COMPARISON OF FACIAL ANGULAR MEASUREMENTS BETWEEN MALES AND FEMALES PRESENTING AT A TERTIARY CARE HOSPITAL

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Abstract

Background and Objective: The effectiveness of orthodontic diagnosis and treatment planning is dependent on an accurate assessment of the patient's soft tissue profile. The objective of the study was to compare the facial angular measurements between males and females.

Methods: The study comprised 100 volunteers (50 males and 50 females) ranging in age from 12 to 16 years. The respondents were chosen through convenience sampling technique from orthodontics department of children hospital Lahore. Cephalometric and photographic profile analysis was used, with angular measurements based on standard cephalometric and photographic records taken in natural head position. The study included four factors in total.

Results: The mean cephalometric and photographic naso-frontal angle was 121.05^0 and 121.03^0respectively, where as cephalometric and phographic measurement in females were 122.24^0 and 122.84^0 respectively.

Conclusion: There was no significant difference in angular measurements between two genders.

Keywords: Photographic analysis, Cephalometric analysis, Naso-labial angle, Naso-mental angle, Naso-frontal angle, Naso-facial angle

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Cephalometric and photographic angular measurements are commonly used in orthodontics to assess the skeletal and dental relationships of patients. The accuracy and reliability of these measurements are crucial in treatment planning and evaluation of treatment outcomes. Both methods have their advantages and limitations. However, the effect of gender on cephalometric and photographic angular measurements has been a topic of interest among researchers.

Cephalometric analysis plays a vital role for the treatment planning and evaluation of orthodontic patients. Accurate identification of the anatomical landmarks on cephalograms is crucial for a reliable cephalometric analysis.[1] One commonly used imaging technique is the Lateral cephalometric radiograph in orthodontics. Lateral Cephalometric Radiographs (LCR) capture a Two-Dimensional (2D) projection of the entire craniofacial structures in a sagittal plane. They provide measurable information about the maxilla, mandible, and dentition and their spatial relationships in the anteroposterior and vertical dimensions.[2,3]

Clinical photographs provide the orthodontist with a valuable means to thoroughly examine the Soft-tissue patterns of a patient before the treatment planning phase. They enable the assessment of factors such as lip morphology and tonicity, the smile arc and smile aesthetics from various angles.[4] The diagnostic data obtained through these imaging techniques is highly beneficial for treatment planning, predicting of growth

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and treatment outcomes, and evaluating the effectiveness of orthodontic and surgical procedures.[5]

Several studies have compared angular measurements between cephalometric radiographs and photographs. A study by de Menezes et al. evaluated the accuracy of angular measurements on photographs compared to cephalometric radiographs and found that most measurements were similar, with slight differences in some angles.[6]

Cephalometric radiographs provide a two-dimensional view of the facial skeleton, and angular measurements are taken by identifying specific landmarks on the radiograph. The accuracy and reliability of cephalometric measurements have been well documented.[7] However, the radiographic image may not always reflect the patient's true skeletal relationship due to distortions caused by head position, patient movement, and radiographic technique.[8]

Several studies have investigated the differences in cephalometric and photographic angular measurements between males and females. In a study by Gökçe et al., they found significant differences in some cephalometric measurements between males and females, with males having larger values for the angle of convexity and the facial angle, while females had larger values for the nasolabial angle and the inter-incisal angle.[9] Another study by Abdullah et al. also found significant differences in some photographic measurements between males and females, with females having a larger inter-labial gap and a more acute nasolabial angle.[10] A study by Almeida et al. (2012) found that the nasolabial angle and mento-labial angle measured from facial photographs were highly correlated with those measured from cephalometric radiographs. However, they found that the facial profile angle was not as accurate in photographs as it was in cephalometric radiographs.[11]

Understanding the gender differences in cephalometric and photographic angular measurements can help in providing more accurate treatment planning and evaluation of treatment outcomes. However, additional research is required to gain a comprehensive understanding of these differences and their implications in clinical practice. The aim of this study was to find the differences of facial angular measurements between males and females.

METHODS

It was a cross sectional study and convenient sampling technique was used. Participants who meet the criteria of inclusion were enrolled from The Children Hospital Lahore Orthodontic Department and were asked to give their informed consent.

During this investigation, 50 males and 50 females were photographed and had lateral cephalometric radiographs obtained. On both radiographs and pictures, the naso-labial, naso-mental, naso-facial, and naso-frontal angles were analyzed separately. Photographs with standardized profiles were taken in the natural head position of the patients with reference to a mechanical device having fixed markings on it. The patients were told to look directly at the mirror at eye level. Inclusion criteria was normal angle cases, ANB must be (0-4), patients should be between the ages of 12 and 16, no prior history of craniofacial trauma, craniofacial anomaly is not present, no prior history of orthodontic treatment. Exclusion criteria was cases with high angle and low angle and skeletal class II and III patients. All findings were documented in a standardized proforma, and data were analyzed using SPSS Version 25. For all quantitative variables, standard deviations and arithmetic mean were calculated. Inferential statistics were performed. $P < 0.05$ was considered significant.

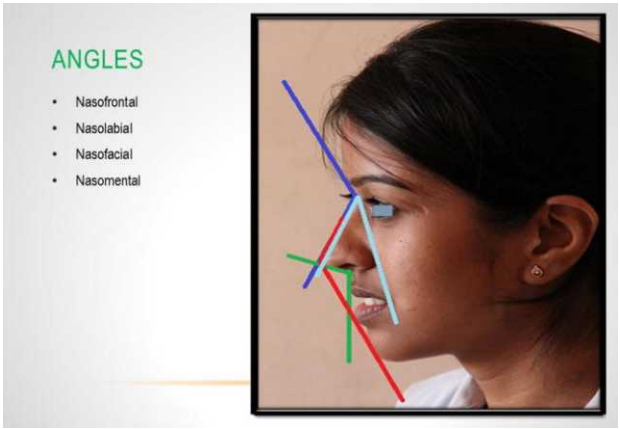

Figure: *Facial Angles*

RESULTS

The following table 1 compares the soft tissue angular measurements for 50 males and 50 females by applying independent t-test. The mean of cephalometric and photographic Naso-frontal angle was 121.05° and 121.03° respectively in males. The mean of cephalometric and photographic Naso-frontal angle was 122.24° and 122.84° respectively in females which are slightly larger than in males. There was no statistically significant difference between males and females in comparison of both cephalometric and photographic Naso-frontal angles.

Table 1: Facial Angular Measurements

Sex	Parameters	Mean	SD	S.E.M	t-value	p-value
Male	Naso-frontal Angle	121.05^0	4.76	0.673	-1.09	0.276
Female	(cephalogram)	122.24^0	6.03	0.853		
Male	Naso-frontal Angle	121.03^0	4.62	0.654	-1.67	0.096
Female	(photograph)	122.84^0	6.05	0.856		
Male	Naso-facial Angle	36.58^0	2.84	0.402	1.54	0.125
Female	(cephalogram)	35.73^0	2.64	0.374		
Male	Naso-facial Angle	36.54^0	2.88	0.408	2.34	0.021
Female	(photograph)	35.24^0	2.66	0.3766		
Male	Naso-labial Angle	97.79^0	6.03	0.853	1.96	0.052
Female	(cephalogram)	95.66^0	4.72	0.667		
Male	Naso-labial Angle	97.88^0	5.92	0.837	1.84	0.068
Female	(photograph)	95.92^0	4.61	0.653		
Male	Naso-mental Angle	124.07^0	3.76	0.532	-2.03	0.044
Female	(cephalogram)	125.69^0	4.17	0.59		
Male	Naso-mental Angle	124.04^0	4.97	0.562	-2.44	0.016
Female	(photograph)	126.04^0	4.19	0.593		

The mean value of photographic Naso-facial angle was 36.54° in males showing larger values than females 35.24° according to table. Slightly significant difference between male and female values of photographic Naso-facial angle was calculated. The mean value of cephalometric Naso-facial angle was 36.58° in males and 35.73° in females. No statistically significant difference was found between males and females when comparing their cephalometric Naso-facial angle values.

The mean of cephalometric and photographic Naso-labial angle was 97.79° and 97.88° respectively in males showing larger values than females. The mean of cephalometric and photographic Naso-labial angle was 95.66° and 95.92° respectively in females. No statistically significant difference was found between males and females when comparing their cephalometric and photographic Naso-labial angles.

The mean value of photographic Naso-mental angle was 126.04° in females showing larger values than males 124.04° according to table. Significant difference between male and female values of photographic Naso-mental angle was calculated. The mean value of cephalometric Naso-mental angle was 124.07° in males and 125.69° in females according to analysis. This time females have slightly larger values than males. There was slightly significant difference between males and females in comparison of their cephalometric Naso-mental angle values.

DISCUSSION

The aimof this study was to identify the average values of the soft tissue facial profile of the population under consideration, While comparing the current results to those of other studies, keep the method and sample characteristics in mind.

The naso-labial angle is determined by the inclination of the upper anteriors. One of the clinically uncertain facial profile criteria is the connection between the nasal base (columella) and the upper lip. The current investigation found no significant differences between the sexes. Legan and Burstone discovered no gender differences in this angle, with both genders having an average angle of 1020 ± 80. In a Caucasian adolescent sample with normal facial appearance, they found a nasolabial angle of 740 ± 80 degrees.[12,13] Similarly, McNamara et al. recorded a male angle of 102.20 ± 80 and a female angle of 102.40 ± 80.[14]

Using standardized photographic records, Yuen and Hiranaka reported an angle of 102.70 ± 110 for males and 101.60±110 for females in Asian teenagers, which is nearly identical to the current finding.[15]

According to Bergman, this angle should be 1020 ± 80 for both orthodontic and surgical correction. It is useful in determining upper lip position and is employed in extraction decisions.[16] Genecov et al. discovered that the angular parameters of the nasal complex were largely stable between the ages of 7 and 17 years.[17] While only a few discoveries of changes in nasal complex development, the overall nasal shape grew by 30-40, which is consistent with the findings of Ferrario et al.[18] Milosevic et al. discovered gender differences in this angle, with a mean of 109.390±7.840 in females and 105.420 ± 9.520 in male.[19] In current study, the value of naso-mental angle for males is 124.070 ± 40 and for female is 1260±40. So there is not significant difference in the values of naso-mental angle between males and females. A less prominent nose in relation to chin is preferable in females and the opposite in males.[20] Almarzooqi et al. evaluated the naso-mental angle in males and females and found that there was no significant difference between them.

Several studies have investigated the differences in naso-facial, naso-frontal, and naso-mental angles between males and females. For instance, a study by Ustuner et al.[11] compared the nasofacial angle in 52 males and 51 females and found that females had a significantly larger nasofacial angle than males. The current study also indicates the same results.

Naso-frontal angle regulates the angulation of the nose on the face, which has a significant impact on facial attractiveness. The current investigation found no significant gender differences. In Caucasians, Epker found no gender difference,[21] whereas Milosevic et al. found a gender difference for this angle. They found that females had a mean value of 139.110 ± 6.350 and males had a mean value of 136.380 ± 6.70. As the study was conducted in one hospital, the results cannot be applied generally to the whole population.

CONCLUSION

Comparing the patient's facial features with established standards for soft tissue facial profiles is crucial, as even minor orthodontic interventions can impact overall facial appearance. The findings indicated that there were no significant variations between genders in the majority of measurements, including the naso-labial angle, naso-mental angle, naso-frontal angle, and naso-facial angle. These measurements hold great significance in assessing and evaluating the aesthetic outcomes of orthodontic procedures.

Ethical Approval:

The ethical Approval was obtained from IERM via letter number 25108/UCHS-CH dated17-04-2023, University of Child Health Sciences, Children Hospital, Lahore.

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