket placement suggested only temporary reversible periodontal changes.\(^{8,9}\)

Another study, however, reported significant attachment loss during orthodontic treatment.\(^{10}\) There are different opinions regarding the relationship between crowding of teeth, plaque and gingival condition as well as destructive periodontal disease.\(^{11}\) These different opinions are due partly to multiple variables such as participant differences in motivational patterns for oral hygiene Maintenance,\(^{12}\) age range and sex of subjects, oral regions affected (maxillary versus mandibular, anterior versus posterior), systemic health condition experimental designs, application of statistics and different diagnostic criteria.\(^{13}\)

It is imperative to know other effective factors that initiate periodontal problems including fixed orthodontic application.\(^{14,15,16}\)

The aim of this study was to determine the short term effect of fixed orthodontic appliances on periodontal health.
METHODOLOGY
A sample of 54 patients (40 females and 14 males) of 12-26 year old age (with the mean age of 17.43) were included in this study.

All patients were of similar economic and cultural conditions, and all were medically free and in permanent dentition. Those with history of previous orthodontic treatment were excluded. Patients were scheduled for bonding of fixed orthodontic appliances in the orthodontic clinic at Prince Hashim Hospital in Zarqa. Age, gender, degree of motivation and type of malocclusion were registered in orthodontic clinic prior to periodontal clinic referral.

Patients were then referred to the periodontal clinic. Under artificial light, using sterile mirror and WHO periodontal probe, gingival index and plaque index according to Silness and Loe (1964) for both the labial and lingual surfaces were scored by the same Periodontist.

Orthodontic treatment was then performed on the same day in both dental arches with fixed orthodontic appliances [edge wise orthodontic appliances Roth 0.022]

Initial alignment 12 nitinol wires were used for this initial stage, all patients were given the ordinary post fixed appliance instructions regarding the oral hygiene and care of the appliance.

All participants were scheduled a two week appointment. Gingival index and plaque index were again scored by the same examiner using the same instruments. The mean gingival and plaque indices were calculated for each patient. T-test was used for comparison of the results.

RESULTS
Table 1 shows age range and gender distribution of the study group.

Relationship between crowding and plaque index before and after orthodontic treatment is shown in Table 2 and Table 3 provides relationship between crowding and gingival index. Relationship between age and plaque index can be seen in Table 4. Table 5 shows relationship between age and gingival index.

DISCUSSION
The present study demonstrated that a positive relationship existed between gingivitis and crowding of dental arches.

Highly statically significant (p less than .0001) increase in gingival score and plaque score in the relationship between crowding and periodontitis and gingivitis before and after placement of orthodontic appliances has been recorded.

The results of this study corroborated well with some studies18,19,20, and were in contrast with others21.

<table>
<thead>
<tr>
<th>Age range</th>
<th>Number</th>
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<tbody>
<tr>
<td>12-16 years</td>
<td>23 (male &amp; female)</td>
</tr>
<tr>
<td>17-26 years</td>
<td>31 (male &amp; female)</td>
</tr>
</tbody>
</table>

**TABLE 2: RELATIONSHIP BETWEEN CROWDING AND PLAQUE INDEX BEFORE & AFTER ORTHODONTIC TREATMENT**

<table>
<thead>
<tr>
<th>Crowding</th>
<th>0 crowding</th>
<th>Mild</th>
<th>Moderate</th>
<th>Sever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before ortho</td>
<td>.5967</td>
<td>.5490</td>
<td>.5791</td>
<td>.7474</td>
</tr>
<tr>
<td>After ortho</td>
<td>.7998</td>
<td>.8427</td>
<td>.8288</td>
<td>1.002</td>
</tr>
<tr>
<td>P=.086</td>
<td>P=.0077</td>
<td>P=.0843</td>
<td>P=.4417</td>
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</table>

**TABLE 3: RELATIONSHIP BETWEEN CROWDING AND GINGIVAL INDEX (BEFORE & AFTER ORTHO)**

<table>
<thead>
<tr>
<th>Crowding</th>
<th>0 crowding</th>
<th>Mild</th>
<th>Moderate</th>
<th>Sever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before ortho</td>
<td>.589</td>
<td>.417</td>
<td>.5329</td>
<td>.5618</td>
</tr>
<tr>
<td>After ortho</td>
<td>.6793</td>
<td>.7063</td>
<td>.7012</td>
<td>.987</td>
</tr>
<tr>
<td>P=.40100</td>
<td>P=.00090</td>
<td>P=.1018</td>
<td>P=.2770</td>
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</table>
Crowding is predisposing factor for initiation and progression of periodontal disease. This is due to difficulty in keeping good oral hygiene.

Buckley22 found a significant relationship between crowding and periodontal disease. He noted that significant relationship was found between irregular teeth, plaque, and gingivitis.

And in 1981, Buckley reconfirmed his previous studies emphasizing the significant correlation between crowding, plaque, and gingivitis.

Warehag23 concluded that the crowding may predispose to premature loss of attachment, and periodontal damage.

Finding of this study come in contrary to the finding of Gould and Picton.24

Periodontal status is combination of gingival inflammation, mobility, and pocket depth. So combining all these measure into single measure is questionable.

In the present study increase in gingival index was noticed and plaque index after placement of orthodontic appliance in all types of crowding, because fixed orthodontic appliances make oral hygiene difficult. Most patients undergoing treatment have shown some degree of gingivitis.

REFERENCES


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<table>
<thead>
<tr>
<th>Age</th>
<th>12-16 years</th>
<th>17-26 years</th>
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</thead>
<tbody>
<tr>
<td>Plaque index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>.5211</td>
<td>.6396</td>
</tr>
<tr>
<td>After</td>
<td>.9324</td>
<td>.7937</td>
</tr>
<tr>
<td>P</td>
<td>.00033</td>
<td>.0170</td>
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<table>
<thead>
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<th>17-26 years</th>
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<tbody>
<tr>
<td>Before</td>
<td>.5442</td>
<td>.5023</td>
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<tr>
<td>After</td>
<td>.7992</td>
<td>.6644</td>
</tr>
<tr>
<td>P</td>
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