International Journal of Dentistry and Oral Science (IJDOS)
ISSN: 2377-8075

# Associated Factors For Deep Bite Malocclusion Among Adolescents In An Institutional Setup

Research Article

Nadhirah Faiz[1], Ravindra Kumar Jain[2*], Iffat Nasim[3]

[1] Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai – 600 077, TN, India.
[2] Associate Professor, Department of Orthodontics and Dentofacial Orthopedics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, 162, Poonamallee High Road, Chennai - 600077, Tamil Nadu, India.
[3] Professor, Head of Department, Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, 162, Poonamallee High Road, Chennai - 600077, Tamil Nadu, India.

## Abstract

Deep bite is characterised by excessive overlap of upper and lower anterior teeth in occlusion. Deep bite malocclusion is associated with excessive attrition of lower anterior teeth, compromised esthetics and temporomandibular joint problems. It is one of the most prevalent malocclusion in India and the south east asian countries. The aim of the study was to determine the association of deep bite with age, gender and type of malocclusion in early permanent dentition patients reported to an institutional setup. From a sample of 86,000 patients who reported to a university hospital setup, case records of patients with deep overbite were selected and included in the study. The study included 90 patients with deep overbite in the age range of 13-17 yrs. Data about the gender, malocclusion and severity of the deep bite was recorded and subjected to analysis using SPSS version 20.0 software. The results of the study showed in a sample size of 90 patients, 49% of the sample size were females and 51% of the cases were males. More patients with severe deep bite are seen within the 15-18 yrs age groups (Pearson chi square test ; P>0.05) . Amongst patients across all ages, deep bite was more common in subjects with Class I malocclusion than class II malocclusion (Pearson chi square test ; P<0.05). The association of gender with severe deep bite can be seen in males (Pearson chi square test ; P>0.05). In both males and females, more number of deep bite cases were associated with Class I malocclusion (Pearson chi square test ; P>0.05).

**Keywords:** Prevalence; Esthetics; Smile; Severity Scoring; Future Malocclusion; Gender Predilection; Deep Overbites.

## Introduction

Malocclusion is a condition of the oral cavity which has increased its prevalence over the past few centuries [1]. Malocclusion can be defined as an abnormal relationship of upper and lower teeth. The cranio-mandibular system undergoes functional problems caused due to the presence of malocclusions [2]. Such malocclusions usually get treated at an adolescent or adult stage, but they get established at an early age [3].

Deep bite can be defined as the excessive vertical overlap of upper teeth on the labial surface of lower teeth in centric occlusion when exceeds the normal range of 1-2 mm. Deep bite has been benchmarked as one of the most common malocclusion, yet most difficult to treat and retain. More often, deep bite correction is the main objective of orthodontic treatment as it has a potentially detrimental effect on periodontal health, TMJ function and esthetics [4, 5]. Deep bite malocclusion has been found to be also associated with abnormal mandibular function. Similarly, patients who have had deep overbites may require an indeterminate length of time in retention [6-12].

Deep bite can be categorized into skeletal and dental deep bites, of which skeletal deep bite is of genetic origin. This kind of bite is caused by the upward and forward rotation of the mandible and can be worsened by downward and maxillary inclination [13]. It is most frequently seen next to crowding [13]. The ideal overbite ranges from 5-25% overlap. This can either be described in millimeters or as a percentage of the amount of crown structured

***Corresponding Author**:
Ravindra Kumar Jain,
Associate Professor, Department of Orthodontics and Dentofacial Orthopedics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, 162, Poonamallee High Road, Chennai - 600077, Tamil Nadu, India.
Tel: 9884729660
E-mail: ravindrakumar@saveetha.com

**Received:** May 28, 2021
**Accepted:** June 16, 2021
**Published:** July 03, 2021

**Citation:** Nadhirah Faiz, Ravindra Kumar Jain, Iffat Nasim. Associated Factors For Deep Bite Malocclusion Among Adolescents In An Institutional Setup. *Int J Dentistry Oral Sci.* 2021;8(7):3011- 3015. doi: http://dx.doi.org/10.19070/2377-8075-21000613

overlapped by maxillary incisors [14, 15]. Deep bite is commonly encountered with class II malocclusion patients [16]. There are multiple traits which can be visualised in cases of deep bite, few of which are shorter vertical maxillary length, mandibular retrusion as well as smallest gonial angle [17] (trouten et al 1983). Trauma from occlusion, lower anterior mobility, attrition of the lower anterior teeth as well as increased overbite are features to look out for in cases of deep bite. Some literature reports that deep bite is associated with reduced lower anterior facial heights [14].

Accurate information on prevalence of different occlusal traits like deep bite may be needed when planning of orthodontic services involved targeting specific types of malocclusion [18-21]. Considering the significance of deep bite in orthodontic treatment planning, it is important that prevalence of deep bite among early permanent dentition patients be reported in a specific population to enable early detection and treatment [20, 22-25]. Between racial groups, it has been seen that deep bite prevalence and severity varies. It is important to create a holistic idea of the prevalence of deep bite to equip dentists to understand the malocclusion and its prevalence, effectively diagnose and treat the condition encountered.

The aim of the study was to determine the association of deep bite with age, gender and type of malocclusion in adolescent subjects reported to an institutional setup.

## Materials And Methodology

### Study setting

The study was conducted in a universal setting in a South Indian population. The positives of the study conducted was the similar ethnicity of the sample size of the study as well as the online availability of the photographs of the patients. There were 2 reviewers involved in the data collection process. Both reviewers of the study were responsible for the data collection upon reviewing intraoral photos of the patients selected for the study. The cases were selected on the basis of inclusion and exclusion criteria.

### Study design

Inclusion and exclusion criteria for the given study are given as follows -

### Inclusion criteria

1. Patients of 13 years to 18 years were included in the study
2. Patients have to have no missing teeth and no proximal caries

### Exclusion criteria

1. Patients who were medically compromised were excluded from the study.
2. Patients with ages below the age of 13 years were excluded from the sample size.
3. Patients with ages above the age of 18 years were excluded from the sample size.

### Ethical approval

This study was approved by the University Ethical committee. The Ethical number provided for this study was SDC/SIHEC/2020/DIASDATA/0619-0320.

### Sample size criteria

After reviewing 86000 patients, a total of 90 subjects who fulfilled the inclusion criteria were enrolled for the study. Cross verification of the patient's data was performed by checking the photographs to prevent errors. There were 2 reviewers involved in the data collection process. The internal validity of the study is applicable. The external validity of the study defines the eligible criteria of the sample size population.

### Study design and Data collection

The internal validity of the study is applicable. The external validity of the study defines the eligible criteria of the sample size population. The photographs of the patients were collected from the Dental Information Archiving Software with the age group between 13years to 18 years. The case sheets of the given sample size of the study are reviewed by the usage of intraoral photos of the patients. The photographs were imported to photoshop software (Adobe) where the overlap of the lower anterior teeth by the upper anterior teeth was marked and cross verified with 2 external reviewers and analysis was done to confirm the deep bite severity in the patient. Cross verification of the patient's data done by two reviewers to prevent errors. The measure to prevent errors done is to review the observer which will minimize the sampling bias.

### Scoring criteria

The data was collected from the college's Database with a confined age group of 13-17years and a scoring of the severity was done with the following -
0.0 - less than 1/3rd incisal coverage
1.0 - 1/3rd to ⅔ rd incisal coverage
2.0 - 2/3rd covered incisal coverage
3.0 - complete incisal coverage

### Data Analysis

The data was tabulated using the Microsoft Excel Spreadsheet and analysis of the data was performed using IBM SPSS version 20.0 software where chi square analytical tests were done.

## Results And Discussion

The results are tabulated and summarized in the following tables and bar charts. In a sample size of 90 patients, 48.8% of the sample size were females and 51.2% of the cases were males. This sample size can be further categorized into 2 groups based on age, 12 to 14 years - 32.2% and 15 to 18 years - 67.8%. (table1)

The present study was conducted in a university setup and the patients reporting represented the entire population. Class I malocclusions were commonly associated with deep overbite than class II malocclusion. In both genders and age groups, more number of deep bite cases were associated with Class I Malocclusion. But both the above associations were not statistically significant since in this study the number of patients with class I malocclusion were more than class II. Association between age and overbite severity showed that 15 - 18 years had more severe deep overbite

**Table 1. The above table presents the demographic variables of the study and their values in the study conducted.**

| DEMOGRAPHIC VARIABLES | CATEGORIES | NUMBER OF PATIENTS | PERCENTAGE |
|---|---|---|---|
| GENDER | FEMALES | 44 | 48.80% |
| | MALES | 46 | 51.20% |
| AGE | 12 to 14 years | 29 | 32.20% |
| | 15 to 18 years | 61 | 67.80% |

**Table 2. The above table presents the age wise distribution of deep bite severity as well as type of malocclusion.**

| DEMOGRAPHIC VARIABLES | CATEGORIES | NUMBER OF PATIENTS WITHIN 12-14 YEARS | NUMBER OF PATIENTS WITHIN 15-18 YEARS |
|---|---|---|---|
| DEEP BITE | 0 | 1 | 3 |
| SEVERITY | 1 | 10 | 16 |
| SCORING | 2 | 15 | 12 |
| | 3 | 3 | 20 |
| MALOCCLUSION | Class I | 18 | 41 |
| | Class II | 11 | 20 |
| | Class III | 0 | 0 |

**Figure 1. The above graph represents the association between gender groups and deep bite Severity. X axis denotes the gender group of the patient and Y axis denotes number of patients with deep bite. Severe deep bites (grade 3) are common in males and mild deep overbite(grade 1) is common in females. Chi square association test was performed and found to be statistically significant. Chi square value - 51.135 ; P value - 0.001 (P<0.05) statistically significant.**

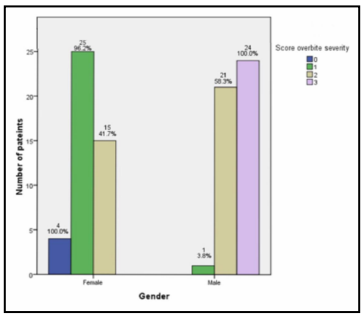
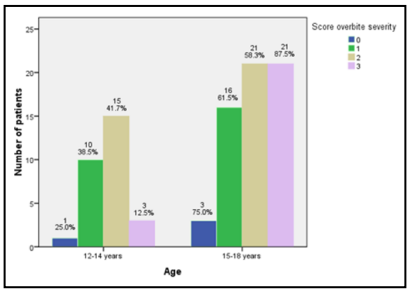



**Figure 2. The above graph represents the association between age groups and deep bite Severity. X axis denotes the age group of the patient and Y axis denotes number of patients with deep bite. Majority of patients with severe deep bite are seen in the 15-18 year old age group. Chi square association test was performed and found to be non significant. Chi square value - P value - 0.098 (P>0.05) statistically not significant.**




but it was not statistically significant (p value - 0.098). Statistically significant association between gender and severity of overbite was found and it was seen that males have more positive overbites than females. (p value - 0.001)

There is a lot of literature pertaining to deep overbite prevalence. In the study reported by Grando G et al 2008(26), no statistical significance was seen between gender and malocclusion as well as between age and malocclusion was noted. In the study conducted by Alailan SS et al 2019(27), it was reported that females had a higher prevalence of moderate overbite at 17.8%. In the study conducted by Amin AA et al 2015(28), sample size has 70.5% females and 29.5% males, of which 41% of the sample size show incidence of deep bite.

In the study conducted by Abdulazayem MA et al in 2012 [29], majority of deep overbite cases were mild 80.8%, moderate were 15% and severe deep overbite were at 4.2% of the total cases studied. Male subjects commonly had moderate to severe deep bite.

**Figure 3. The above graph represents the association between type of malocclusion and gender of patients with deep bite. X axis denotes the gender of the patient and Y axis denotes the number of patients with deep bite in class I and class II malocclusion. In both males and females more number of deep bite cases were associated with Class I Malocclusion. Pearson's chi square test was performed and the association was statistically not significant. Pearson chi square test - 0.915 ; P value = 0.339 (P>0.05) statistically not significant.**

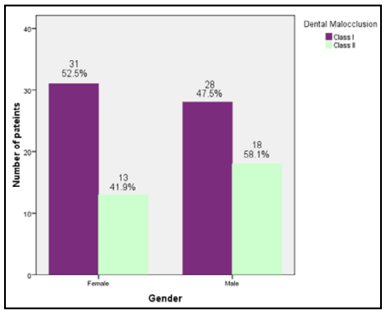
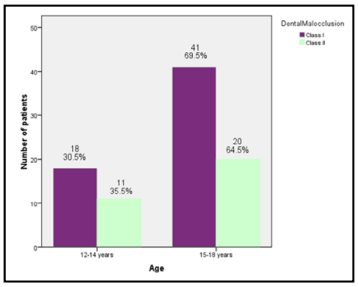



**Figure 4. The above graph represents association between malocclusion type and Age groups of patients with deep bite. X axis denotes age group of the patient and Y axis denotes the number of patients with deep bite in class I and class II malocclusion. In both age groups deep bite was more common in subjects with Class I malocclusion than class II malocclusion. Chi square association test was performed. Pearson's chi square value - 0.230 ; P value - 0.631 (P>0.05) statistically not significant.**




Mild deep bite was found to be most predominant in 15-18 years age group patients (61.5%) while moderate deep bite was found to be most predominant in the 13-14 years age group patients(55.5%). Severe deep bite has the majority within the age group of 15-18 years of age (86.9%). Class I (69.4%) and Class II (64.5%) malocclusions are highly prevalent in 15-18 years of age while Class III malocclusions are not present within the complete sample size of the study. (table 2)

The limitations of this present study are a smaller sample size which cannot be generalized to the entire population, unequal distribution among all malocclusions.

In a sample size of 90 patients, 48.8% of the sample size were females and 51.2% of the cases were males. This sample size can be further categorized into 2 groups based on age, 12 to 14 years - 32.2% and 15 to 18 years - 67.8%. (table 1)

## Conclusion

Within the limits of the study, it can be concluded that prevalence of deep bite was more in adolescent females. Class I malocclusion was more commonly associated with deep overbite than class II malocclusion, but both the above findings were not significant statistically. Severe deep overbites were more common among adolescent males, moderate deep bites were common in adolescent females and both the above findings were statistically significant.

## Author Contributions

First author, Dr Nadhirah Faiz, performed the analysis, and interception and wrote the manuscript. Second author, Dr.Ravindra Kumar Jain, contributed to conception , data design, analysis interpretation and critically revised manuscript. The third author, Dr Iffat Nasim , Participated in the study and revised the manuscript . All the authors have discussed the results and contributed to the final manuscript.

## Acknowledgement

Thanks to Saveetha Dental College for allowing us to review the case sheets.

## References

[1]. Corruccini RS. How anthropology informs the orthodontic diagnosis of malocclusion's causes. Edwin Mellen Press; 1999:206.
[2]. Graber TM. The "three M's": Muscles, malformation, and malocclusion. Am. J. Orthod. 1963 Jun 1;49(6):418-50.
[3]. Graber LW, Vanarsdall RL, Vig KW, Huang GJ. Orthodontics-e-book: current principles and techniques. Elsevier Health Sciences; 2016 Jul 15:928.
[4]. Kumar KA, Deepa D. Perio-gnathic correction of traumatic anterior deep bite with skeletal class II and retrogenia. J. Interdiscip. Dent. 2012 Jan 1;2(1):47.
[5]. Kumar P. Management of Deep Bite. Synopsis of Orthodontic Treatment. 2007:108. Available from: http://dx.doi.org/10.5005/jp/books/10887_12
[6]. Sivamurthy G, Sundari S. Stress distribution patterns at mini-implant site during retraction and intrusion--a three-dimensional finite element study. Prog Orthod. 2016;17:4.Pubmed PMID: 26780464.
[7]. Kamisetty SK, Verma JK, Arun, Sundari S, Chandrasekhar S, Kumar A. SBS

vs Inhouse Recycling Methods-An Invitro Evaluation. J Clin Diagn Res. 2015 Sep;9(9):ZC04-8. doi: 10.7860/JCDR/2015/13865.6432. Epub 2015 Sep 1. PMID: 26501002.
[8]. Oksenberg A, Froom P, Melamed S. Dry mouth upon awakening in obstructive sleep apnea. J. Sleep Res. 2006 Sep;15(3):317-20.
[9]. Ramesh Kumar KR, Shanta Sundari KK, Venkatesan A, Chandrasekar S. Depth of resin penetration into enamel with 3 types of enamel conditioning methods: a confocal microscopic study. Am J Orthod Dentofacial Orthop. 2011 Oct;140(4):479-85.Pubmed PMID: 21967934.
[10]. Dinesh SP, Arun AV, Sundari KK, Samantha C, Ambika K. An indigenously designed apparatus for measuring orthodontic force. J Clin Diagn Res. 2013 Nov;7(11):2623-6.Pubmed PMID: 24392423.
[11]. Pandian KS, Krishnan S, Kumar SA. Angular photogrammetric analysis of the soft-tissue facial profile of Indian adults. Indian J. Dent. Res. 2018 Mar 1;29(2):137.
[12]. Felicita AS, Chandrasekar S, Shanthasundari KK. Determination of craniofacial relation among the subethnic Indian population: a modified approach (vertical evaluation). Indian J. Dent. Res.. 2013 Jul 1;24(4):456.
[13]. Baratam S. Deep overbite—A review (Deep bite, Deep overbite, Excessive overbite). Annessences Dent. 2009;1(1):8-25.
[14]. Beckmann SH, Kuitert RB, Prahl-Andersen B, Segner D, The RP, Tuinzing DB. Alveolar and skeletal dimensions associatedwith overbite. Am J Orthod Dentofacial Orthop. 1998 Apr 1;113(4):443-52.
[15]. Abdulrahman A. Prevalence of Anterior Open Bite among Male Saudi Children in Eastern Province. J. med. sci. clin. res. 2016. Available from: http://dx.doi.org/10.18535/jmscr/v4i7.12
[16]. Baccetti T, Franchi L, McNamara Jr JA. Longitudinal growth changes in subjects with deepbite. Am J Orthod Dentofacial Orthop. 2011 Aug 1;140(2):202-9.
[17]. Richardson A. Skeletal factors in anterior open-bite and deep overbite. Am J Orthod. 1969 Aug 1;56(2):114-27.
[18]. Rubika J, Felicita AS, Sivambiga V. Gonial angle as an indicator for the prediction of growth pattern. World J Dent. 2015;6(3):161-3.
[19]. Samantha C, Sundari S, Chandrasekhar S, Sivamurty G, Dinesh S. Comparative evaluation of two Bis-GMA based orthodontic bonding adhesives-A randomized clinical trial. J Clin Diagn Res. 2017 Apr;11(4):ZC40.
[20]. Felicita AS. Orthodontic management of a dilacerated central incisor and partially impacted canine with unilateral extraction - A case report. Saudi Dent J. 2017 Oct;29(4):185-193.Pubmed PMID: 29033530.
[21]. Felicita AS. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor - The sling shot method. Saudi Dent J. 2018 Jul;30(3):265-269.Pubmed PMID: 29942113.
[22]. Krishnan S, Pandian S, Kumar S A. Effect of bisphosphonates on orthodontic tooth movement-an update. J Clin Diagn Res. 2015 Apr;9(4):ZE01-5. Pubmed PMID: 26023659.
[23]. Vikram NR, Prabhakar R, Kumar SA, Karthikeyan MK, Saravanan R. Ball Headed Mini Implant. J Clin Diagn Res. 2017 Jan;11(1):ZL02.
[24]. Felicita AS. Quantification of intrusive/retraction force and moment generated during en-masse retraction of maxillary anterior teeth using mini-implants: A conceptual approach. Dental Press J Orthod. 2017 Sep-Oct;22(5):47-55.Pubmed PMID: 29160344.
[25]. Jain RK, Kumar SP, Manjula WS. Comparison of intrusion effects on maxillary incisors among mini implant anchorage, j-hook headgear and utility arch. J Clin Diagn Res. 2014 Jul;8(7):ZC21-4.Pubmed PMID: 25177631.
[26]. Viswanath A, Ramamurthy J, Dinesh SP, Srinivas A. Obstructive sleep apnea: awakening the hidden truth. Niger J Clin Pract. 2015 Jan-Feb;18(1):1-7. Pubmed PMID: 25511335.
[27]. Sundareswaran S, Kizhakool P. Prevalence and gender distribution of malocclusion among 13-15-year-old adolescents of Kerala, South India. Indian J Dent Res. 2019 May-Jun;30(3):455-461.Pubmed PMID: 31397424.
[28]. Alajlan SS, Alsaleh MK, Alshammari AF, Alharbi SM, Alshammari AK, Alshammari RR. The prevalence of malocclusion and orthodontic treatment need of school children in Northern Saudi Arabia. J Orthod Sci. 2019 May 23;8:10.Pubmed PMID: 31161133.
[29]. Amin AA, Rashid ZJ. Prevalence of deep bite in orthodontic patients in Sulaimini city-a cross sectional study. IOSR J Dent Med Sci. 2015;14(8):56-8.
[30]. Abdulazayem MA. Prevalence and severity of anterior deep bite in a sample of orthodontic patients. CU Theses. 2012.