Research Article

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Comparative Study of Mandibular Symphysis Region in Class I and Class III Malocclusion

Mohammad Kashif Noorani[1*] Kumar Adarsh[2] Apurva[3] Kunal Gaurav Seth[4] Bhavana Sharma[5] Suprabha Sharan[6]

[1]Senior Lecturer, Department of Prosthodontics, Dr. B.R. Ambedkar Institute of Dental Sciences & Hospital, Patna, Bihar, India.
[2]Senior Lecturer, Department of Orthodontics, Dr. B.R. Ambedkar Institute of Dental Sciences & Hospital, Patna, Bihar, India.
[3]Consultant Orthodontist, New Delhi, India.
[4]Private Practitioner, Muzaffarpur, Bihar, India.
[5]Senior Lecturer, Department of Periodontology, Hazaribagh College of Dental sciences and Hospital, Hazaribagh, Jharkhand, India.
[6]Private Practitioner, Patna, Bihar, India.

ABSTRACT

Background: Disproportions and malposition of the structures often lead to malocclusions or facial deformities. In orthodontics, knowledge of mandibular growth is highly beneficial in diagnosis and treatment planning and is critical in the development of balanced dentofacial structures.

Materials and methods: 60 pretreatment radiograph of skeletal class I and class III patients were selected for the measurement in symphysis region. Analysis of variance (ANOVA) was used for statistical analysis.

Results: A significant difference in symphysis height of class I and class III patients was found.

Conclusion: Symphysis height was significantly greater in the Class III group.

Keywords: Class III, alveolar bone height, skeletal malocclusion.

INTRODUCTION

Class III malocclusion is a significant problem that can be disturbing both socially and functionally. Many factors have been implicated in its etiology and a strong genetic background has been established in literature. The prevalence of class III malocclusion varies according to ethnicity; it is high among Asians of the Far East (12%) and low in Caucasians (1-4%)[1].

Facial types of a multidimensional nature are derived from the combination of anteroposterior and vertical dimensions. Teeth, muscles, and bones interact intimately during growth, increasing or masking initial deformities[2]. Disproportions and malpositions of the structures often lead to malocclusions or facial deformities[3].

In orthodontics, knowledge of mandibular growth is highly beneficial in diagnosis and treatment planning and is critical in the development of balanced dentofacial structures[4]. Mandibular rotation types have been well defined by several authors[5,6]. It was stated that some additional growth at the major growth sites accompanied by mandibular rotation and remodeling tend to reshape the mandible. These remodeling changes described for the inferior mandibular border have been related to rotational changes in the mandible[7]. Anterior rotation is generally associated with deposition in the inferior aspect while posterior rotation is associated with resorption[8]. These remodeling processes were thought to be indirectly

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*Correspondence **Dr. Mohammad Kashif Noorani.**
Department of Prosthodontics, Dr. B.R. Ambedkar Institute of Dental Sciences & Hospital, Patna, Bihar, India.
Email: Not Disclosed

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related to the nature of the stresses generated by the supra-hyoid musculature[3].

It is believed by some authors that the symphysis region properties could be a good indicator of mandibular rotation[4,5,9,10].

MATERIAL AND METHODS

In this study a total of 60 lateral cephalographs (30 for class I and 30 for class III) of adult patients (age 20-40yrs) were selected. The symphysis height was measured in all the cephalographs. The distance from the midpoint of the anterior alveolus to the menton point was measured as symphysis height. The results were inferred by analysis of variance (ANOVA) using statistical software (SPSS version 23).

RESULTS

COMPARISON OF SYMPHYSIS PARAMETERS

Table shows symphysis height was significantly greater in Class III group than in the control group.

Table 1: Intergroup comparison of symphysis parameters

Parameter	Class III			Class I			Mean Difference	P value
	N	Class III	Std. Deviation	N	Class I	Std. Deviation		
Sym Ht (mm)	30	32.200	3.9339	30	28.920	2.2663	3.2800	<0.001**

**-Highly significant (p<0.001)

DISCUSSION

Dayoub[11] conducted a study to assess the supporting bone tissue thickness of 68 lower central incisors and to investigate the impact of gender on the alveolar bone thickness. Thirtyfour healthy patients with no previous orthodontic were evaluated by Cone Beam Computed Tomography. Sagittal sections views were analyzed to check the thickness of supporting bone on the cervical, middle of the root and apical for both surfaces buccal and lingual. The results showed that buccal apical and lingual apical regions had the greatest values of bone tissue thickness, and the lowest values were in lingual cervical, buccal cervical and buccal middle of the root for both lower central incisors. There was no significant effect of gender on supporting bone thickness.

Gutermanna[12] reassessed the inclination of lower incisors and evaluated possible associations with gender, age, symphyseal parameters, and skeletal pattern. Twelve hundred and seventy-two (605 females, 667 males) cephalograms of untreated subjects of a craniofacial growth study (8–16 years) were evaluated. Correlations between the angulation of the lower incisors and age, symphyseal distances (height, width, and depth), symphyseal ratios (height-width, height-depth), and skeletal angles (divergence of the jaws and gonial angle) were investigated for all ages separately and for both sexes independently. Lower incisor inclination was linked to the subject's sex, age, and skeletal pattern. The inclination of lower incisors increased over age, correlated with the divergence of the jaws for all ages significantly or highly significantly, except for boys and girls 9 years of age and girls 11 and 12 years of age, for which only a tendency was observed. Similarly, a strong correlation to gonial angle was observed. No correlation was found between the inclination of lower incisors and any symphyseal parameters (absolute measurements and ratios), except for symphyseal depth. The inclination of lower incisor was not associated with symphyseal dimensions, except symphyseal depth. Factors related to natural inclination of lower incisors should be respected when establishing a treatment plan.

Karlsen [10] stated that dentoalveolar mechanisms have great potential for compensating for vertical skeletal deviations. Overdevelopment of the anterior lower facial height was compensated by marked growth of the incisal heights in both jaws. In his study evaluating low and high angles in patients 6-12 years of age, he found great increases in the upper and lower incisor heights in the high angle cases. As the mandible is displaced downward and forward, supraeruption of the incisors fills the created space.[6] Mandibular rotation also interacts with vertical growth, and anterior or counterclockwise rotation might be expected to limit vertical change in the anterior region. Baumrind et al[13] investigated the amount of modeling at the apices of the mandibular and maxillary incisors and molars associated with remodeling changes in the mandible from 8.5 to 15.5 years of age. They observed statistically

significant tooth displacements associated with surface remodeling in the maxilla at all timepoints, whereas significant differences in the mandible were observed only in the vertical direction in the incisors. Janson et al[14] stated that the lower anterior dental height was significantly different in each facial type.

Morphological differences in the symphyseal region between Class III cross bite and Class I normal occlusion were found in the present study. Symphyseal height was significantly greater in Class III subjects compared to Class I controls. The findings of the present study indicate a large symphysis allows a greater sagittal but also vertical mandibular tooth movements, particularly required during decompensation of anterior dental segments during the phase of pre surgical orthodontics.

CONCLUSION

Symphysis height was significantly greater in the Class III group than in the Class I group.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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