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TONGUE THRUSTING AND OPEN BITE AMONG ORTHODONTIC PATIENTS - A RETROSPECTIVE STUDY

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ABSTRACT :

Tongue thrusting in simple terms is the habit of pushing the tongue forward between the upper and lower anterior teeth during deglutition. Tongue thrusting habit has been baffling orthodontists for a long time regarding its role in malocclusion and regarding the approach to intervention in addressing it. This investigation was aimed at identifying the prevalence of tongue thrusting in patients being treated for a malocclusion. A single-center data collection for 490 patients was done. The diagnosis of all cases was reviewed and evaluated by the primary investigator. The cases in which the diagnosis mentioned tongue thrusting was noted. These cases were further reviewed and the diagnosis was evaluated by the second investigator. The attending post-graduate of each case was interviewed and the arch affected and direction of thrust was also noted. The collected data were tabulated into an excel spreadsheet. Pie charts were prepared and the prevalence was calculated. The evaluation and calculation made from the data showed a prevalence of tongue thrusting in orthodontic patients to be 3.87%. Most cases were anterior tongue thrusting and in most cases, the upper arch was affected. The relationship between atypical swallowing and malocclusion demands a multidisciplinary therapeutic approach, orthodontic and myofunctional, to address the condition. Early diagnosis and prompt intervention have a key role in the outcome of therapy and also have a positive influence on the well being of the patient.

INTRODUCTION

Tongue thrusting in simple terms is the habit of pushing the tongue forward between the upper and lower anterior teeth during deglutition¹. Barbar described it as an oral habit pattern related to the persistence of an infantile swallow pattern during childhood and adolescence and causes an open -bite and protrusion of anterior teeth ^{2,3}. The correct tongue posture entails the tongue to be placed against the palate behind the upper anteriors². Tongue thrusting habit has been baffling orthodontists for a long time regarding its role in malocclusion and regarding the approach to intervention in addressing it⁴. The tongue is a powerful muscle that has the potential to alter the position of teeth ^{5,6}. Inappropriate positioning of the tongue is seen as the major causative factor in the etiology of the malocclusion and relapse of treatment'. During the rest, the tongue pressure is slight but due to the increased duration, it can move teeth⁸. A recent literature review has highlighted the impact of atypical swallowing and its role in causing occlusal alterations, but the evidence also points out the opposite that malocclusion causes atypical swallowing which is considered as an adaptation⁹. This demonstrates the close relationship between function and morphology. Some methods for assessment of atypical forces of the tongue on teeth include assessment by patient perception in function, evaluation of static position of tongue using contrast radiography and functional evaluation ^{9,10}. Attempts have also been made to quantify the forces with varying degrees of success¹¹. Various methods from myotherapy to the use of LEDs have been used to address this deleterious habit ^{12,13,14}. This investigation aims to determine the prevalence of tongue thrusting and open bite among orthodontic patients.

MATERIALS AND METHODS

The study was conducted with data acquired from a single center. The cases were those who sought treatment from the Department of Orthodontics, Saveetha Dental College and Hospital in Chennai, India. The cases that were considered were those being treated by the Postgraduates in the 3-year orthodontic Postgraduate program in the Department of Orthodontics. Records for 490 cases were sought. These patients had started undergoing treatment from August 2019 to April 2020. The case records were reviewed and the diagnosis was evaluated by the first investigator(MTM). 19 cases were identified in which the postgraduate attending to the case reviewed had mentioned tongue thrusting in the findings. The postgraduate in each case was interviewed in each case. The data were grouped based on the direction of the thrust and arch affected by the thrust. The collected data were tabulated in a Microsoft Excel Spreadsheet (Microsoft Office Home and Student 2013; Microsoft Corporation, Redmond, Washington, USA). This spreadsheet and the collected data were reviewed by the second investigator for errors and bias. Pie charts were prepared and the prevalence was calculated.

RESULTS AND DISCUSSION

The prevalence calculated from the collected data was 3.87% (Fig 1). The cases with anterior tongue thrust were 17 cases implying a prevalence of 3.46%. The cases with lateral tongue thrust were 2 cases implying a prevalence of 0.41%. In 16 cases the tongue thrusting showed effects on

3 8% 96.12%

maxillary dentition and in 3 cases the effects of tongue thrusting were also evident in the lower dentition.

Figure 1 :Pie chart showing the distribution of tongue thrusting in the study population. 3.87% patients had the habit of tongue thrusting (Blue) and remaining 96.12% did not have the habit of tongue thrusting (Green).



Figure 2- Bar-chart showing the association between gender and tongue thrusting habit with open bite. X-axis represents gender and Y-axis represents the number of the patients with a habit of tongue thrusting. Association between open bite and gender was done using Chi-Square test and was not significant. In males, most cases with tongue thrust presented with open bite malocclusion. Females were more likely to present without open-bite malocclusion. Pearson Chi-Square p value = 0.405(>0.05) not significant.

From the 19th century, there was consensus among dentists that orofacial musculature had a significant role in the etiology of malocclusion ^{15,16}. The tongue plays a vital role in many physiologic functions such as speech, deglutition, respiration, and mastication ^{1,17}. Tongue thrusting in infants and children till the age of 3-4 years^{18–20}. The degree of thrust decreases as the child develops an improved muscular balance during the function of the tongue ^{21,22}. The malocclusion developed to date self- corrects ^{23,24}. In our study, our participants were patients who were seeking treatment. The age group was from 11 to 42 years. Although there is evidence reported in the literature to correlate an association between mouth breathing and tongue thrusting, our investigation wasn't able to identify such a correlation ^{25,26,6,27}.

Hanson *et al* reported from their study that mentalis muscle contractions were not related to the presence of tongue thrusting in children²⁸, but the study Dixit and colleagues showed that 25% of people with tongue thrust have hyperactive mentalis activity²². They also recorded a finding of increased upper lip thickness in children with tongue thrusting but there was no evidence in the literature²². Straub concluded from his findings that tongue thrusting is the primary cause of open bite malocclusion ^{29,6}. In our investigation we observed a predominance of anterior open bite malocclusion(Fig 4), although a few cases did present without open-bite malocclusion. In our investigation, we also observed that tongue thrusting mostly affected the upper anterior, which is concurrent with the findings of Alexander and Sudha and Dixit et al²². This is contrary to the findings of Barber and Bonus³.

In our study we were able to identify a higher rate of incidence of tongue thrusting in females (Fig 2), although there was no evidence in literature to support this finding. Tongue thrusting with open-bite malocclusion was seen more in males than compared to females(Fig 2)^{22,11,8,36}

There is some evidence of the impact of tongue thrusting in the lower dentition ^{3,30,31} and our study identified a prevalence of 4.1 cases per 1000 cases. Tongue thrusting showed a strong association with constriction of the maxilla and lisping ^{28,29,3233–35}. In our study we were able to observe a slight female predilection for tongue thrusting(Fig 2) but the literature evidence was inconsistent. All patients considered in this investigation were patients diagnosed in the department of orthodontics and excluded other patients who sought treatment in the hospital.

CONCLUSION

Within the limits of this study we were able to identify the prevalence of tongue thrusting habit as 3.8%. Tongue thrusting habit was seen to have a slight female predilection. Males were more likely to present with open-bite malocclusion associated with tongue thrusting habit. Eliminating the etiology is considered as the primary objective in addressing malocclusions such as open-bite occurring as a sequela to this habit^{37,38}. Early intervention avoids the development of severe skeletal malocclusions during growth and development⁴. The relationship between atypical swallowing and malocclusion demands a multidisciplinary therapeutic approach, orthodontic and myofunctional³⁹, to address the condition ^{22,37,40-42}.

CONFLICT OF INTEREST

The authors would like to inform you that there is no conflict of interest in this investigation.

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