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Original Research

Assessment of mandibular symphyseal morphology and dimensions in different anteroposterior skeletal malocclusions

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ABSTRACT:

Background: The morphology of the mandibular symphysis (MS) influences orthodontic diagnosis and treatment planning. The present study was conducted to assess mandibular symphyseal morphology and dimensions in different anteroposterior skeletal malocclusions. **Materials & Methods:** The present study comprised of 125 adult subjects visiting to the department of orthodontics. Lateral cephalograms were taken in centric occlusion. The radiographs were selected according to their skeletal AP jaw relationship (Class I, Class II, or Class III relationship). Class I skeletal relationship was considered when ANB angle is 3 degrees, Class II skeletal relationship was considered when ANB angle was >4 degree, and Class III skeletal relationship was considered when ANB angle was <2 degree. Five angular and five linear measurements was performed. **Results:** Out of 125 subjects, males were 60 (48%) and females were 65 (52%). Class I had 52, class II had 48 and class III had 25 subjects. The difference was significant (P< 0.05). B-B1-Gn was 63.5, 61.4 and 64.9, B-Pog-Me was 124.6, 127.2 and 126.8, Id-B-Pog was 147.4, 147.0 and 152.3, Id-B/Md was 110.2, 111.5 and 10.4.8, B-Pog/Md was 67.8, 68.0 and 69.1, Id-B was 10.9, 10.5 and 11.2, B-Pog was 14.3, 13.2 and 15.4, Pog-Me was 10.2, 10.4 and 10.8, Id-Me was 32.4, 32.7 and 33.4, perpendicular distance from Pog to B-Me line was 2.5, 2.3 and 2.1 and area was 36.5, 36.9 and 39.2 in group I, II and III respectively. The difference was non- significant (P> 0.05). **Conclusion:** Larger dimensions and area of MS was seen in class III than in class I and class II relationships.

Key words: Lateral cephalograms, linear measurements, mandibular symphysis

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INTRODUCTION

The morphology of the mandibular symphysis (MS) influences orthodontic diagnosis and treatment planning. The MS is considered a primary landmark for facial profile esthetic and determination of lower incisor positioning. Moreover, the internal cortical structure of the symphysis inferior border is a stable landmark; hence it is used for mandibular superimposition, and the symphyseal morphology can also be used for prediction and assessment of mandibular growth pattern.

The growth of the symphysis shows changes from childhood to adulthood in both sexes. Males demonstrate larger and later changes in symphysial dimensions as compared to females. With age, the symphyseal angle (measured between the mandibular plane and a line between the lowest point on the symphysis, or Menton and the deepest point on the anterior concavity of the symphysis, or B-point) decreases and the reduction is more significant in males than in females. Also as age increases, the ratio between symphysis height and thickness also increases. Symphysis ratio is important for the assessment of chin morphology. A smaller symphysis ratio, more common in males, indicates a prominent chin

MS morphology is a complex phenotype that results from the interplay of different genetic, nongenetic, and adaptive factors. Functional environment has been claimed to affect the shape and size of MS, such that MS demonstrates an adaptive morphological response to the biomechanical loads experienced at various points in the masticatory cycle. Other factors that may affect the morphology and/or dimension of MS are vertical jaw relationships and inclination of the lower incisors. Inclination of the lower incisors

may indirectly affect the shape of MS during the growth period; dentoalveolar compensation occurring during that period as a result of anteroposterior (AP) jaw discrepancy might be reflected in the morphology and dimension of MS. The present study was conducted to assess mandibular symphyseal morphology and dimensions in different anteroposterior skeletal malocclusions.

MATERIALS & METHODS

The study was carried out by selecting 125 adult subjects who had undergone comprehensive orthodontic treatment in the Post Graduate Department of Orthodontics & Dentofacial Orthopaedics, Government Dental College & Hospital, Srinagar. Approval for the study was obtained from institutional ethical and clearance committee. Lateral cephalograms were taken in centric occlusion. The radiographs were selected according to their skeletal AP jaw relationship (Class I, Class II, or Class III relationship). Class I skeletal relationship was considered when ANB angle is 3 degree, Class II skeletal relationship was considered when ANB angle was >4 degree, and Class III skeletal relationship was considered when ANB angle was <2 degree. Five angular and five linear measurements were performed. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

Gender	Number	Percentage
Male	60	48%
Female	65	52%

Table I shows that out of 125 subjects, males were 60 (48%) and females were 65 (52%).

Table II Anteroposterior skeletal jaw relationship

Relationship	Number	P value
Class I	52	0.05
Class II	48	
Class III	25	

Table II, graph I shows that class I had 52, class II had 48 and class III had 25 subjects. The difference was significant (P< 0.05).

Graph I Anteroposterior skeletal jaw relationship

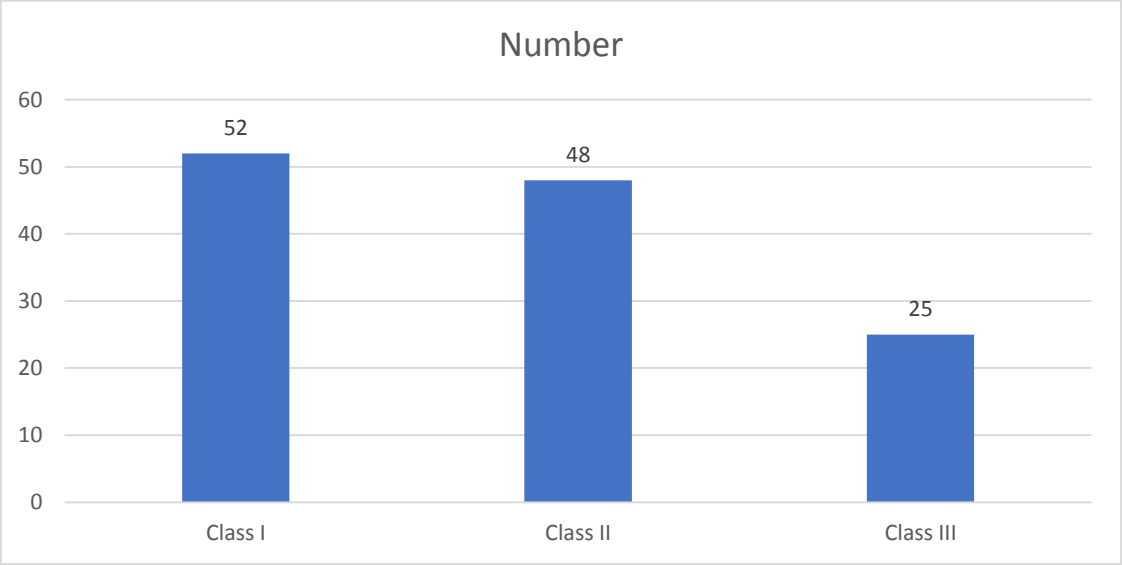


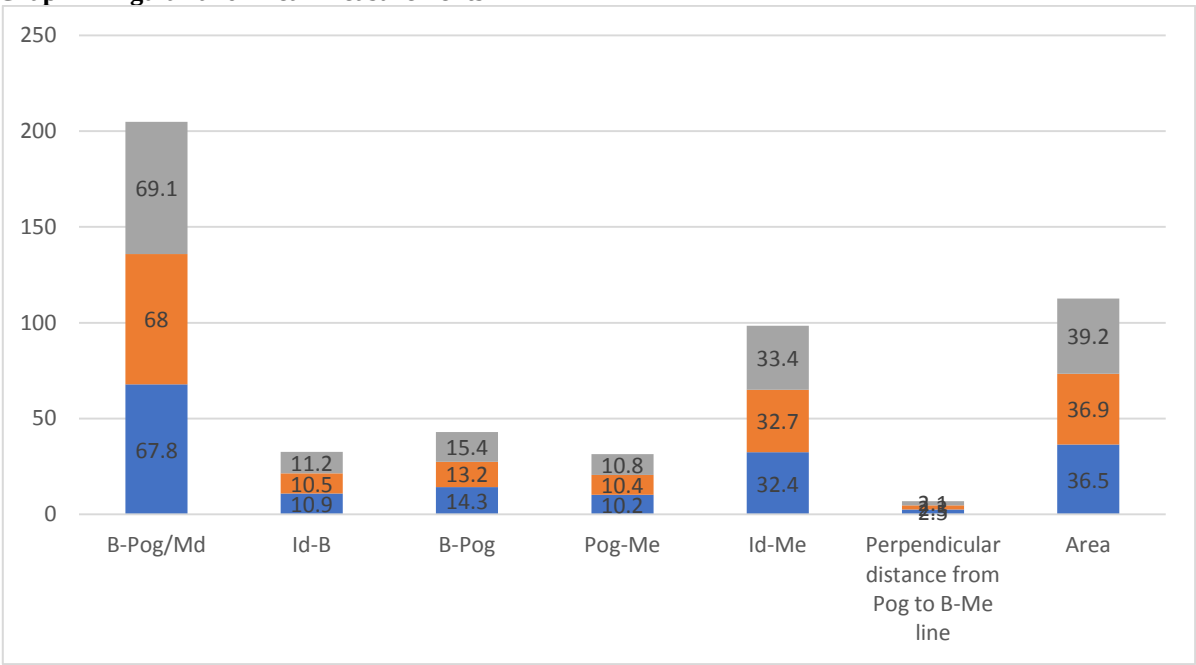
Table III Angular and linear measurements

Mandibular Symphysis	Class I	Class II	Class III	P value
B-B1-Gn	63.5	61.4	64.9	0.12
B-Pog-Me	124.6	127.2	126.8	0.15
Id-B-Pog	147.4	147.0	152.3	0.25
Id-B/Md	110.2	111.5	10.4.8	0.42
B-Pog/Md	67.8	68.0	69.1	0.51
Id-B	10.9	10.5	11.2	0.17

B-Pog	14.3	13.2	15.4	0.61
Pog-Me	10.2	10.4	10.8	0.72
Id-Me	32.4	32.7	33.4	0.81
Perpendicular distance from Pog to B-Me line	2.5	2.3	2.1	0.90
Area	36.5	36.9	39.2	0.94

Table II, graph I shows that B-B1-Gn was 63.5, 61.4 and 64.9, B-Pog-Me was 124.6, 127.2 and 126.8, Id-B-Pog was 147.4, 147.0 and 152.3, Id-B/Md was 110.2, 111.5 and 10.4.8, B-Pog/Md was 67.8, 68.0 and 69.1, Id-B was 10.9, 10.5 and 11.2, B-Pog was 14.3, 13.2 and 15.4, Pog-Me was 10.2, 10.4 and 10.8, Id-Me was 32.4, 32.7 and 33.4, perpendicular distance from Pog to B-Me line was 2.5, 2.3 and 2.1 and area was 36.5, 36.9 and 39.2 in group I, II and III respectively. The difference was non- significant (P> 0.05).

Graph I Angular and linear measurements



DISCUSSION

The mandibular symphysis plays an essential role in determining the profile of patients and is important part of the mandible anatomy. The boundaries of the dentoalveolar symphysis can define the limits of orthodontic tooth movement since larger symphysis may allow for the proclination of the lower incisors.[7] Hence, the dimensions of the mandibular symphysis can serve as important diagnostic tool in the orthodontic treatment planning because of its anatomical importance. The symphysis may be affected by anteroposterior skeletal classification. Class I skeletal pattern has normal relationship of the maxilla (SNA) to the mandible position (SNB) measured by ANB angle.[8] Class II skeletal pattern has backward position of mandible (large ANB value) and Class III has advanced position of the mandible (less ANB value). Previous literature found that Class III skeletal pattern is associated with smaller angle of the anterior concavity of the symphysis compared to Class I and II.[9] Also, the alveolus of the mandibular incisor is closer to the mandibular plane. Class III subjects also have larger symphysial area than Class I or II.[10] The present study was conducted to assess mandibular symphyseal morphology and dimensions in different anteroposterior skeletal malocclusions.

In present study, out of 125 subjects, males were 60 (48%) and females were 65 (52%). Marghalani et al[11] determined association between mandibular symphysis dimensions and anteroposterior and vertical skeletal patterns in adults. 125 lateral cephalograms of subjects who were treated in the department were included. Symphyseal height, thickness, and ratio between height and thickness were measured in relation to seven anteroposterior and vertical skeletal measurements in females and males. Symphyseal measurements were associated with SNA^{o} (anteroposterior) in females and Gonial angle (vertical) in males. When analyzed by anteroposterior skeletal classification (ANB^{o}), no significant differences in symphyseal dimensions were found. Multiple linear regression analyses showed that Gonion-Nerve (mm) and Gonial angle were significantly associated with symphyseal height. Gonion-Nerve (mm), basal bone width (mm), and alveolar bone height (mm) were associated with symphyseal thickness. Basal bone width (mm) and alveolar bone height (mm) were associated with

symphyseal ratio. Symphyseal dimensions were significantly associated with vertical but not anteroposterior skeletal patterns. Future studies are warranted to evaluate the Gonion-nerve measurements concerning the symphysis in relation to vertical and anteroposterior skeletal patterns

We observed that class I had 52, class II had 48 and class III had 25 subjects. Khateeb et al[12] assessed the morphology and dimensions of mandibular symphysis (MS) in different anteroposterior jaw relationships and to investigate whether craniofacial parameters have any correlation with its shape and/or dimensions. Lateral cephalograms of subjects with Class I, Class II, and Class III skeletal relationships were traced. Several craniofacial and MS parameters were measured. Larger angle of concavity of the chin, more inclination of the alveolar bone toward the mandibular plane, and larger MS dimensions and area (P< .001) were found with a Class III skeletal relationship compared to Class I and Class II relationships. The Pearson correlation coefficient between Id-Me and AFH was r - 0.83 and between Id-Me and LAFH it was r - 0.81.

We observed that B-B1-Gn was 63.5, 61.4 and 64.9, B-Pog-Me was 124.6, 127.2 and 126.8, Id-B-Pog was 147.4, 147.0 and 152.3, Id-B/Md was 110.2, 111.5 and 10.4.8, B-Pog/Md was 67.8, 68.0 and 69.1, Id-B was 10.9, 10.5 and 11.2, B-Pog was 14.3, 13.2 and 15.4, Pog-Me was 10.2, 10.4 and 10.8, Id-Me was 32.4, 32.7 and 33.4, perpendicular distance from Pog to B-Me line was 2.5, 2.3 and 2.1 and area was 36.5, 36.9 and 39.2 in group I, II and III respectively. Ceylan et al[13] found that mandibular dentoalveolar heights and symphyseal height and area were greater in individuals with open bites and shorter and wider in subjects with deep bites.

CONCLUSION

Authors found that class III skeletal jaw relationship had a less concave anterior contour of MS, an increase in its vertical dimension, and more inclination of the alveolar part toward the mandibular plane than did the other AP relationships, reflecting compensation for the skeletal pattern of the jaws. Larger dimensions and area of MS were seen in class III than in class I and class II relationships.

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