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Overjet in Adolescents with Class II Division 1 Malocclusion- A Retrospective Cross Sectional Study

Research Article

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Abstract

Overjet is the horizontal distance between labial surfaces of maxillary and mandibular incisors. Normal overjet is 2 - 3 mm. Overjet greater than 3 mm and less than 1 mm are considered as sagittal discrepancies. An increased overjet is commonly seen in Class II malocclusions and is one of the most common complaints among patients reporting for orthodontic treatment. The aim of the study was to evaluate the severity of overjet in adolescents with class II division1 malocclusion. Patient records from Saveetha Dental College were retrieved and screened for data on Class II div I malocclusion. Patients aged from 12 to 18 with Class II div I malocclusion were included in the study. 210 records were randomly selected based on inclusion criteria .Severity of overjet was assessed from photographic records and categorised as Group A (N=79) (severe), Group B(N= 61) (moderate)and Group C (N=70) (mild). The tabulated data was imported into SPSS and analysed. The results of the study showed that 37.62% of the entire sample population had severe overjet. Among the genders 22.38% of males and only 15.24% of females had severe overjet. Severe increase in overjet was seen in 13 year olds. Pearson's chi square value of 0.359 and p value (0.836) showed poor association between gender and overjet. Pearson's chi square value of 14.66 and p value (0.145) showed poor association between age and overjet. From the results of the study it can be concluded that severe increase in overjet is seen only in 37.62% of the sample population without any association with gender or age.

Keywords: Class II Malocclusion; Class II Division 1; Malocclusions; Overjet.

Introduction

Class II Div I malocclusion is found among 15% of the world population and is often complicated by the presence of underlying skeletal discrepancy between maxilla and mandible [49]. Proclination of maxillary incisors is a common complaint among these patients. Severe overjet of 6mm and more is a common feature in 14-15% of 10 year old children [18, 47] with Class II div I malocclusion. Increased overjet in Class II div 1 patients are usually a result of habits and imbalance of muscular forces due to lip trap.

An increased overjet makes anterior teeth more susceptible to trauma and contributes to incompetency of lips. Increased visibility of incisors can adversely influence the psychosocial wellbeing of an adolescent. The most common presenting complaint of patients with Class II div I malocclusion is an increased overjet.

An increase in overjet in a child is first observed by parents once the incisors have erupted. Incompetency of lips, lip apart posture while sleeping and hypotonic upper lip are accompanying signs of overjet increase in growing children. Peer pressure at school and unesthetic facial appearance drive parents towards the orthodontist for correction of this anomaly.

Increased overjet may also have underlying skeletal causes. Increased proclination of upper incisors alone may not be the only contributing factor. Sagittal discrepancy between maxilla and mandible as in skeletal class II patterns is another leading cause for increased overjet in adolescents.

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Habits play an important role in the development of this anomaly. Pressure from thumb sucking can lead to labial movement of upper incisors and lingual movement of lower incisors. Imbalance between perioral muscles and the tongue lead to sagittal and transverse anomalies of the dentition. A hypotonic upper lip along with a curled lower lip trapped between upper and lower incisors can further worsen overjet.

Early treatment has been suggested to reduce the incidence of incisal trauma to upper permanent incisors in paticuts with large overjet and incompetent lip closure [2, 21, 48].

Correction of class II division 1 malocclusion with functional appliances is a common treatment approach in young patients [6]. The functional appliance shifts the mandible into a protrusive position, generating muscle actions that create the forces needed to correct the dental arch relationship and aiming to improve the patients facial profile [3, 16]. Activator is a widely used functional appliance that prevents the mandible from sliding backward and transfers the forces to the maxilla, which is essentially the anchorage unit for the anteriorly displaced mandible[17, 46].

Timing of treatment in Class II div I patients may vary according to parent awareness, social and demographic factors, Orthodontist and patient compliance. This leads to a proportion of patients left untreated well into their adolescence. Previously our team has a rich experience in working on various research projects across multiple disciplines [1, 10, 15, 19, 24, 25, 29, 30-32, 36, 43, 50, 53]. Now the growing trend in this area motivated us to pursue this project.

This study aims to retrospectively evaluate the variations in severity of overjet among class II division 1 adolescent patients reporting to an institution for orthodontic treatment.

Materials and Methods

Study setting:

This study is in an institutional setting at Saveetha Dental College. Digital patient records of 86000 patients over a six month period from 1st June 2019 to 31st March 2020 were retrospectively screened for patients with Class II div I malocclusion. Approval was obtained from the institutional Scientific Review Board and Ethical committee (SDC/SIHEC/2020/DIASDATA/0619-0320). Two examiners were involved in the study.

Sampling

Over 86000 Patient records from August 2019 to February 2020 were reviewed and screened for patients with Class II div I malocclusion. Filters were appropriately used so that only adolescent patients in the age group of 12 to 17 were included in the study. Patients with a history of orthodontic treatment and active periodontal disease were excluded from the study. A total of 210 patient case sheets were randomly selected based on these criteria. 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. Photographic evaluation of overjet of patients was done by a single investigator and the samples were divided into three groups. Group A had patients with severe overjet, Group B had patients with moderate overjet and Group C had patients with mild overjet.

Data collection/ Tabulation:

Data was methodically tabulated on MS Excel worksheet and imported into IBM SPSS for statistical analysis.

Analysis:

The Pearson's chi square test for independence was done to observe for any association between gender, age and severity of overjet.

Results & Discussion

Out of 210 patients, 125 patients were male and 85 patients were female. 37.62% of the patients had severe overjet, 33.8% of mild overjet and 29.8% of moderate overjet. On analysing severity among each gender, 22.38% of samples with severe overjet were males 15.24% of samples with severe overjet were females. 11.9% of samples with severe overjet were 13 year olds and only 1.9% of samples with severe overjet were 16 year olds. Chi square test for association between gender and severity of overjet showed a p value of 0.836 (p value >0.05 is statistically insignificant). Chi square test for association between age and severity of overjet showed a p value of 0.145 (p value >0.05 is statistically insignificant).

Increased consciousnesses about ones well-being among the adolescent population and increasing awareness of parents towards orthodontic treatment have led to an increasing number of patients reporting for orthodontic treatment. Adolescent patients

Figure 1: Bar graph shows the age distribution among the samples chosen. The X axis represents the age and the Y axis represents the percent of samples. Red represents age of 12, green represents 13, blue represents 14 years, purple represents 15 years, yellow represents age 16 and orange represents age 17. It can be inferred that most number of patients reported for correction of increased overjet at the age of 13.

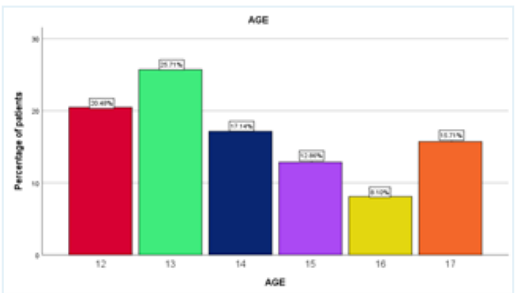


Figure 2: Bar Graph shows the proportion of patients according to severity of overjet. The X axis represents the Groups based on severity of overjet and the Y axis represents the percent of samples in each group (green-severe), (blue-moderate), (red-mild). It can be inferred from the graph that the maximum number of patients in the sample population had severe overjet.

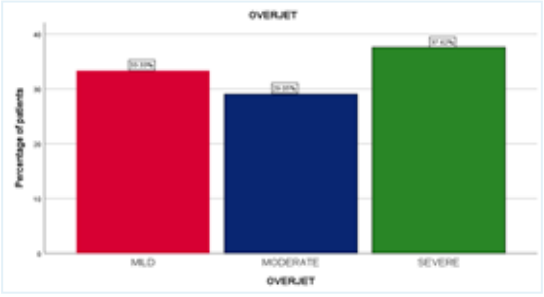


Figure 3: The Bar Graph shows the gender distribution among the sample population chosen. The X axis represents gender and the Y axis represents the proportion of the specific gender in the samples chosen (male-blue) (females-red). From the graph it can be inferred that male adolescent patients are more likely to report for treatment of increased overjet than females.

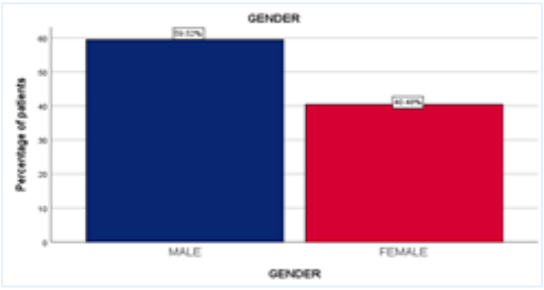
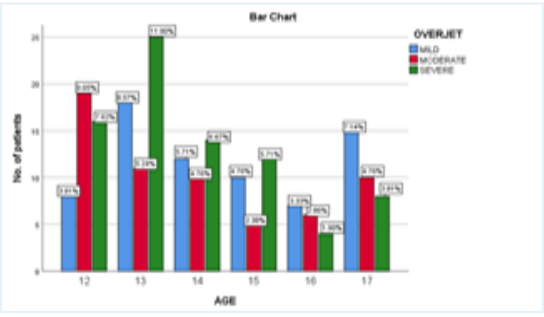


Figure 4: Bar Graph shows association between gender and severity of overjet. The X axis represents gender and the Y axis represents the number of patients. Severity of the overjet is color coded as red- mild, blue- moderate and severe-green. Chi square analysis resulted in a p value of 0.836 (p value>0.05, statistically insignificant). From the graph it can be inferred that even though there was no statistically significance, severe overjet was maximum in males than in females.

Figure 5: Bar graph shows the association between age and severity of malocclusion. The X axis represents age and the Y axis represents the number of patients. The severity of malocclusion was color coded as red- mild, blue-moderate and green-severe. The Chi square test resulted in a p value of 0.145 (p value > 0.05 considered as statistically insignificant). From the bar graph it can be inferred that severe overjet were highly prevalent in 13 year old patients and least prevalent in 16 year old patients. However this is statistically insignificant.



contribute to the major number of cases in any orthodontic practise. With the pubertal growth spurt and subsequent waning of growth velocity occurring in this age group, orthodontic treatment for this age group has always been of importance for researchers and clinicians. The most common presenting complaint among this age group is increased overjet and the one of the common malocclusions is Class II dv I.

Previously investigators have conducted various studies related to orthodontic diagnosis and treatment and their association with mini implants [20, 44, 53]. GMP based orthodontic bonding adhesives [41], bisphosphonates [26] forces and apparatus used in forces determination [7, 12, 14], recycling methods and sleep apnea [22, 54], craniofacial relation [13, 40], enamel conditioning [38] dilacerated and impaction tooth [14].

This retrospective study was conducted to evaluate the pattern of distribution of overjet magnitude among adolescent patients

with Class II div I malocclusion. The objective of the study was to statistically test for any association between gender, age and overjet magnitude.

The results of this study show that in the sample population chosen, 37.62% of the population had severe overjet. Overjet above 6 mm have been reported in 14-15% of the population in scandinavian children [18, 47]. The results of this study show results in a higher proportion of adolescents having severe increase in overjet which do not agree with results from previous studies. The most number of samples which showed severe overjet were aged 13. This result could substantiate the cause for early intervention in correction of increased overjet in Class II div I patients. Early correction of class II malocclusion in Sweden is often undertaken by GP after consultation with an orthodontist [33].

Growth modification therapies in the early correction of class II malocclusion have been investigated in 3 studies. These studies concluded that early treatment does provide correction of incisal relationship mainly due to dentoalveolar changes [23, 28]. Only 40% of the patients with a full class II relationship were corrected to class I during treatment and in the follow-up period relapse occurred in 10 percent [5]. Both increased overjet and lip incompetence are considered significant risk factors for dental trauma on the maxillary mirrors [2, 5, 21, 48]. Early treatment provided for class II division1 can reduce the risk of dental trauma in maxillary anteriors due to severe proclination. Our institution is passionate about high quality evidence based research and has excelled in various fields [4, 9, 27, 34, 35, 37, 42, 45, 51, 52]. We hope this study adds to this rich legacy.

Gender and age were poorly associated with severity of overjet among the sample population. Severity of the overjet did not show any pattern of distribution among males or females of any age.

Conclusion

Within the limitations of the study, it can be concluded that a major proportion of adolescent patients with Class II div I malocclusion have moderate to severe overjet. Age or gender was not associated with the severity of the overjet.

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