Relationship between deep bite and periodontal problems in the anterior teeth in patients reporting for Orthodontic treatment

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Abstract

INTRODUCTION: Deep bite causes a traumatic occlusion, which exerts pressure on the supporting structures with increase in the rate of inflammation and damage to the periodontal tissue. The continuous pressure produces an injury to the gingival surface and periodontal tissues of the opposing teeth in the arch.

AIM OF THE STUDY: The aim of the present study was to determine the correlation between deep bite and periodontal problems in the anterior teeth in patients requiring Orthodontic treatments.

MATERIALS AND METHODS: This study was based on data collected from the digital database of Saveetha Dental College and Hospitals. Over 86000 patient records were reviewed and analyzed over a six month period from September 2020 to February 2021. A total of 1000 case sheets were cross verified for error was done by presence of additional reviewers and by photographic evaluation. Simple random sampling was done to minimize sampling bias. After reviewing, 1000 case sheets were filtered based on data required. The final sample size was 171 patients with a deep bite. Inclusion criteria: Patient with deep bite, periodontal problem, lip competence. The data was entered in Excel Spreadsheets. And the collected data was analysed using SPSS software version 19. Chi square test was used to statistically evaluate the results.

RESULTS: In the present study, the OHIS score was poor in 10% of the patients within the age group of 61-72, fair in 35% of patients within the age group 21-30. Males were found to have slightly better status of gingiva (40%) compared to females (30%). 6% of the male patients were found to have generalised chronic periodontitis compared to 3% of female patients. The results obtained were statistically significant (p<0.005). This study showed that there was a significant relationship between patients with deep bite and periodontal problems.

CONCLUSION: The current study showed that there is a relationship between patients who seek orthodontic treatment for deep bite and periodontal problems in the anterior teeth.

KEYWORDS: Deep bite, Anterior teeth, Orthodontic treatment, innovative

INTRODUCTION:
Deep bite is commonly treated by molar extrusion, incisor intrusion, or both. Diagnostic assessment is needed to determine the best treatment approach and must be very precise(1). Patients with structural deep bite may require orthognathic surgery for a full correction(2,3). The amount of incisor exposure during a smile is an important consideration in deep bite cases(4–6)
Some studies show there is a positive correlation between crowded teeth and periodontal diseases. Plaque and calculus increase the incidence of gingivitis(7) (8). Changes in periodontal tissues can lead to edema of the gingival tissue, bleeding upon provocation, gingival swelling, discoloration, ulceration, and pocket formation. Malocclusion is also one of the predisposing factors of dental trauma as it makes plaque control difficult(9) (10)
Periodontal tissues can adapt to occlusal force. An increase in occlusal force on the periodontal tissues can lead to an increase in periodontal ligament width (11) (12) (13) (14). Changes in direction of occlusal force can cause reorientation of force and tensile stress on periodontal tissues, which can lead to trauma of the periodontal tissues. Malocclusion does not always lead to occlusal trauma, but excessive force borne by periodontal tissues over the long term is frequently caused by malocclusion (15) (16) (17).

Deep bite may be one of the predisposing local factors of periodontal and skeletal problems. Poor plaque control on the palatal aspect of the maxillary incisor can cause palatogingival inflammation and swelling (18). Deep bite also causes soft tissue trauma due to contact from antagonist teeth. In adults and children, deep bite is the most commonly occurring type of malocclusion (19,20).

Periodontal disease in the upper anterior region can be in isolation or may affect more teeth. The periodontal disease and its sequelae such as diastema, pathological migration, labial tipping or missing teeth often lead to functional and esthetic problems either alone or with restorative problems (21). Advanced periodontal disease is characterized by severe attachment loss, reduced alveolar bone support, tooth mobility and gingival recession. Orthodontic treatment is initiated only after periodontal disease is brought under control (22,23).

Several studies have analyzed the association between malocclusion and periodontal status, but few have analyzed the periodontal status of subjects with deep bite. The results of this study were expected to increase public awareness of the need to treat malocclusion so it does not lead to periodontal diseases (24) (25) (26).

In another study, clinical evaluation revealed extensive gingival recession on the vestibules of mandibular anterior segment. Patients had an Angle’s class III malocclusion and deep bite. To maintain the teeth until orthodontic therapy and maxillofacial surgery, mucogingival surgeries were performed to maintain the attached gingiva, to provide oral hygiene and reduce inflammation (27) (5) (28). Gingival recession is basically the displacement of soft tissue margin apically leading to root surface exposure. Tooth malpositions, high muscle attachment, frenal pull have been associated with gingival tissue recession. Deep bite trauma is defined as injury resulting in tissue changes within the attachment apparatus as a result of occlusal forces (29) (30) (23). Trauma from occlusion may cause a shift in tooth position and the direction of the movement depends on the occlusal force. Hence this study was proposed to compare the prevalence of periodontal problems among different age groups and gender in patients with deep bite. The aim of this study is to evaluate the prevalence of periodontal problem in patients with open bite.

**MATERIALS AND METHODS:**

**Study design - Retrospective study.**

Study Setting: This study was based on data collected from the patient records of Saveetha Dental College and Hospitals. Over 86000 patient records were reviewed and analysed over a six month period from September 2020 to March 2021. 1000 records of patients reporting with Orthodontic complaints were retrieved. Approval was obtained from the institutional Scientific Review Board. Two examiners were included in the study.

**Sampling**

Data was collected retrospectively over a six month period spanning from September 2020 to February 2021. A total of 1000 case sheets of patients were reviewed. Cross verification of data for error was done by presence of additional reviewers and by photographic evaluation. Simple random sampling was done to minimize sampling bias. After reviewing, 1000 case sheets were filtered based on data required. The final sample size was 171 patients with Deep Bite.

**Data collection**

The data was entered in the system in a methodical manner. For the present study, Clinical examination, periodontics examination, orthodontic diagnosis and photographs of these patients were evaluated to find the presence of Deep bite and periodontal problem. The data includes patient’s details, Lip competence whether it is competent, incompetent or potentially competent, Periodontal problems, if any chronic gingival enlargement is present, OHIS score, presence
of any gingival recession and localised mobility. The data was entered in excel manually and imported to SPSS for analysis. Incomplete or censored data was excluded from the study.

Inclusion criteria: Patient with deep bite, periodontal problem, lip competence
Exclusion criteria: Patient name, gender, interarch relationship.

Data analysis
The collected data were entered in an Excel sheet and subjected to statistical analysis using SPSS software. The collected data was further analysed and cross verified by another examiner. Chi square tests were done between age of the patients with deep bite and periodontal problem, age of the patients with deep bite and gingival recession and age of the patients with deep bite and localised mobility. The level of significance is p<0.005.

RESULTS AND DISCUSSION:

Graph 1. Bar chart depicts that prevalence of deep bite in relation to the sex of the patients. It shows that the prevalence was seen in 50.88% of the males and 49.12% of females. From the graph we can interpret that deep bite was more prevalent among males than females in the outpatient population.
Graph 2. Bar chart depicts that prevalence of deep bite in relation to the age of the patients. It shows that the prevalence was 37.43% in age group 10-20, 46.20% in age group 21-30, 13.45% in age group 31-40, 1.75% in age group 51-60 and 0.58% in age group 61-72. From the graph we can interpret that deep bite was more prevalent among age group 21-30 years.
Graph 3. Bar chart depicts correlation between age and periodontal problems of patients reporting with deep bite. X-axis represents age and Y-axis represents periodontal problems. The blue bar represents 20.47% of patients with clinically healthy gingiva in the majority of patients among 21-30 years old, green bar represents 16.37% generalised chronic gingivitis in the majority of patients among 10-20 year olds, violet bar represents 2.34% localised chronic gingivitis among 21-30 year olds, yellow bar represents majority of 7.69% localised chronic periodontitis among 21-30 year olds. Pearson’s chi square value = 0.000 (P<0.05) which is statistically significant.

<table>
<thead>
<tr>
<th>Age</th>
<th>Localised gingival recession</th>
<th>Total</th>
<th>Level of significance</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Absent</td>
<td>Present</td>
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<tr>
<td>10-20</td>
<td>52</td>
<td>12</td>
<td>64</td>
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<td>8</td>
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<tr>
<td>41-50</td>
<td>3</td>
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<td>3</td>
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<tr>
<td>51-60</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>61-72</td>
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<td>1</td>
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</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>39</td>
<td>171</td>
</tr>
</tbody>
</table>
Graph 4. Bar chart depicts correlation between age and presence of localised gingival recession in patients reporting with deep bite. X-axis represents age and Y-axis represents presence or absence of localised gingival recession. The blue bar represents 36.26% of patients with absence of localised gingival recession among 10-20 year olds and the green bar represents the majority of 9.94% patients among 10-20 year olds with presence of localized gingival recession. Pearson’s chi square value = 0.079 (P>0.05) which is statistically insignificant.
Graph 5. Bar chart depicts correlation between age and presence of localised mobility in patients reporting with deep bite. X-axis represents age and Y-axis represents presence or absence of localised mobility. The green bar represents 46.20% of patients with absence of localised gingival recession in a majority among 21-30 year olds, 12.87% the green bar represents absence of localised mobility in 31-40 years and 0.58% of that patients had mobility 0.58%. 0.58% patients among 51-60 year olds had localized mobility and 0.58% in the age group 61-72 years also had localised mobility. Pearson’s chi square value = 0.000 (P<0.05) which is statistically significant.

As per our results, 50.88% male patients were seen to have reported for orthodontic treatment of deep bite, slightly more than the 49.12% of female patients.

In an article by Millet DT(31), The experimental sample of 23 Class II division 2 deep-overbite patients favored males over females by a ratio greater than 6 to 1. A natural bias for male expression of deep-bite malocclusion has been reported earlier.

In our study, the highest cases reported were 46.20% patients between 21-30 years and the least cases reported were 0.58% patients between 51-72 years.

According to another study(32), results showed that among 21 subjects, the majority were 15 females aged 23–40 years (mean 29.2) and six males aged 25–44 years (mean 32.8) and morphological deviations of the cervical column occurred significantly more often in the deep bite group.

Our study shows that 16.37% of 10-20 year olds had the highest reported cases of generalised chronic gingivitis and the least reported cases were 0.58% of 51-72 year olds with generalised chronic periodontitis.
According to recent scientific progression(32), there were significant differences between the normal and deep bite group for the presence and severity of gingival recession, probing depth, and clinical attachment loss and in conclusion there is an association between deep bite and periodontal status.

Our results also showed that localised mobility was absent in the majority of 46.20% of 21-30 year olds and present only in 0.58% of 41-72 year olds.

A study by Harvin J, (33) interpreted contradictory views where he showed that as deep bites tend to occur more often in cases with a more sagittal directed growth pattern and stronger muscles, whereas open bites appear more often in cases with a more vertical directed growth pattern and weaker muscles, this may be interpreted as a consequence of different skeletal patterns.

Our study showed that localized gingival recession was absent in the majority of 36.26% and present in 9.94% of 21-30 year olds and the least present only in 0.58% of 51-72 year olds.

In an article by Kumar P(34), it was shown that prevalence of gingival recession increases during and after orthodontic treatment and recession was similar in deep bite patients and untreated controls 15 years later. Orthodontic patients seem not to have worse long-term outcomes in regard to the prevalence of gingival recession than untreated controls seeking orthodontic treatment.

CONCLUSION

It can be concluded from the present small sampled retrospective study, there is significant correlation between patients who require orthodontic treatment for deep bite and periodontal problems in the anterior teeth.

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AUTHORS CONTRIBUTION

Ushanthika T: Literature search, data collection, data analysis, manuscript writing.

A.Sumathi Felicita: Study design, data verification, manuscript drafting.

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CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in the present study.

REFERENCES


Dr Shweta Nagesh, et al.: Relationship between deep bite and periodontal problems in the anterior teeth in patients reporting for Orthodontic treatment

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