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Adolescent and Adult Skeletal and Soft Tissue Facial Profiles

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Abstract:

Aim- The aim of this study was to establish the norms for several cephalometric soft tissue measurements and to look at differences in the mean values of these measurements between two age groups (11–14 and 18–25) and two genders.

Methodology-The adolescent sample is made up of 30 individuals, 15 of each gender, ranging in age from 11 to 14. The adult sample is made up of 30 participants, 15 men and 15 women, ranging in age from 18 to 25 years. The two classes that met the requirements of facial equilibrium, class I molar relationship ship, and regular over bite–over jet relationship ship. Tracing a lateral cephalometric radiograph yielded ten skeletal and soft tissue measurements. A descriptive statistic and a student t– test were used to evaluate the results.

Results- There were no major variations between males and females during puberty. Males have higher values for all measurements (except nasolabial and mentolabial angles) during adulthood, but this is not statistically important. The angles of facial convexity, Z– angle, lower lip length, and nasal depth vary greatly between adolescent and adult males, with the adult male having the higher value. In the adult age, female's lower lip length and nasal depth are substantially higher.

Conclusion- Adult males have a straighter facial profile than females. Furthermore, the Z– angle is greater in adult males than in adolescents. Adults had substantially greater nasal depth and lower lip vertical height than children of both genders.

Keywords- Soft tissue profile; Cephalometric; Nasal Dept.

Introduction:

In order to schedule orthodontic care, it is important to consider growth-related changes. Orthodontists are interested in identifying changes in the various components of the craniofacial structures, including the patient's soft tissue profile, since it is necessary to recognize and predict the volume and relative rate

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of growth in different parts of the face (1,2,3).
The primary aim of orthodontic care is to enhance facial esthetics, and the soft tissue profile that results is one predictor of esthetic performance (4–6).Many soft tissue studies of the face have been performed (7, 8), and the changes in soft tissue caused by development have been studied from an across–sectional (9), semi–longitudinal (10), and longitudinal perspective (11). The majority of these studies conclude that there is a sexual dimorphism pattern in the development of facial soft tissue. Kids, on average, have greater overall growth than girls and appear to grow over longer periods of time (12).
The nose develops in a downward and foreward direction during adulthood, with an average annual growth of 2 mm between the ages of 5 and 10 years (13), and the nose tends to develop in a downward and foreward direction during adulthood (14).According to Nanda et al. (12), both genders' upper lip development is completed by the age of 15, and males' average rise in upper and lower lip height is more than twice that of females. Between the ages of 7 and 18, Nanda et al. (12) observed a total increase in soft tissue chin thickness of around 2.7 mm in males and 2 mm in females. Saglam and Gazilerli noticed a similar pattern in males with a greater rise in soft tissue chin thickness (15).
The basic goals of this study were to create norms for several integument variables and to compare the mean values of these measures between two age groups, adolescent and adult samples, statistically.

Methodology:

The present study was done in the Department of Orthodontics and Dentofacial Orthopedics of the Dental College. The Dental institution approved the ethical clearance for the study. All the patients were informed regarding the study, and their consent was obtained. A total of two groups of untreated subjects were chosen. The adolescent subjects were chosen from some primary and intermediate schools. The sample consisted of 30 participants, 15 men and 15 women, ranging in age from 11 to 14. The adult subjects, on the other hand, were chosen from those attending the College of Dentistry. The adult sample included 30 individuals ranging in age from 18 to 25 years old. Balanced facial profile, class I molar relation ship, capable lips, and regular over bite–over jet relation ship were all met by both classes. The data for this analysis came from lateral cephalograms taken with the subject's head in a cephalostat and positioned parallel to the Frankfort horizontal plane, lips closed (Figure-1). Traces of the radiographs were made. Thurow's skeletal landmarks were used to establish the skeletal landmarks (16). The soft tissue landmarks were determined using Chaconas and Bartroff's descriptions (17).
Angle of skeletal convexity (N–A–Pog) (18), angle of soft tissue facial convexity excluding the nose (N'–Sn–Pog') (18), angle of complete facial convexity (N'–Pr–Pog') (18), soft tissue facial plane angle (N'–Pog' to Frankfort horizontal (FH) plane) (19), nasolabial angle (between the tangent to columela of (21).
All sagittal and vertical linear measurements were taken perpendicular to the Frankfort horizontal (FH) plane and parallel to it, respectively. Upper lip length (Sn–St), lower lip length (St–Me'), and nasal depth (Pr–N') were among the linear variables calculated by Zylinski et al., (21).
Descriptive statistics such as mean and standard deviation were used to interpret the results. At p0.05, the disparity between males and females within the same age group and between the two age groups was tested using the Student's t– test.

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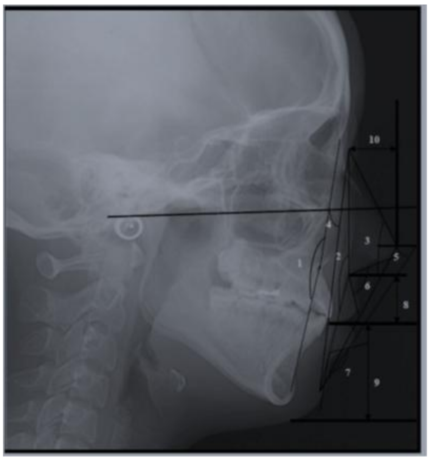

Figure (1): skeletal and soft tissue measurements: 1. N–A–Pog angle, 2. N'–Sn–Pog' angle,3. N'–Pr–Pog' angle, 4. N'–Pog' to FH angle, 5. Z–angle, 6. nasolabial angle, 7. Mentolabialangle, 8. upper lip length, 9. lower lip length, 10. nasal depth.

Results:

Tables 1–4 demonstrate the descriptive and student t–test analyses of the soft tissue profile for the various age groups (1, 2, 3 and 4).

1. Comparison of males and females during puberty-Females had higher values for (N–A–Pog) angle, (N'–Sn–Pog') angle, mentolabial angle, Z– angle, and all linear measurements, but these variations were not significant.As shown in Table 1, males had higher mean values for (N'–Pr–Pog') angle, (N'–Pr–Pog' to FH) angle, and nasolabial angle with no statistical significance (1).
2. Comparison of males and females during maturity-Males with higher mean values for (N–A–Pog), (N'–Sn–Pog'), (N'–Pr–Pog'), (N'–Pog' to FH) angle, Z– angle, upper lip length, and nasal depth. These figures did not have statistical meaning. Although males had significantly longer lips than females, females had significantly shorter lips.Females had higher nasolabial and mentolabial angles, but the variations were not statistically important, as shown in Table (2).
3. Comparison of adolescent and adult males- As shown in Table 3, adult males had significantly higher means for the following variables: (N–A– Pog) angle, (N'–Sn–Pog') angle, Z– angle, lower lip length, and nasal depth than adolescent males. The other variables, on the other hand, were statistically insignificant.
4. Comparison of adolescent and adult females-Adult females have higher mean values for (N'–Sn–Pog') angle, (N'–Pog' to FH) angle, nasolabial angle, mentolabial angle, and Z– angle, but these variations are not statistically important. Meanwhile, as shown in Table-4, there was a statistically significant difference in lower lip length and nasal depth between the two age groups, with adult females having the higher values.

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Table-1: Mean, standard deviation, and t– value for one skeletal and nine soft tissue variables of adolescent males and females.

	Variables	Sex	Mean	SD	t– value	Sig.
angular	N–A–Pog angle	M	174.53	3.13	–.75	.460
		F	175.86	6.10		NS
	N'–Sn–Pog' angle	M	161.90	2.68	.31–	.755
		F	162.46	6.37		NS
	N'–Pr–Pog' angle	M	131.83	3.46	.62	.537
		F	130.93	4.36		NS
	N'–Pog' to FH angle	M	89.06	3.93	.35	.729
		F	88.63	2.74		NS
	Z– angle	M	72.40	4.57	–.908	.372
		F	74.00	5.06		NS
	Nasolabial angle	M	107.40	6.23	.31	.754
		F	106.53	8.58		NS
	Mentolabial angle	M	129.90	11.60	–1.32	.198
		F	134.63	7.57		NS
linear	Sn–St	M	20.60	2.38	–.37	.714
		F	20.90	2.04		NS
	St–Me'	M	44.83	2.75	–.85	.401
		F	45.76	2.75		NS
	Nasal depth	M	22.90	6.10	–.57	.572
		F	24.00	4.23		NS

Table-2: Mean, standard deviation, and t– value for one skeletal and nine soft tissue variables of adult males and females.

	Variables	Sex	Mean	SD	t– value	Sig.
angular	N–A–Pog angle	M	178.70	5.33	2.01	.054
		F	175.13	4.33		
	N'–Sn–Pog' angle	M	166.26	5.40	1.89	.069
		F	162.60	5.20		
	N'–Pr–Pog' angle	M	131.30	4.00	2.04	.051
		F	128.36	3.86		
	N'–Pog' to FH angle	M	91.30	3.74	.28	.776
		F	90.90	3.87		
	Z– angle	M	78.90	5.54	1.11	.275
		F	76.43	6.55		
	Nasolabial angle	M	99.40	14.69	–1.90	.067
		F	109.30	13.74		
	Mentolabial angle	M	133.40	11.18	–1.45	.156
		F	139.20	10.60		
linear	Sn–St	M	21.23	3.33	.37	.714
		F	20.86	1.89		
	St–Me'	M	53.20	3.26	3.41	.002*
		F	48.63	4.02		
	Nasal depth	M	28.73	4.95	.82	.419
		F	27.40	3.88		

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Table-3: Comparisons of group means between adolescent and adult males.

Variables	Adolescent males	Adult males	t– value	Sig.
N–A–Pog angle	174.53	178.70	–2.61	.016*
N'–Sn–Pog' angle	161.90	166.26	–2.80	.011*
N'–Pr–Pog' angle	131.83	131.30	.39	.699
N'–Pog' to FH angle	89.06	91.30	–1.59	.122
Z– angle	72.40	78.90	–3.50	.002*
Nasolabial angle	107.40	99.40	1.94	.067
Mentolabial angle	129.90	133.40	–.84	.408
Sn–St (mm)	20.60	21.23	–.59	.555
St–Me' (mm)	44.83	53.20	–7.58	.000*
Nasal depth (mm)	22.90	28.73	–2.87	.008*

Table-4: Comparisons of group means between adolescent and adult females.

Variables	Adolescent females	Adult fe-males	t– value	Sig.
N–A–Pog angle	175.86	175.13	.38	.707
N'–Sn–Pog' angle	162.46	162.60	–.06	.950
N'–Pr–Pog' angle	130.93	128.36	1.70	.099
N'–Pog' to FH angle	88.63	90.90	–1.84	.075
Z– angle	74.00	76.43	–1.13	.265
Nasolabial angle	106.53	109.30	–.66	.514
Mentolabial angle	134.63	139.20	–1.35	.186
Sn–St (mm)	20.90	20.86	.04	.963
St–Me' (mm)	45.76	48.63	–2.15	.040*
Nasal depth (mm)	24.00	27.40	–2.29	.030*

Discussion:

Total facial convexity increases with age, according to previous research (17, 18). The angle N'– Pr–Pog', which decreases with age, equates to this. This increase in total facial convexity can be attributed to a greater increase in nasal prominence in comparison to the rest of the soft tissue profile as a result of development. This study showed that total facial convexity increases with age in both males and females, which is consistent with previous research.

Adult males appeared to have wider angles of convexity of the facial skeleton and soft tissue except the nose, suggesting a comparatively straighter facial profile. This implies that skeletal and soft tissue prognathism of the chin are linked; a rapid increase in skeletal prognathism would cause the soft tissue chin to protrude, making the soft tissue profile less convex. However, there were no major variations in facial convexity between males and females. This is consistent with the results of Zylinski et al., (21) and Bishara et al (22).

Merrifield (23) discovered that the average Z– angle in the 11 to 15 year old age group was $78^0 \pm 5^0$, with females having higher values than males. He discovered that the average Z– angle in adults is $80^0 \pm 5^0$, with males having higher values than females. This study's results are consistent with Merrifield's analysis.

The upper lip length continues to increase as a result of development until about the age of 14 years, and after complete eruption of the maxillary central incisors, a constant vertical connection ship to the edge of the incisors was preserved. Similar results were reported by Nanda et al. (12), who found that the vertical growth of the upper lip was completed by 15 years for both boys and girls. Graber (24) noticed that girl's lower lips continued to develop past the age of 15 and boys' lower lips continued to grow until they were

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18 years old. This analysis also came to the same conclusion.

Males with a short upper lip at 10 years old are more likely to have a short upper lip at 18 years old, according to slight differences in upper lip length. This finding has a major effect on treatment planning since excessive upper gingiva showing, if present, should be corrected early to create a more desirable tooth/lip relationship ship.

The nasolabial angle narrows with age in men. This is compatible with Abdul Qadir's (25)results. Since the nasolabial angle is created by two lines, one from the nose and the other from the upper lip, both of which are independent of one another, it is difficult to pinpoint the exact cause of the reduction. Measuring the angle alone does not reveal which aspect is responsible for the variability. The nose, the mouth, or both may be involved. This angle increased with age in females, contrary to Geneccove et al., findings (25).

The mentolabial angle is determined by the inclinations of the lower incisors and the direction of the chin. Since females have a more convex facial profile during puberty and adulthood, suggesting a more retruded jaw, this may explain why females in this study had a greater mentolabial angle than males.

From puberty to adulthood, nasal depth increases. This is in accordance with Nanda et al., (12), who found that the median growth curves for males and females run parallel from the age of 7 to 16, the size of the nasal depth is roughly similar, but the curve starts to diverge from the age of 16 to 18, with the male group showing growth acceleration to the female group.

Conclusion:

Adult males have a comparatively straighter facial profile as they grow older (growth), as demonstrated by greater angles of convexity of the facial skeleton, soft tissue except the nose, and the Z– angle. A substantial increase in nasal depth and lower lip length was found in both genders during adulthood.

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