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Original Research

Assessment of effect of overjet on the maxillary and mandibular morphology

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ABSTRACT:
Background: Assessment of the horizontal relationship of the teeth and jaws is an important component of many orthodontic assessment. The present study was conducted to assess effect of overjet on the maxillary and mandibular morphology. **Materials & Methods:** 80 subjects in age range 18 to 24 years of both genders were divided into 4 groups of 20 each. Group I (positive) were those with overjet more than +2 mm. Group II (normal) were those overjet >1 mm but less than 2 mm. Group III (edge-edge) were those with overjet more than –1 mm but less than 1 mm. Group IV (negative) were those with overjet less than -1mm. Overjet was measured as a distance between the incisal tip of the maxillary central incisor and the buccal surface of the mandibular central incisor parallel to the occlusal plane. Standard Lateral cephalograms were taken. Linear and angular measurements such as maxillary anterior alveolar and basal height (MxAABH), maxillary anterior depth (MxAD), maxillary posterior alveolar and basal height (MxPABH), anterior nasal spine-posterior nasal spine (ANS-PNS), mandibular anterior alveolar and basal height (MdAABH), mandibular posterior alveolar and basal height (MdPABH), Condylion-gonion (Cd-Go), Condylion-gnathion (Cd-Gn), gonion-gnathion (Go-Gn), symphysis height (SH), symphysis depth (SD), ramus width (RW), antegonial notch depth (AND) and gonial angle was measured. **Results:** Group I had 8 male and 12 females, group II had 7 male and 13 female, group III had 9 male and 11 female and group IV had 10 male and 10 female. The mean MxAABH was 30.2, 24.2, 22.3 and 26.5, MxAD was 17.6, 15.4, 16.1 and 16.5, MxPABH was 19.0, 19.2, 19.1 and 20.3, ANS-PNS was 53.6, 58.4, 56.2 and 49.0, MdAABH was 40.2, 35.4, 37.2 and 37.6, MdPABH was 29.3, 29.5, 29.9 and 28.3, Cd-Go was 61.2, 65.2, 65.4 and 62.8, Cd-Gn was 123.4, 128.2, 129.0 and 133.2, Go-Gn was 79.2, 83.2, 83.5 and 83.9. SH was 35.4, 37.5, 35.7 and 29.4, SD was 18.4, 17.7, 18.2 and 15.4, RW was 34.3, 33.4, 34.8 and 24.3, AND was 1.3, 2.0, 1.4 and 2.8 and gonial angle (deg) was 125.4, 123.6, 121.6 and 135.4 in group I, II, III and IV respectively. The difference was significant (P< 0.05). **Conclusion:** Results showed that overjet was related to morphological feature in both the jaws.
Key words: Angular measurements, Linear, Overjet

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INTRODUCTION

Assessment of the horizontal relationship of the teeth and jaws is an important component of many orthodontic assessment. There is a difference in the inter-arch relationships of subjects with Class I, II, III malocclusions due to differences in the skeletal morphology.[1] With severe sagittal discrepancies in the jaw relationships, orthognathic surgery is usually required. Patients with mild discrepancies, only orthodontic treatment are preferable.[2]

Investigations of the dentoalveolar and morphological features of maxilla and mandible have found statistically significant correlations between vertical craniofacial structures and certain dentoalveolar and morphological parameters in the jaw.[3] For example, investigators have found larger dentoalveolar height in the front part of both the jaws

in patient with open bite compared with patients with normal and deep bite.[4]

To a greater or lesser degree, the above factors are associated with the anatomy of individual facial features, such as the lips, eyes, and chin. The morphology of the lower facial third, in particular, contributes significantly to the variation in facial appearance among humans.[5] D uring adolescent growth and development, the effect of sexual hormones is largely expressed on the lower third of the face, with females exhibiting fuller lips and a less pronounced chin than males. In adulthood, although sexual dimorphism tends to decline, facial changes continue to manifest in both sexes through flattening of the lips and an increase in nose length.[6] The present study was conducted to assess effect of overjet on the maxillary and mandibular morphology.

MATERIALS & METHODS

The present study comprised of 80 subjects in age range 18 to 24 years of both genders. All were agreed to be the part of the study and gave their written consent. Ethical clearance was obtained before starting the study.

Demographic data of each subject was recorded. Subjects were divided into 4 groups of 20 each. Group I (positive) were those with overjet more than +2 mm. Group II (normal) were those overjet >1 mm but less than 2 mm. Group III (edge-edge) were those with overjet more than –1 mm but less than 1 mm. Group IV (negative) were those with overjet less than -1mm. Overjet was measured as a distance between the incisal tip of the maxillary central incisor and the buccal surface of the mandibular central incisor parallel to the occlusal plane. Standard Lateral cephalograms were taken.

Linear and angular measurements such as maxillary anterior alveolar and basal height (MxAABH), maxillary anterior depth (MxAD), maxillary posterior alveolar and basal height (MxPABH), anterior nasal spine-posterior nasal spine (ANS-PNS), mandibular anterior alveolar and basal height (MdAABH), mandibular posterior alveolar and basal height (MdPABH), Condylion-gonion (Cd-Go), Condylion-gnathion (Cd-Gn), gonion-gnathion (Go-Gn), symphysis height (SH), symphysis depth (SD), ramus width (RW), antegonial notch depth (AND) and gonial angle was measured. Results were tabulated and assessed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I: Distribution of subjects

Groups	Group I	Group II	Group III	Group IV
Overjet	Positive	Normal	Edge- edge	Negative
Number (M:F)	8:12	7:13	9:11	10:10

Table I shows that group I had 8 male and 12 females, group II had 7 male and 13 female, group III had 9 male and 11 female and group IV had 10 male and 10 female.

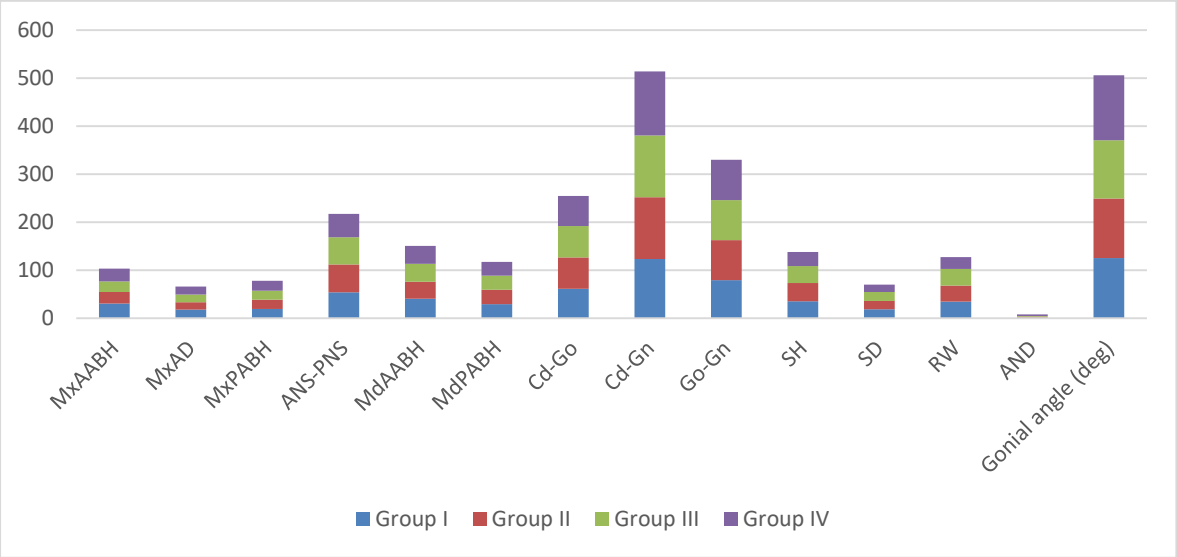
Table II: Assessment of linear and angular parameters

Parameters	Group I	Group II	Group III	Group IV	P value
MxAABH	30.2	24.2	22.3	26.5	0.05
MxAD	17.6	15.4	16.1	16.5	0.11
MxPABH	19.0	19.2	19.1	20.3	0.09
ANS-PNS	53.6	58.4	56.2	49.0	0.02
MdAABH	40.2	35.4	37.2	37.6	0.51
MdPABH	29.3	29.5	29.9	28.3	0.32
Cd-Go	61.2	65.2	65.4	62.8	0.21
Cd-Gn	123.4	128.2	129.0	133.2	0.04
Go-Gn	79.2	83.2	83.5	83.9	0.17
SH	35.4	37.5	35.7	29.4	0.41
SD	18.4	17.7	18.2	15.4	0.34
RW	34.3	33.4	34.8	24.3	0.01
AND	1.3	2.0	1.4	2.8	0.12
Gonial angle (deg)	125.4	123.6	121.6	135.4	0.05

Table II, graph I shows that mean MxAABH was 30.2, 24.2, 22.3 and 26.5, MxAD was 17.6, 15.4, 16.1 and 16.5, MxPABH was 19.0, 19.2, 19.1 and 20.3, ANS-PNS was 53.6, 58.4, 56.2 and 49.0, MdAABH was 40.2, 35.4, 37.2 and 37.6, MdPABH was 29.3, 29.5, 29.9 and 28.3, Cd-Go was 61.2, 65.2, 65.4 and 62.8, Cd-Gn was 123.4, 128.2, 129.0 and 133.2, Go-Gn was 79.2, 83.2, 83.5 and 83.9. SH was 35.4, 37.5, 35.7 and 29.4, SD was 18.4, 17.7, 18.2 and 15.4, RW was 34.3, 33.4, 34.8 and 24.3, AND was 1.3, 2.0, 1.4 and 2.8 and

gonial angle (deg) was 125.4, 123.6, 121.6 and 135.4 in group I, II, III and IV respectively. The difference was significant (P< 0.05).

Graph I: Assessment of linear and angular parameters



DISCUSSION

Orthodontists have historically been studying the human face as well as the underlying skeletal structures in order to observe normal variation and, most importantly, be able to predict physiologic transformation due to growth or changes caused by orthodontic treatment. [7,8]There is a strong correlation between hard and soft tissue facial morphology and, thus, it is expected that structural skeletal changes or positional dental changes will directly impact facial appearance.[9] The existing literature does confirm the influence of orthodontic treatment on soft tissues. Given that the lips are affected by orthodontic tooth movement the most, there is a lot of focus on lip responses to sagittal or vertical movements of the anterior dentition.[10] These movements are commonly described as changes in overjet and overbite, which are defined as the sagittal/horizontal and the coronal/vertical distance between the upper and lower anterior teeth, respectively.[11] The present study was conducted to assess effect of overjet on the maxillary and mandibular morphology.

In present study, we found that group I had 8 male and 12 females, group II had 7 male and 13 female, group III had 9 male and 11 female and group IV had 10 male and 10 female. Gupta et al[12] in their study lateral cephalograms of a total 64 subjects were taken. The chronological ages of the subjects ranged from 18 to 24 years. The 64 subjects were selected on the basis of overjet and were divided into four groups according to overjet size. Finally, each overjet group consists of 16 subjects (eight males and eight females). Thirteen linear and one angular measurement were used to assess the maxillary and mandibular morphology. Analysis of variance shows that for males MxAABH (maxillary anterior alveolar and basal height), ANS-PNS (palatal length), Cd-Gn (mandibular length), RW (ramus width), and gonial angle were found statistically significant among overjet groups and in females MxAABH, MxAD (maxillary anterior depth), Cd-Gn, SD (symphysis depth) and RW were found significant among overjet groups. Correlations were found significant for both males and females in relation to Cd-Gn, RW and gonial angle parameters.

We found that the mean MxAABH was 30.2, 24.2, 22.3 and 26.5, MxAD was 17.6, 15.4, 16.1 and 16.5, MxPABH was 19.0, 19.2, 19.1 and 20.3, ANS-PNS was 53.6, 58.4, 56.2 and 49.0, MdAABH was 40.2, 35.4, 37.2 and 37.6, MdPABH was 29.3, 29.5, 29.9 and 28.3, Cd-Go was 61.2, 65.2, 65.4 and 62.8, Cd-Gn was 123.4, 128.2, 129.0 and 133.2, Go-Gn was 79.2, 83.2, 83.5 and 83.9. We observed that SH was 35.4, 37.5, 35.7 and 29.4, SD was 18.4, 17.7, 18.2 and 15.4, RW was 34.3, 33.4, 34.8 and 24.3, AND was 1.3, 2.0, 1.4 and 2.8 and gonial angle (deg) was 125.4, 123.6, 121.6 and 135.4 in group I, II, III and IV respectively. Kanavakis et al[13] study comprised 1754 46-years old individuals. Their profile images were digitized using 48 landmarks and semi-landmarks. The subsequent landmark coordinates were then transformed to shape coordinates through Procrustes Superimposition, and final data were reduced into Principal Components (PCs) of shape. Overjet and overbite values were measured manually, during a clinical examination. A multivariate regression model was developed to evaluate the effect of overjet and overbite on profile shape. The first nine PCs described more than 90% of profile shape variation in the sample and were used as the shape variables in all subsequent analyses. Overjet predicted 21.3% of profile shape in the entire sample ($\eta^2_{overjet} = 0.213$; $p < 0.001$), while the effect of overbite was weaker ($\eta^2_{overbite} = 0.138$; $p < 0.001$). In males, the equivalent effects were 22.6% for

overjet and 14% for overbite, and in females, 25.5% and 13.5%, respectively. Incisor occlusion has a noteworthy effect on profile shape in middle-aged adults. Its impact becomes more significant taking into consideration the large variety of genetic and environmental factors affecting soft tissue profile.

CONCLUSION

Authors found that overjet was related to morphological feature in both the jaws.

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