

# Patient response to the usage of tongue spike in children and parents reporting for orthodontic treatment

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**Abstract:** The 4 main types of tongue thrust includes physiological, habitual, functional and anatomical tongue thrust. Physiologic tongue thrusting habit comprises the normal tongue thrust swallow of infancy. The habitual type refers to when the tongue thrusting swallow is present as a habit even after the correction of the malocclusion. Whereas the functional tongue thrusting refers to when the tongue thrust mechanism is an adaptive behaviour developed to achieve an oral seal. This was a retrospective study carried out from records of patients with mixed dentition who visited Saveetha Dental College. It was a university based study setting. The data was collected by analyzing the records of 86000 patients between June 2019-March 2020. Records of 6 to 12 year old patients in their mixed dentition who had completely erupted upper and lower first permanent molars were included in our study. The prognosis of complex tongue thrust will not be that much good when compared to simple tongue thrust if it is of neuromuscular origin. The extent to which a clinician can respond to the wishes and requirements of young patients in terms of removable appliance wear is crucial to the compliance necessary for success.

## INTRODUCTION

Adverse oral habits such as thumb sucking and tongue thrusting have lead to various type of malocclusions. Tongue thrust, as defined by Tulley in 1969, refers to the action of forward most placement of tongue tip between the teeth meeting lower lip during deglutition & in sounds of speech, so that the tongue becomes interdental. The 4 main types of tongue thrust includes physiological, habitual, functional and anatomical tongue thrust. Physiologic tongue thrusting habit comprises of the normal tongue thrust swallow of infancy. The habitual type refers to when the tongue thrusting swallow is present as a habit even after the correction of the malocclusion. Whereas the functional tongue thrusting refers to when the tongue thrust mechanism is an adaptive behaviour developed to achieve an oral seal. Lastly, individuals with enlarged tongue can have an anterior tongue posture indicating an anatomical type of tongue thrust habit.

The etiology behind tongue thrusting can be largely classified as hereditary or a learned behaviour. When there is a specific anatomic or neuromuscular variations involved in the orofacial region causing tongue thrust it is considered as a hereditary factor. A typical case as such is hypertonic orbicularis oris activity. However, tongue thrust can also be acquired as a habit. Some of the predisposing factors include Improper bottle feeding, prolonged thumb sucking or prolonged tenderness on gum or teeth.

It is to be noted that prior to any orthodontic management of malocclusion. Cessation of habit is needed prior to orthodontic management of malocclusion for treatment better prognosis Tongue thrust can lead to malocclusions. Management of tongue thrust is by tongue spike a removable appliance. Orthodontic treatment could help obtain aesthetics, function and improves quality of life.

A similar study titled “Oral habits in school going children of Delhi: a prevalence study done by O P Kharbanda et al 2003, reveals that tongue thrust has been observed as most prevalent habit at 18.1%. Overjet significantly increased in tongue thrust individuals. In addition, Bjorn Ludwig et al in The Angle orthodontist 2013 mentioned that age was an important factor as less than 13 years aged wore appliance 3 hours more than adults. The biggest challenge faced in this study is the limited research in South Indian population.

The objective of this study was to show the significance of patient compliance as a key factor for removable habit breakers appliance. Effect of tongue function, correction of malocclusion, stability after treatment.

## MATERIALS AND METHODS

### Study population:

This was a retrospective study carried out from records of patients with mixed dentition who visited Saveetha Dental College. It was a university based study setting. The data was collected by analyzing the records of 86000 patients between June 2019-March 2020. Records of 6 to 12 year old patients in their mixed dentition who had completely erupted upper and lower first permanent molars were included in our study. Records of patients with malformed or grossly deformed or extracted permanent first molars were excluded from the study. The collected data includes the patient's age, gender and usage of tongue spikes.<sup>32</sup> Patient's records which were incomplete were excluded from the study. The data collected were cross verified with intraoral photographs and randomly selected records were verified by the second examiner. Patients with usage of tongue spike were segregated and the data was tabulated separately.

### Sample size:

Sample size is the total number of patients who visited Saveetha Dental College in their mixed dentition between 6-12 years old with tongue spike appliance. Their distribution according to age, gender, and malocclusion were recorded.

### Ethical approval:

Ethical clearance was obtained from the Institutional Ethical Committee and Scientific Review Board [SRB] of Saveetha Dental College. SDC/SIHEC/2020/DIASDATA/0619-0320

### Data analysis:

The data collected were entered and subjected to statistical analysis using SPSS software. Descriptive statistics was done to find the prevalence of distal step molar relation. The data was further stratified based on the age and gender. Independent variables were age and gender while dependent variable was the molar relationship. Chi square test was done to look for any association between the age and gender in the study population. The level of significance was kept at  $p < 0.05$ .

## RESULTS AND DISCUSSION

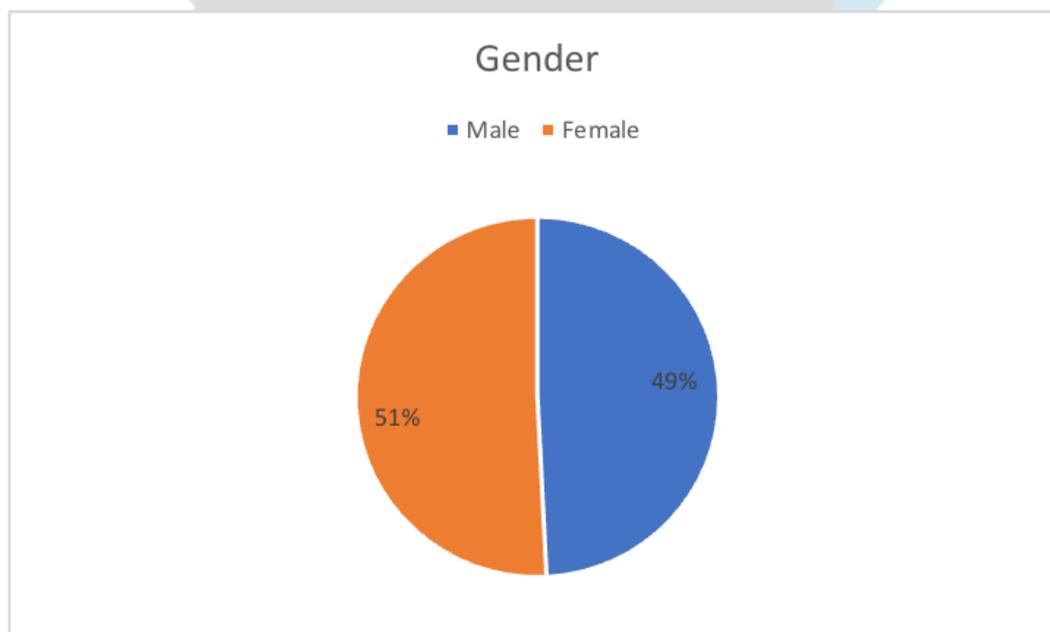


Figure 1 showed the gender distribution of this study

Approximately 150 children exhibited anterior open bite malocclusion with a pooled prevalence of 45.50% (95% confidence interval (CI): 38.08–52.81%). Anterior open bite is one of the most challenging malocclusions for orthodontists. While some believe the tongue spike to be a successful treatment option and that correcting the tooth positions in open bite cases should cause changes in swallowing patterns, others have a different perception to it. This might be due to individual variations in the adaptive capacity of the tongue.

A study on tongue movement done by Cleall, using cinefluorography in patients wearing a palatal crib where he found that the crib forced the tongue to function in a posterior and higher position. In addition to this, Sayın et al did a study on initial effects of the tongue crib by means of MRI where it was found that the tongue tip was positioned more posteriorly when the crib was in place and, to compensate for this posterior position, adaptive changes occurred. A lack of success with crib therapy reported by Subtelny and Sakuda was associated with crib wear of less than 6 months. It was found that using a compliance-free, fixed appliance for the correction of open bite and inhibition of habits produces more positive results. Our objective was to find out the effects of the spike on tongue posture in growing subjects.

For this study initial resting tongue posture's measurements and post treatment resting tongue posture measurement was taken. The spikes should be bent in such a way that when it is worn it should not impinge on lower anteriors or anterior lingual alveoli.

According to measurements performed on the middle spur of the crib appliance, both swallowing and resting tongue pressures showed a regular decrease during 10 months of crib wear ( $P < .05$ ). These findings are in agreement with the studies supporting the soft tissue-adaptation hypothesis.<sup>6-8,20</sup>

In the study group, after installation of the appliance, both swallowing and resting pressures on the upper molar vastly increased and continued increasing during the first week. We believe that these increases are due to the restricted area and restricted forward movement of the tongue.

After the first week, the values showed a gradual decrease and, even at the 10th month when the appliance was removed, the pressures remained lower than initial values. Besides, the difference between the study group and the control group was significant for the 10th- and 12th-month resting pressure values. These results call for studies to determine whether the tongue has an adaptive capability in response to environmental changes.<sup>6-8,20</sup>

For the upper and lower central incisors in the study group, swallowing tongue pressures decreased after 10 months, then returned to their initial values 2 months after removal of the appliance. The resting tongue pressure on the upper central incisor remained significantly lower when compared with the control group at the 12th month, which may indicate tongue adaptation to the new position of the incisors with open bite closure.

Similarly, Fröhlich et al<sup>11</sup> claimed that the negative correlations they found between the amount of overjet, size of the upper dental arch, and resting tongue pressure on the upper incisors confirm the hypothesis of the tongue's adaptive role. The tongue adapts to an existing morphology rather than actively molding dental arches. Similarly, Proffit<sup>30</sup> observed lower tongue pressures in Australian Aborigines than in Americans. although Aborigines have wider dental arches.

## CONCLUSION

The prognosis of complex tongue thrust will not be that much good when compared to simple tongue thrust if it is of neuromuscular origin. The extent to which a clinician can respond to the wishes and requirements of young patients in terms of removable appliance wear is crucial to the compliance necessary for success.

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