



## THE ASSOCIATION OF TONGUE POSTURE WITH DENTOAALVELOAR MAXILLARY AND MANDIBULAR MORPHOLGY IN CLASS -I, CLASS - II, CLASS - III SAGITTAL RELATIONS.

### Orthodontology

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### ABSTRACT

**AIM:** To assess the interrelation of tongue posture with the dentoalveolar maxillary and mandibular morphology in a group of class III and class II subjects in comparison to a group of class I subjects. **MATERIALS AND METHODS:** 30 pre-treatment lateral cephalograms and dental casts were evaluated. 30 subjects were divided into three groups according to the sagittal jaw relations. Tongue posture was determined in six different points in terms of tongue-to-palate distance. The arch widths were evaluated on the dental casts. **RESULT:** In Class II subject, Mean value of arch width in maxilla were narrow and tongue posture is high compare to Class III and class I subjects. Tongue posture had a weak correlation with dental arch width in all subject groups. **CONCLUSION:** Significant difference in term of tongue- to – palate distance was found at middle portion of tongue in different skeletal sagittal pattern. No significant different was found in dentoalveolar arch form.

### KEYWORDS

Tongue posture, sagittal jaw relation, dentoalveolar morphology

### INTRODUCTION

Malocclusion of teeth and dentofacial deformity is generally due to the interaction between the innate genetic factors and external environmental factors<sup>1,2</sup>. Therefore, the environmental factors influence in both the growth of jaw and proper position of the teeth in the equilibrium state. If in any way the equilibrium state is altered, it leads to malocclusion and dentofacial deformity<sup>2</sup>.

Nowadays, many orthodontists follow the concept of equilibrium of labio-lingual muscle force for maintaining the stability of the arch shape and position of teeth after the orthodontic treatment<sup>2-4</sup> Also, The maintaining the stability of treatment requires the proper diagnosis and treatment plan of oro-muscular function<sup>7-10</sup>. Thus, The tongue posture and function plays important role in long-term stability of orthodontic treatment<sup>6</sup>.

Therefore, The aim of the present study is to assess the interrelation of tongue posture with the dentoalveolar maxillary and mandibular morphology in a group of class III and class II subjects in comparison to a group of class I subjects.

### MATERIALS AND METHODS

In this cross-sectional study, 30 patients aged between 17 to 28 years, required the pre-treatment lateral cephalograms and dental cast were evaluated. They referred to the Department of Orthodontics and Dentofacial Orthopaedics Narsinhbhai Patel Dental College and Hospital for orthodontic treatment purpose and written consent was obtained.

Subjects were equally divided into the three study groups based on sagittal jaw relationship:-

1. Class I skeletal pattern : ANB angle  $0^{\circ}$  to  $4^{\circ}$ ,
2. Class II skeletal pattern : ANB angle  $> 4^{\circ}$ ,
3. Class III skeletal pattern: ANB angle  $< 4^{\circ}$ .

Inclusion criteria included the good quality of pre-treatment dental casts and lateral cephalograms with good visibility of tongue posture and shape of tongue. The dental casts included the full set of permanent dentition till second molar, with no missing or extracted teeth. Exclusion criteria included the subjects with history of previous orthodontic or orthopaedics treatment, presence of any cranio- and dentofacial anomaly and speech or myofunctional impairment, history of surgery involving tongue and presence of any pathology and trauma to the tongue posture.

Pre-treatment lateral cephalograms of all subjects were obtained using Kodak 8000C (Trophy, France) machine. Tongue posture was

evaluated in subject's pre-treatment lateral cephalograms using the method described by Grabber et al<sup>11</sup>. A template was used to assess the tongue posture. According to the template, the horizontal line passes through the incisal edge of lower central incisors to the cervical distal third of lower second molar and line extending posteriorly upto most inferior point of the uvula. The contour of bony palate and the dorsum of tongue were marked and taking the cervical area as a centre, sixed angle were drawn at  $0^{\circ}$ ,  $30^{\circ}$ ,  $60^{\circ}$ ,  $90^{\circ}$ ,  $120^{\circ}$ ,  $150^{\circ}$  and six distance (D1-D6) were measured between the Palatal and tongue contour (Fig .1)<sup>9</sup>.

Subject's pre-treatment dental casts were used to measure the intercanine and intermolar width at cuspal and gingival levels in maxillary and mandibular cast using the ABSOLUTE digimatic digital vernier calliper (mitutoyo, Philippines) with 0.01 mm accuracy according to manufacturer's specification (Fig.2). Data was analysed with appropriate/ standard statistical methods.



**Figure .1: Evaluation of tongue posture and tongue – palatal six distance (white lines D1-D6) on lateral cephalograms.**



**Figure .2: Assessment of intercanine width in maxillary arch at cuspal and intermolar width at gingival level.**

### RESULT AND DISCUSSION

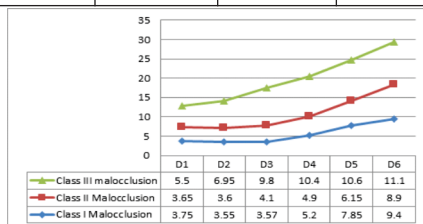
In this study, the mean age of all the subjects was  $21.50 \pm 3.17$  years. In this study, transverse morphological characteristic of dental arch were

evaluated as intercanine (IC) and intermolar (IM) width at cuspal and gingival level (Table 1). The mean values were found that the IC and IM width in maxilla is narrow in class II malocclusion compare to Class III and Class I malocclusion. Uysal et al<sup>12</sup>, who conducted a cross-sectional study between Class I and Class II individuals and found that IM width and IC width is narrow than the class I malocclusion. Similar report was reported by Ahmed et al<sup>13</sup>. IC and IM width is higher found in maxillary arch in class III compare to class II malocclusion found in this study and also found by Hashim et al<sup>14</sup>.

In our study, the resting tongue posture shows a significant in different skeletal sagittal pattern and in higher tongue position was found in class II subjects in middle and posterior area compared to class III and class I subjects. Verma s et al<sup>15</sup> reported that tongue moved postero-superiorly from rest to centric occlusion. Primozic et al<sup>9</sup> found that In class III subject the position of tongue was found lower.

**Table 1: Malocclusion and Morphological Characters wise distribution**

Cast Analysis	Mean ± SD			P Value
	Class I Malocclusion	Class II Malocclusion	Class III Malocclusion	
IC Width (Maxilla) Cuspal Area	34.70 ± 3.08	30.58 ± 3.43	34.37 ± 2.61	0.009
IC Width (Maxilla) Gingival Area	25.74 ± 5.06	22.43 ± 1.30	24.05 ± 1.83	0.088
IC Width (Mandibular) Cuspal Area	24.45 ± 3.15	24.50 ± 1.94	26.77 ± 2.14	0.074
IC Width (Mandibular) Gingival Area	18.33 ± 2.78	17.59 ± 1.57	19.14 ± 1.85	0.284
IM Width (Maxilla) Cuspal Area	53.76 ± 3.54	48.90 ± 4.01	53.41 ± 3.07	0.008
IM Width (Maxilla) Gingival Area	35.39 ± 2.86	34.26 ± 2.17	35.84 ± 2.65	0.386
IM Width (Mandibular) Cuspal Area	45.42 ± 2.87	45.17 ± 2.37	44.40 ± 2.61	0.666
IM Width (Mandibular) Gingival Area	32.22 ± 2.53	21.13 ± 2.62	31.32 ± 2.37	0.682



**Figure 3: comparison of tongue-to-palate distance at the six measurement points among different skeletal pattern**

**Table 2: Association of Tongue posture and Morphological Characters at Cuspal Area wise distribution**

Tongue – to – palate distance	Class I Malocclusion r Value (P Value)		Class II Malocclusion r Value (P Value)		Class III Malocclusion r Value (P Value)	
	IC Ratio	IM Ratio	IC Ratio	IM Ratio	IC Ratio	IM Ratio
D1	-0.010 (0.979)	-0.385 (0.272)	-0.091 (0.803)	-0.100 (0.783)	0.290 (0.417)	0.158 (0.663)
D2	-0.053 (0.885)	-0.071 (0.846)	0.095 (0.795)	-0.024 (0.947)	-0.131 (0.719)	-0.194 (0.592)
D3	-0.445 (0.197)	0.267 (0.456)	0.020 (0.957)	-0.059 (0.872)	-0.141 (0.697)	-0.257 (0.473)
D4	-0.699 (0.024)	0.165 (0.648)	0.029 (0.937)	0.078 (0.830)	-0.315 (0.375)	-0.288 (0.458)
D5	-0.590 (0.072)	-0.124 (0.732)	-0.028 (0.939)	-0.038 (0.917)	-0.318 (0.370)	-0.140 (0.700)
D6	-0.411 (0.238)	-0.389 (0.266)	0.284 (0.427)	-0.163 (0.652)	-0.270 (0.451)	-0.273 (0.445)

**Table 3: Association of Tongue posture and Morphological Characters at Gingival Area wise distribution**

Tongue –to –Palate distance	Class I Malocclusion r Value (P Value)		Class II Malocclusion r Value (P Value)		Class III Malocclusion r Value (P Value)	
	IC Ratio	IM Ratio	IC Ratio	IM Ratio	IC Ratio	IM Ratio
D1	-0.382 (0.277)	-0.417 (0.231)	0.299 (0.401)	-0.021 (0.954)	-0.187 (0.604)	0.060 (0.870)
D2	-0.186 (0.606)	-0.348 (0.324)	0.323 (0.362)	0.159 (0.661)	-0.217 (0.547)	-0.643 (0.045)
D3	-0.387 (0.269)	-0.030 (0.934)	0.300 (0.399)	0.133 (0.713)	-0.010 (0.978)	-0.677 (0.310)
D4	-0.537 (0.109)	0.062 (0.865)	0.409 (0.241)	-0.038 (0.916)	-0.159 (0.660)	-0.348 (0.324)
D5	-0.680 (0.030)	-0.045 (0.901)	0.366 (0.298)	0.000 (0.999)	-0.305 (0.392)	-0.256 (0.476)
D6	-0.429 (0.216)	-0.169 (0.641)	0.347 (0.326)	0.163 (0.653)	-0.172 (0.635)	-0.272 (0.447)

Current study revealed that there was a large significant difference in tongue posture was present at middle portion of the tongue (D2, D3 and D4) in different sagittal skeletal pattern (Fig. 3). Whereas, Primozic et al<sup>9</sup> reported large significant difference on class I and class III subjects at D2, D3, D4 and D6.

Previous studies reported correlation between transverse characteristics of the dental arches and tongue posture<sup>4,9</sup> and tongue size<sup>6</sup>. Whereas, this study has very weak correlation of tongue and dental arches were present at D4 in intercanine at cuspal area (table 2) and at D5 in intercanine at gingival area at class I subjects among the other group (Table 3). For the better stability and good result of comprehensive orthodontic treatment, we should imply this clinically and monitor the tongue posture. . Longitudinal study would yield for more accurate result.

## CONCLUSION

In Class II subject, Mean value of intercanine and intermolar width in maxilla were narrow compare to Class III and class I subjects. Significant difference was found at maxillary intercanine and intermolar at cuspal area. In class III subject, mean value of tongue – to – palate distance was higher compared to class II and Class I subject. Tongue posture had a weak correlation with dental arch width in all subject groups.

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