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PHOTOGRAPHIC ANALYSIS OF SOFT TISSUE PROFILE IN PAKISTANI PEOPLE

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Abstract:

Aim: *To determine the soft tissue linear and angular measurements of skeletal class-I patients and gender dimorphism from the selected sample.*

Methods: *This descriptive study was conducted in the department of orthodontics; Nishtar Institute of Dentistry Multan for one-year duration from May 2019 to April 2020. The sample comprised of subjects within age 16 through 20 years. All subjects had Class I dental and skeletal relationships, competent lips with normal over-jet and over-bite. Lateral photographs of all the subjects were taken at natural head position. A total 22 parameters were evaluated which included 8 linear measurements four Canut's linear measurements six linear horizontal measurements four angular measurements.*

Results: *In the study of facial heights [Superior Facial Third (Tri-G), Middle Facial Third (G-Sn), Inferior Facial Third (Sn-Me)], the similarity between the inferior facial third (Sn-Me: men 40.5 ± 0.123 mm and females 39.9 ± 0.09 mm) and the middle facial third was observed. However, in the superior third (Tri-G: males 40.5±3.6 mm and females 39.9±3.1 mm), sexual dimorphism was not found nor were the facial thirds proportional with the other thirds.*

Conclusion: *In conclusion, this profile depends on the age, gender and ethnic group of the person.*

Key words: *orthodontics, soft tissues, occlusion, lateral photograph*

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INTRODUCTION:

Facial aesthetics has been of interest to people of all cultures. The world is full of evidence of what people have been doing since ancient times to make themselves more beautiful and attractive[1-2]. One of the main goals of an orthodontist is to obtain a good functional occlusion and facial aesthetics that has been under pressure for several days. Effective orthodontic treatment involves diagnosis and planning to achieve goals[3-4]. The skeleton of the face and its draping of soft tissues determine the harmony and balance of the face. Orthodontic treatment significantly affects the aesthetics of the face. It is indispensable in clinical practice, where it is used as an aid in treatment planning, with particular emphasis on soft tissue changes after orthodontic treatment. Different researchers have developed the characterization of three known classes of malocclusion, naming classes I, II and III in different populations. These analyzes are used to diagnose and plan treatment in order to improve the functioning and aesthetics of people and achieve facial harmony[5-6]. Researchers developed numerous methods of analysis to interpret diagnostic information, which are provided by a lateral even single variable regarding the soft tissue image. The issue of soft tissue profiles, however, played a minor role in the profile of the majority, and significant research was lacking[7-8]. The analysis of soft tissues is an important condition for obtaining an aesthetic result of orthodontic treatment.

MATERIALS AND METHODS:

This descriptive study was conducted in the department of orthodontics; Nishtar Institute of Dentistry Multan for one-year duration from May 2019 to April 2020. The sample consisted of 16-20-year old, Class I Dental Skeletal, Competent lips, and Normal over-jet and over-bite. Patients with a history of orthodontic treatment, craniofacial disorders, thumb sucking, and facial / tooth trauma were excluded from the study. Lateral photographs of all subjects were taken in their natural head position. A total of 22 parameters were assessed, including eight linear measurements, four Canut's linear measurements, six horizontal linear measurements, and four angular measurements. The lateral facial photograph will be taken under standard conditions by the same operator with the patient's head in a natural position. Each subject stood on a line on the floor, framed by a vertical scale divided in 5-cm segments. The soft tissue landmarks were used superior facial third (Tri-G), middle facial third (G-Sn) and inferior facial third (Sn-Me). Data was analyzed through computer software SPSS-10. Student 't' test was used for comparing males and females and tracing I and tracing II parameters.

RESULTS:

In the study of facial height (Tri-G, G-Sn, Sn-Me), a similarity was observed between the lower third of the face (Sn-Me: males 40.5 ± 0.123 mm and females 39.9 ± 0.09 mm) and the middle third facial. However, in the superior third (Tri-G: males 40.5 ± 3.6 mm and females 39.9 ± 3.1 mm) no sexual dimorphism was found, and the facial thirds were not proportional to the remaining thirds. When analyzing the nose, it was observed that males had a greater length (N-Sn: males 32.2 ± 2.9 mm, and females 33.4 ± 4.3 mm) and nasal prominence (Prn / Sn-Sm: males 15.4 ± 2.3 mm and females 15.2 ± 2.2 mm; Prn to N-Ort: males 15.3 ± 2.6 mm and females 15.2 ± 2.7 mm: al-Prn: male 18.9 ± 2.2 mm and females 17.7 ± 2.4 mm) than females, with statistically significant differences Height of the tip of the nose (Sn-Prn: males 6.8 ± 1.6 mm and females 7.0 ± 2.2 mm) was the only nasal measurement that did not show sexual dimorphism. Analyzing the labial bulge in relation to the Sn-Sm line, it was found that both upper lips (Ls / Sn-Sm: male 9.2 ± 2.0 mm and female 8.1 ± 3.3 mm) and the lower lip (Li / Sn-Sm: males 7.9 ± 2.0 mm and females 6.8 ± 2.3 mm) the difference between the sexual dimorphism was not significant. However, when it comes to the N-Ort line, both the upper lip (Ls-N-Ort line: males 8.9 ± 2.4 mm and females 7.6 ± 2.8 mm) and the lower lip (Li- N-Ort: males 7.6 ± 2.8 mm and females 6.1 ± 2.9 mm) showed a different visibility that was much more noticeable in males. In both cases the upper lip was more forward than the lower lip. The different protrusions of the lips to the baseline could possibly be explained by the different primates in males and females. In this study, all the measurements of the analysis in the chin area showed sexual dimorphism of greater length (Sm-Me: males 16.7 ± 2.7 mm and females 16.2 ± 3.4 mm) and greater enhancement ($P < 0.01$) and mandibular contour (chin pharyngeal angle: $P < 0.01$). There were smaller individual differences in nasolabial angles (men: 99.95 ± 9.49, women: 105 ± 11.58) and sub-muscle (men: 105.21 ± 10.57, women: 102.90 ± 14.02). A slight gender difference was observed in the chin throat angle (men: 100.83 ± 9.55, women 99.71 ± 1.15).

Table 1: Comparison of linear vertical measurements for method error of male and female patients

Photographic parameters	Male patients		P value	Female patients		P value
	Tracing I	Tracing II		Tracing I	Tracing II	
Tri-G	40.5.2±3.6	40.5±3.7	0.123	39.9±3.1	40.1±4.1	0.090
G-Sn	42.5±3.5	42.9±3.7	0.334	43.6±3.6	42.1±3.6	0.791
Sn-Me	41.9±3.6	42.4±3.7	0.251	42.4±3.3	42.0±3.8	0.562
N-Sn	32.2±2.9	33.7±3.2	0.057	33.4±4.3	32.2±3.4	0.731
Sn-Sts	16.8±1.6	15.6±1.3	0.052	16.0±2.3	16.2±1.6	0.032
Sti-Sm	15.7±2.3	14.8±1.0	1.00	14.7±2.4	15.2±1.7	0.029
Sm-Me	16.7±2.7	17.3±3.0	0.93	16.2±3.4	17.7±2.4	0.005
Sn-Prn	6.8±1.6	6.8±1.6	0.287	7.0±2.2	6.9±1.4	0.013

Table 2: Comparison of Canut's linear vertical measurements for method error of male and female patients

Photographic parameters	Male patients		P value	Female patients		P value
	Tracing I	Tracing II		Tracing I	Tracing II	
Prn to Sn-Sm	15.4±2.3	16.2±2.1	0.181	15.2±2.2	16.0±1.5	0.002
Ls to Sn-Sm	9.2±2.0	8.5±2.2	0.843	8.1±3.3	8.8±2.2	0.019
Li to Sn-Sm	7.9±2.0	7.4±1.7	0.806	6.8±2.3	7.7±1.9	0.00
Pg to Sn-Sm	0.5±1.8	1.6±1.2	0.00	1.7±0.4	0.9±0.1	1.00

Table 3: Comparison of linear horizontal measurements for method error of male and female patients

Photographic parameters	Male patients		P value	Female patients		P value
	Tracing I	Tracing II		Tracing I	Tracing II	
Trg-Sn	77.5±7.2	76.4±7.1	0.713	72.3±7.7	73.6±7.5	0.071
Al-Prn	18.9±2.2	19.0±2.0	0.666	17.7±2.4	19.1±2.4	0.001
Prn to N-Ort line	15.3±2.6	15.5±2.3	0.688	15.2±2.7	16.1±2.0	0.005
Ls to N-Ort line	8.9±2.4	7.6±2.3	0.313	7.6±2.8	8.5±2.6	0.010
Li to Ort line	7.6±2.8	6.3±2.5	0.542	6.1±2.9	7.1±2.8	0.030
Pg to N-Ort line	0.04±1.1	1.7±1.6	0.00	0.6±3.0	0.8±1.4	0.113

Table 4: Comparison of angular measurements for method error of male and female patients

Photographic parameters	Male patients		P value	Female patients		P value
	Tracing I	Tracing II		Tracing I	Tracing II	
Nasolabial angle	99.95±9.49	103.48±10.67	0.463	105.6±11.58	97.44±6.86	0.077
Submentolabial angle	105.21±10.57	107.68±10.94	0.026	102.90±14.02	99.08±12.51	0.173
Chin Throat angle	100.83±9.55	101.36±11.99	0.368	99.71±1.15	98.24±8.47	0.378
Chin Neck Throat angle	110.59±7.28	112.80±7.41	0.002	120.14±10.50	120.68±6.49	0.465

DISCUSSION:

In the study of facial height (Tri-G, G-Sn, Sn-Me), a similarity was observed between the lower third of the face (Sn-Me: men 40.5 ± 0.123 mm and women 39.9 ± 0.09 mm) and the middle third facial. as pointed out by Powell and Humphreys. However, Epker found that the middle third was slightly larger (38%) than the worse third (32%)[9-10]. In both cases: males showed greater similarity between facial parts and much greater absolute values than females; this is consistent with the findings of other authors, however, in the higher third (Tri-G: men 40.5 ± 3.6 mm and women 39.9 ± 3.1 mm) no sexual dimorphism was found, and the third parts of the face were not proportional to the rest of the third. Farkas published sex differences (men 58 ± 6 mm and women 51 ± 6 mm) in which the height was also greater in men. It was also shown that the facial depth (Trg-Sn) is significantly greater in males (77.5 ± 7.2 mm) than in females (72.3 ± 7.7 mm)[11-12]. Nanda and Ghosh examined the depth of the face at the tip of the nose (Trg-Prn), observing significant sex differences (men 122 ± 4 mm and women 113 ± 5 mm). On the other hand, it is worth mentioning the high individual variability, with large standard deviations (SD) and the difficulty of measuring the Trg and Tri points. This was reflected in the high error of the method with higher face height and depth. When analyzing the nose, it was observed that males had greater length (N-Sn: males 32.2 ± 2.9 mm, and females 33.4 ± 4.3 mm) and nasal prominence (Prn / Sn-Sm: males 15.4 ± 2.3 mm, and females 15.2 ± 2.2 mm; Prn to N-Ort line: males 15.3 ± 2.6 mm and females 15.2 ± 2.7 mm: al-Prn: males 18 , 9 ± 2.2 mm and females 17.7 ± 2.4 mm) than females, with statistically significant differences. The height of the tip of the nose (Sn-Prn: males 6.8 ± 1.6 mm and females 7.0 ± 2.2 mm) was the only nasal measurement that showed no sexual dimorphism. This discovery coincides with the discovery of Nanda and Ghosh. As far as the reliability of the parameters is concerned, it can be said that in most of the measurements the variability was not excessive (SD = 2-4mm), similar to the error which ranged from 1 to 1.5mm. Analyzing the labial process in relation to the Sn-Sm line, it was observed that both the upper lip (Ls / Sn-Sm: male 9.2 ± 2.0 mm and female 8.1 ± 3.3 mm) and the lower lip (Li / Sn- Sm: men 7.9 ± 2.0 mm and women 6.8 ± 2.3 mm), the difference between the sexual dimorphism was not significant. However, when it comes to the N-Ort line, both the upper lip (Ls-N-Ort line: males 8.9 ± 2.4 mm and females 7.6 ± 2.8 mm) and the lower lip (Li- N-Ort: males 7.6 ± 2.8 mm and females 6.1 ± 2.9 mm) showed a different visibility that was much more noticeable in males. In both cases the upper lip was more forward than the lower lip[13]. The different prominence of the lips relative to the baseline could possibly be explained by the different primates in males and females. The chin height (Sm-Me), analyzed by Park and Burstone, ranged from 30 to 35 mm with no sex differences. In this study, all measurements of the analysis in the chin area showed sexual dimorphism of greater length (Sm-Me: men 16.7 ± 2.7 mm and women 16.2 ± 3.4 mm) and greater enhancement (P <0.01) in females than in males (line Pg-N-Ort: males 0.4 ± 1.1 mm and females 0.6 ± 0.3 mm; Pg / Sn-Sm: 0.5 ± 0.1 mm and females 1.7 ± 0.4 mm). In the presented studies, sexual dimorphism was found in several angles: nasolabial and chin-labial: P <0.01) and the outline of the mandible (chin angle P <0.01). There were smaller individual differences in nasolabial angles (men: 99.95 ± 9.49, women: 105 ± 11.58) and sub-muscle (men: 105.21 ± 10.57, women: 102.90 ± 14.02). A slight gender difference was observed in the chin throat angle (male: 100.83 ± 9.55, women 99.71 ± 1.15). Sexual dimorphism was found for several angles: naso-frontal (GN-Prn: P <0.01), vertical nasal (CmSn / N-Prn: P <0.01), nasal (N-Prn / TV: P <0, 01), nasal ridge (N -Mn-Prn: P <0.05) and mandibular contour (C-Me / G-Pg: P <0.01). [L14arge] individual differences were also observed in the nasolabial and mental-labial angles. There was no significant difference in the lower lip, soft tissue facial angle, and Z angle. The nasolabial angle only reflected the change in the upper lip but could not reflect the features of the facial profile. There is no absolutely perfect nasolabial angle. In general, the nasolabial angle should be greater than 90 degrees for each. The nasolabial and labial-labial angles did not differ significantly between the younger and older age groups. The chin-cervical angle (Sm-Ce) and the thickness of the chin soft tissue at point C (IBM-Sm) showed the largest difference between the ideal subjects (118.0 degrees, 28.0 mm), p <0.001)[15].

CONCLUSION:

The labial, nasal, and chin areas showed sexual dimorphism in most of the parameters we used. Males have larger faces in general, with greater facial heights; longer nasal, labial, and chin lengths, prominence and a greater nasal and facial depth. A proportion of 1:1 between the middle and the inferior facial thirds was observed. There is no markable difference in all parameters, between Tracing I and tracing II. A great variability and a greater sexual dimorphism in the relative measurements to the N-Ort-line were observed. The differences were very marked in the prominence of the lower lip and the chin. The errors were found in facial superior height and facial depth, mainly due to the difficulty in the localization of trichion and tragus points.

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