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A Retrospective Analysis of Prevalence of Anterior Open Bite in Patients Reporting to a Teaching Hospital in Chennai

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ABSTRACT

Introduction: Anterior Open Bite (AOB) is a debilitating malocclusion that requires thorough diagnosis to ensure long-term stability and proper treatment. The aim of this study was to determine the prevalence of AOB in patients visiting a university teaching hospital in Chennai, India in order to assess the need for orthodontic treatment and to determine its relation to other associated features.

Material and methods: This retrospective study was conducted among patients who were diagnosed with anterior open bite in a university teaching hospital in Chennai during the period of December 2020 to May 2021. The collected data was then subjected to statistical analysis using Statistical Package for Social Science (SPSS). Descriptive statistics and Chi square tests were used.

Results: Anterior open bite was frequently observed in males with 52.4% of the total population. Patients with anterior open bite had class I malocclusion prevalently with 85.1% of the total population. 89% of patients with anterior open bite had competent lips, followed by 6.8% of patients who had potentially competent lips. It was noticed that potentially competent lips were more frequent with females than in males.

Conclusion: AOB was more prevalent in males compared to females. Patients diagnosed with anterior open bite predominantly had Class I malocclusion and competent lips. Careful diagnosis and treatment plan for AOB should be done as any error in identifying the etiology may lead to a poor result. Due to the close connection between the prevalence of anterior open bite and dysfunctional problems, prevention modalities should be integrated into a national public health program. Awareness programs targeting parents should be implemented to reduce the risk of anterior open bite malocclusion.

Key words: Anterior open bite, Debilitating malocclusion, Diagnosis, Orthodontic treatment

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INTRODUCTION

Malocclusions may be considered a major public health problem due to the high rates of prevalence and treatment needs and the social impact these conditions cause [1]. Knowledge of etiology of malocclusion is extremely essential for the success of orthodontic treatment, since eliminating the cause is a prerequisite for correction of any malocclusion. In view of the increasing interest in early diagnosis and corresponding emphasis on preventive procedures, further information on etiological factors which cause malocclusion is needed [2].

The term open bite refers to no contact between anterior or posterior teeth. In the year 1842, Caravelli coined the term "open bite" as a distinct classification of malocclusion which can be defined in different manners without any specificity. The term open bite is referred to as no opposing contact between anterior or posterior teeth. The complexity of open bite is attributed mainly to a combination of skeletal, dental and habitual factors. In recent literature, some authors have determined that open bite, or a tendency toward open bite, may occur due to smaller openbite than the normal. While one school of thought argues that open bite is characterized by end-on incisal relationships, the others state that there is no incisal contact present before diagnosing open bite [3–7]. Open bite was also defined by two other authors Sakuda and Subtelny [8]. As the open vertical dimension between the incisal edges of the maxillary and mandibular anterior teeth, although the deficiency in vertical dimension can occur between the anterior or the buccal segment.

Anterior open bite and posterior crossbite are one of the most prevalent debilitating malocclusions [9,10]. Anterior open bite develops at an early age, but might self-correct

spontaneously as the child grows. Malocclusion is the result of a combination of both etiological factored genetic and environmental [11]. Non-nutritive sucking habits are one of the main etiological factors correlated with anterior open bite. While literature states that anterior open bite is associated with non-nutritive sucking habits and other environmental factors with [12–14]. Few investigations have sought to establish associations between sociodemographic factors and malocclusion especially in children aged 5 years or less [9]. Moreover, most studies analyse predisposing factors separately, without considering the concurrent impact or assessing potential interactions. Clinical interest in the etiological factors and primitive diagnosis of malocclusion justifies epidemiological investigations focused on the main types of malocclusion found in preschool children.

Worldwide, the prevalence of anterior open bite in previous literature ranged between 1.6% and 47.1% [15–18]. Anterior open bite was diagnosed more frequently in children than in adults (1.5-24.5%) [17,19]. The treatment of open bite still remains a tough challenge to the clinician; careful diagnosis and timely intervention with proper treatment modalities and appliance selection will improve the treatment outcomes and long-term stability [20–22]. For complicated cases orthognathic surgery is the last and only resort [23]. However, the tendency toward relapse after conventional or surgical orthodontic treatment has been proved and stated in literature. Therefore, open bite is considered one of the most challenging dentofacial deformities to treat. There is a lack of literature about anterior open bite pertaining to the south Indian population. Our team has extensive knowledge and research experience that has translated into high quality publications [24-39]. The main aim of this study was to determine the prevalence of AOB in patients visiting a university teaching hospital in Chennai, India in order to assess the need for orthodontic treatment and to determine its relation to other associated features.

MATERIALS AND METHODS

Study setting: This university hospital-based retrospective study was carried out by reviewing the dental records of patients who underwent surgical extraction of impacted premolars who had visited a university teaching hospital in Chennai. Since this was a university hospital setting the large sample size and distribution of population contributed a major advantage for this study. Data collected was reliable and with evidence. The study was conducted after obtaining approval from the Institutional Ethical Review Board.

Sampling: Data was reviewed and collected from 86,000 patient records over a six months period from December 2020 to May 2021. Data of those patients who underwent extraction of impacted premolar was collected. From 2732 patients who were diagnosed with an open bite, patients in the age group of 10-60 years, and anterior open bite were included in the study while those with incomplete hospital records were excluded from the study. Cross verification was done using photographs and radiographs.

Data collection: The following patient data were recorded as follows: hospital record number, gender, age, radiographic/dental diagnosis. The Total population of patients who were diagnosed with anterior open bite was 1609. Data collected was then exported to Microsoft Excel 2010.

Data analytics: The acquired data was subjected to statistical analysis. Microsoft Excel 2010 data spreadsheet was used for tabulation of parameters and later exported to the Statistical Package for Social Science (SPSS version 20.0) for Windows. Descriptive statistics were applied to the data and chi-square tests were applied at a level of significance of 5% ($P<0.05$).

RESULTS

Anterior open bite was most frequently seen in males with 52.4% of the total population. Patients with anterior open bite had class I malocclusion prevalently with 85.1% of the total population. 89% of patients with anterior open bite had competent lips, followed by 6.8% of patients who had potentially competent lips. It was noticed that potentially competent lips were more frequent with females than in males (Figures 1 and 2).

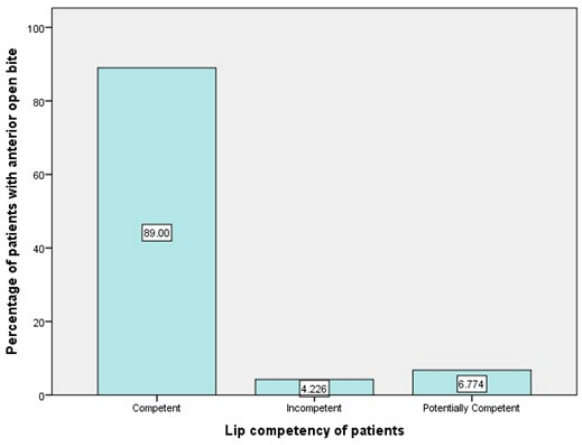

Figure 1: This bar graph represents the lip competency present in patients diagnosed with anterior open bite. X-axis represents lip competency and the y-axis represents the percentage of patients. 89% of patients with anterior open bite had competent lips, followed by 6.8% of patients who had potentially competent lips.

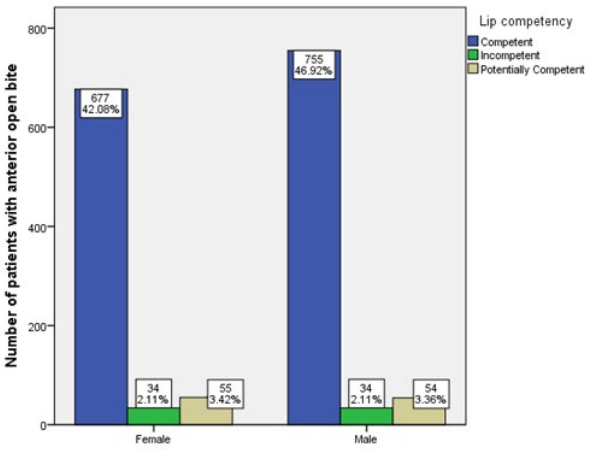

Figure 2: Bar graph depicting association between lip competency of patients with anterior open bite and gender of the patients. X-axis represents the gender with lip competency in the X cluster and Y-axis represents the number of patients who were diagnosed with anterior open bite. Blue colour denotes competent lip, green colour denotes incompetent lips and beige denotes potentially competent lips. *Chi-square test* was done and the association was found to be statistically not significant. Pearson *chi square* value: 6.344; df: 9; p value: 0.705 (<0.05), hence statistically not significant proving there was no significant association between lip competency in anterior open bite patients and their gender. However, it was noticed that potentially competent lips were more frequent with females than in males.

DISCUSSION

From this study, it was observed that anterior open bite was most frequently seen in males with 52.4% of the total population. This is consistent with the results reported by Hameedullah with a low male to female ratio 2:1 of anterior open bite [18]. Moreover, in another study 1585 Yemeni university students' males were recorded to have more open bite than females with a ratio of 4:1 [28]. However, in contrast to this study's findings, numerous previous studies found that anterior open bite was more common in females than males [10,13,15-18]. Variations in the prevalence of anterior open bite among genders can be partially attributed to the fact that Indian parents are more concerned about the appearance of boys than girls and try to prevent and treat all kinds of the abnormalities concerning the teeth and unpleasant appearance on the smile of their sons at an early age.

Patients with anterior open bite had class I malocclusion prevalently with 85.1% of the total population which is in correlation with the study by Rohit [40]. Which stated that complex open bite is frequently associated with class-I and class-II malocclusions and rarely with class III malocclusion. The reason for this result may be the fact that the most common aetiological factor of anterior open bite is habitual; like thumb sucking, pacifier use, mouth breathing, lips and tongue habits. Class II, III malocclusions are found to be evident due to hereditary reasons, hence the disparity in the results.

Lip incompetence is a characteristic clinical feature in patients diagnosed with anterior open bite [23]. However, it was observed in this study that 89% of patients with anterior open bite had competent lips, followed by 6.8% of patients who had potentially competent lips and it was noticed that potentially competent lips were more frequent with females than in males.

CONCLUSION

Open bite is the most difficult malocclusion to treat in orthodontic practice. Treatment modalities include functional appliances in growing children and surgeries in adults. Relapse rates are highest in this type of malocclusion and hence the difficulty in treating these patients. Anterior open bite was more prevalent in males than females. Patients diagnosed with anterior open bite predominantly had class I malocclusion and competent lips. Careful diagnosis and treatment plan for anterior open bite should be done as any error in identifying the etiology may lead to a poor result. Due to the close connection between the prevalence of anterior open bite and dysfunctional problems, prevention modalities should be integrated into a national public health program. Awareness programs targeting parents should be implemented to reduce the risk of anterior open bite malocclusion.

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CONFLICT OF INTEREST

There was no potential conflict of interest.

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