THE ASSOCIATION OF ORTHODONTIC TREATMENT AND PERIODONTITIS

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ABSTRACT

This research was undertaken to study the association between orthodontic treatment and periodontitis. The retrospective study was conducted in a private dental teaching hospital. Data was retrospectively collected from 86,000 patients who reported in the outpatient department in the hospital between June 2019 and March 2020, the data was collected and analyzed. A study population of 2,169 patients undergoing orthodontic treatment with periodontal problems were selected for the study. The data was entered into Microsoft Excel and tabulated. Following which data was imported into the SPSS software by IBM. Data analysis was performed in the statistical software SPSS and data was analyzed by descriptive Analysis and Pearson correlation. In this study we observed that 1.4% of the patients undergoing different types of orthodontic treatment that includes fixed and removable appliances were affected with mild to moderate periodontitis. There was equal gender predilection among the
periodontally affected individuals. The most number of individuals belonged to the age group 16-25 years (43.3%). Pre-adjusted edgewise therapy was the most undergone treatment (46.67%) by the affected individuals, followed by the short term fixed appliance Begg therapy (30%) and the least undergone by the periodontally affected patients was the removable appliance (23.33%). In this study we observed that 1.4% of the patients undergoing different types of orthodontic treatment that includes fixed and removable appliances were affected with mild to moderate periodontitis. Hence, Orthodontic treatment requires accurate assessment and careful diagnosis of complexity of the deformity, type of tooth movement required ,periodontal support, carries risk, patient motivation, patient expectations, patient compliance with treatment and oral care regimens.

Keywords: orthodontic treatment, periodontitis, pre-adjusted edgewise therapy

How to cite this article: Anand SS, Dinesh SPS, Ramamurthy J (2020): The association of orthodontic treatment and periodontitis, Ann Trop Med & Public Health; 23(S22): SP232322. DOI: http://doi.org/10.36295/ASRO.2020.232322

INTRODUCTION:

Orthodontic treatment ensures proper alignment of the teeth and improves the occlusal and jaw relationship. This not only aids in better mastication, speech, and facial aesthetics, but also contributes to general and oral health, thereby improving the quality of life. Like any other treatment modalities, orthodontic treatment, in addition to its benefits, has also associated risks and complications. However, the risk and complication associated with treatment are reported to be considerably lower compared to other surgical or nonsurgical intervention [1]. The most commonly reported adverse effects of orthodontic treatment can be both local and systemic. This includes, tooth discolorations, decalcification, root resorption, periodontal complications, psychological disturbances, gastrointestinal complications, allergic reactions, infective endocarditis, and chronic fatigue syndrome [2,3].It has been shown that orthodontic forces represent a physical agent capable of inducing an inflammatory reaction in the periodontium [4]. This reaction is necessary for orthodontic tooth movement [5]. The periodontal reaction toward orthodontic appliances depends on multiple factors, such as host resistance, the presence of systemic conditions, and the amount and composition of dental plaque [6].

Periodontal health is an important factor that may be used to evaluate the success of orthodontic therapy. Periodontal complications are reported to be one of the most common side effects linked to orthodontics [7]. Also, properly aligned teeth are easier to clean, and perhaps correct occlusion may promote healthier
periodontium. The periodontal complications associated with orthodontic therapy mainly include gingivitis, periodontitis, gingival recession or hypertrophy, alveolar bone loss, dehiscences, fenestrations, interdental fold, and dark triangles [8]. Presence of microbial plaque is reported to be the most important factor in the initiation, progression, and recurrence of periodontal disease in reduced periodontium [9]. The reasons behind these periodontal complications involve patient factors and the technique used in the treatment [10]. Patient factors include past periodontal condition, increased susceptibility, and poor oral hygiene. Smoking is also a known factor that affects the periodontal support [11]. Orthodontic treatment and the procedures are known to induce both positive and negative local soft-tissue reactions in the gingiva. The negative reaction is mainly associated with gingivitis. Orthodontic brackets and elastics might interfere with effective removal of dental plaque, thereby increasing the risk of gingivitis. Orthodontic patients are at a higher risk of periodontal disease development [6]. Close monitoring of adults with reduced periodontal support is mandatory. Orthodontic treatment is usually contraindicated in patients with active periodontal disease or poor periodontal health as the chance of further periodontal deterioration is high in such cases. Hence, this research was undertaken to study the association between orthodontic treatment and periodontitis.

MATERIALS AND METHOD:

This retrospective study was conducted in a university setting. Patients undergoing orthodontic treatment with periodontal problems were evaluated for the association of periodontitis. The study population consisted of 2169 patients who visited from June 2019 to March 2020. We reviewed patient records and analysed the data of 86,000 patients. To minimize sampling bias, inclusion of all available data with exclusion of incomplete data was done. The data was entered in a methodical manner [serial number, name, age, gender and tooth number]. The data was entered into Microsoft Excel and tabulated. Following which data was imported into the SPSS software by IBM. The data collected was reviewed by a reviewer involved in the study and all possibility of bias was excluded from the study. Data analysis was performed in the statistical software SPSS and data was analyzed by Descriptive Analysis and Pearson correlation.

RESULT AND DISCUSSION:

In the present study, a total of 2169 patients were screened. We observed that (30) 1.4% of the patients undergoing different types of orthodontic treatment that includes fixed and removable appliances were affected with mild to moderate periodontitis [table 1]. The affected population was distributed into the following age groups 16 to
25 years (43.33%) , 26 to 35 years (33.33%) and 36 to 55 years (23.33%). The most number of affected individuals belonged to the age group 16-25 years (43.3%) [Figure I]. There was equal gender prevalence among the affected study population [figure 2]. Pre-adjusted edgewise therapy was the most preferred treatment (46.67%) by the affected individuals, followed by short term fixed appliance Begg therapy (30%) and the least common was the removable appliance (23.33%) [Figure 3].

The association between age between extent of periodontitis and age of the patient was assessed by Chi square test. Generalised chronic periodontitis was predominant among the age group 16 to 25 years (20%) and localised chronic periodontitis was predominant among 16 to 25 years (23.33%). However, this is statistically not significant ( p value = 0.783 ) , meaning there is no association between extent of periodontitis and age of the patient among patients undergoing orthodontic treatment affected with periodontitis [figure 4]. The association between the type of orthodontic treatment undergone and extent of periodontitis was assessed using Chi square tests. Patients undergoing, short term fixed appliance Begg therapy treatment were mostly affected by generalised chronic periodontitis (16.17%) , pre-adjusted edgewise therapy were affected mostly by localised chronic periodontitis (26.67%) and removable appliance were also most affected by localised chronic periodontitis (13.33%). The result was not significantly significant ( p value= 0.408 ), meaning there was no significant association between the type of orthodontic treatment undergone and extent of periodontitis [figure 5].

In the present study, a total of 2169 patients were screened. In this study we observed that 1.4% of the patients undergoing different types of orthodontic treatment that includes fixed and removable appliances were affected with mild to moderate periodontitis. Maximum association of 1.02% with periodontitis was evident in patients undergoing pre-adjusted edgewise therapy alone, followed by short term fixed appliance Begg therapy. Oral functional and aesthetic rehabilitation requires multidisciplinary treatment planning [12]. A patient judges the outcome of an orthodontic treatment by assessing the final improvement in facial esthetics. Few clinical studies also reported poor periodontal health and greater loss of clinical attachment level distally in the dental arches. Orthodontic treatment is associated with a number of adverse effects, such as root resorption, pain, pulpal changes, periodontal disease, and temporomandibular dysfunction (TMD) [2]. This could be a result of poor oral hygiene in molar regions and the presence of molar bands, which favours food lodgement [13]. Orthodontic treatment is known to affect the equilibrium of oral microflora by increasing bacteria retention. In a study done by Ristic et al. an increase in the value of periodontal indices and growth of periodontopathogenic bacteria were observed in
adolescent patients undergoing fixed orthodontic treatment [14]. In the majority of the patients, following placement of a fixed appliance, small amounts of gingival inflammation is visible, which could be transient in nature and does not lead to attachment loss [15]. Some reports support the fact that the fixed orthodontic treatment may result in localized gingivitis, which rarely progresses to periodontitis [16]. One of the challenges of orthodontics is to finish the orthodontic treatment with the least effects on the root and periodontium. Root resorption is considered as an undesirable but inevitable iatrogenic consequence of orthodontic treatment [17]. Studies of root resorption date back to more than 150 years. Bates in 1856 was the first to discuss root resorption of permanent teeth [18].

Previously our team had conducted numerous clinical trials [19–27] and in-vitro studies [28–33] over the past many years. Now we are focussing on epidemiological surveys. The idea for this survey stemmed from the current interest in our community.

However, contradictory to the study, Alexander in his results has also reported lack of periodontal destruction over a longer period of time among patients wearing fixed appliances [13]. It is generally recommended that orthodontics be preceded by periodontal therapy based on the belief that orthodontics in the presence of inflammation can lead to rapid and irreversible breakdown of the periodontium [34]. Scaling, root planing (if necessary, by open flap debridement procedures for access), and gingival augmentation should be performed as appropriate before any tooth movement. The corrective phase of periodontal therapy, that is, osseous or pocket reduction/elimination surgery, ought to be delayed until the end of orthodontic therapy, because tooth movement may modify gingival and osseous morphology [35]. If the orthodontic forces are kept within the adequate limits in healthy reduced periodontal tissue support regions, the chances of gingival inflammation will be minimal [36].

Published reports on human periodontal tissues state that the orthodontic banding performed with great care and proper maintenance of oral hygiene can prevent permanent periodontal destruction [13]. Periodontal health is essential for any form of dental treatment. Adult patients must undergo regular oral hygiene instruction and periodontal maintenance in order to maintain healthy gingival tissue during active orthodontic treatment. Therefore, a thorough assessment of the periodontal health and level of attached gingival is recommended prior to the orthodontic treatment. Also, it is equally important to lay emphasis on the necessity of good oral hygiene in order to achieve the best treatment outcome. Oral hygiene instructions should be given before the start of orthodontic treatment and it should be reinforced during every visit.

CONCLUSION:

http://doi.org/10.36295/ASRO.2020.232322
In this study we observed that 1.4% of the patients undergoing different types of orthodontic treatment that includes fixed and removable appliances were affected with mild to moderate periodontitis. Hence, Orthodontic treatment requires accurate assessment and careful diagnosis of complexity of the deformity, type of tooth movement required, periodontal support, carries risk, patient motivation, patient expectations, patient compliance with treatment and oral care regimens. Hence the results of this study stresses on the accurate assessment and treatment planning concerning periodontium of the patient and mild grade periodontitis shouldn't pose as a barrier to orthodontic treatment as the treatment itself improves the periodontal condition.

ACKNOWLEDGEMENT:

Nil

CONFLICT OF INTEREST:

There is no conflict of interest

AUTHORS CONTRIBUTIONS:

Author 1 (Shreya Svitlana), carried out the retrospective study by collecting data and drafted the manuscript after performing the necessary statistical analysis. Author 2 (Dr. S.P.Saravana Dinesh) aided in conception of the topic, has participated in the study design, statistical analysis and has supervised in preparation of the manuscript. Author 3 (Dr. Jaiganesh Ramamurthy) has supervised and has coordinated in developing the manuscript. All the authors have discussed the results among themselves and contributed to the final manuscript.

REFERENCES:

Orthodontic Science 2013.


Table 1. Table showing distribution of patients undergoing orthodontic treatment based on gender and association of periodontitis. From the table we observed that 1.4% of the patients undergoing orthodontic treatment were having mild to moderate periodontitis.

<table>
<thead>
<tr>
<th>ASSOCIATION OF PERIODONTITIS</th>
<th>NIL PERIODONTITIS</th>
<th>MILD TO MODERATE PERIODONTITIS</th>
<th>TOTAL</th>
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</tr>
<tr>
<td></td>
<td>MALE</td>
<td>1055</td>
<td>15</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>2139</td>
<td>30</td>
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</tbody>
</table>
Figure 1. Bar chart representing age distribution of patients undergoing orthodontic treatment, affected by periodontitis. The X axis denotes age of patient and Y axis denotes number of patients undergoing orthodontic treatment affected with periodontitis. The affected population was distributed into the following age groups 16 to 25 years (blue), 26 to 35 years (green) and 36 to 55 years (orange). The most number of affected individuals belonged to the age group 16-25 years (43.3%) and the least affected belonged to age group 36 to 55 years (23.33%).
Figure 2. Bar chart representing gender distribution of patients undergoing orthodontic treatment, affected by periodontitis. The X axis denotes gender and Y axis denotes number of patients undergoing orthodontic treatment affected with periodontitis. The affected male population (blue) and the affected female population (blue) were equal in number. Hence, there was equal gender prevalence among the affected study population.
Figure 3. Bar chart representing distribution of patients undergoing orthodontic treatment, affected by periodontitis according to the type of orthodontic treatment undergone. The X axis denotes type of orthodontic treatment and Y axis denotes number of patients undergoing orthodontic treatment affected with periodontitis. Pre-adjusted edgewise therapy (yellow) was the most undergone treatment (46.67%) by the affected individuals, followed by the short term fixed appliance Begg therapy (pink) (30%) and the least was removable appliance (red) (23.33%).
Figure 4. Bar Graph showing the association between extent of periodontitis and age of the patient among patients undergoing orthodontic treatment affected with periodontitis. The X-axis denotes age of patient. The Y-axis denotes the number of patients affected with periodontitis. Generalised chronic periodontitis (red) is predominant among the age group 16 to 25 years (20%) and localised chronic periodontitis (yellow) is predominant among 16 to 25 years (23.33%). However, this is statistically not significant. (Chi square test; p value = 0.783 - not significant), meaning there is no correlation between extent of periodontitis and age of the patient among patients undergoing orthodontic treatment affected with periodontitis.
Figure 5. Bar Graph showing the association between the type of orthodontic treatment undergone and extent of periodontitis among the patients affected with periodontitis. The X-axis denotes the extent of periodontitis. The Y-axis denotes the number of patients affected with periodontitis. Patients undergoing short term fixed appliance Begg therapy treatment (pink) were mostly affected by generalised chronic periodontitis (16.17%) , pre-adjusted edgewise therapy (yellow) were affected mostly by localised chronic periodontitis (26.67%) and removable appliance (red) were most affected by localised chronic periodontitis (13.33%). However, this is statistically not significant. (Chi square test; p value = 0.408 - not significant), meaning there is no association between extent of periodontitis and type of orthodontic treatment.