

HOLD AWAY SOFT TISSUE NORMS IN A SAMPLE OF PESHAWAR POPULATION

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ABSTRACT

The objective of this study was to determine soft tissue norms in a sample of Peshawar population. Holdaway soft tissues were determined for 150 individuals (78 males and 72 females) from the lateral cephalograms taken in natural head position. All radiographs were traced and measured by the same investigator. Twelve variables of Holdaway's analysis were determined.

The data were analysed using SPSS version 20. The minimum, maximum, mean and SD were calculated for each variable. Differences between males and females were examined using independent sample t-test. The mean age in this study was 19.18± 3.43 years. Most values in this study were similar to the Hold away soft tissue norms. For H angle, nose prominence, upper lip thickness and basic upper lip thickness there were variation from the Hold away norms. The males and females had almost similar means for soft tissue norms except for H angle, skeletal profile convexity and upper lip thickness and basic upper lip thickness. H angle, nose prominence, upper lip thickness and basic upper lip thickness were differed from Holdaway's norms. Males have relatively prominent upper lip thickness and basic upper lip thickness than do the females. Orthodontist and surgeons should consider these variations in mind while formulating camouflage and surgical orthodontic treatment to achieve optimal esthetics.

Key Words: Holdaway's norms, Cephalometry, Soft tissue, Orthodontics.

INTRODUCTION

Physical appearance is an important feature of face. Interestingly, facial features are usually studied in profile. Various methods have been used to evaluate facial characteristics, such as anthropometry photogrammetry computer imaging and cephalometry. Czarnecki et al¹ (1993) evaluated the perception of facial balance by varying the length of the nose, lip protrusion, and chin development. They found that the interrelationships of these facial features must be in balance in order to achieve facial harmony. The success of orthodontic treatment is frequently related to the improvement gained in the patient's facial appearance, which includes the soft tissue profile and since there is considerable variation in the soft tissue covering the face.² Evaluation of soft tissue analysis during orthodontic diagnosis and treatment planning is very important.^{3,4} Facial harmony and balance is influenced by soft tissue.⁵ Holdaway⁶ stated

that better treatment goals can be set if we quantitate the soft tissue features which contribute to or detract from that 'physical attractiveness stereotypes' which has been ingrained into our culture.

During orthodontic practice, diagnosis is made by comparing cephalometric measurements to standard norms.⁷ These norms are however set for specific ethnic and racial population.⁸ In several studies, soft tissue cephalometric norm for esthetically pleasing profile have been established by various researcher by using cephalometric radiographs.⁹ Different racial groups must be treated differently according to their own norms.¹⁰

According to Hwang et al, attempts have been made to investigate the differences in the faces of various ethnic groups including American blacks,¹¹ Africans,¹² Chinese¹³, Japanese,¹⁴ Koreans,¹⁵ Indians,¹⁶ Saudi Arabians,¹⁷ Mexican-Americans,¹⁸ Brazilians,¹⁹ Puerto Ricans.²⁰ The objective of this study was to determine soft tissue norms in a sample of Peshawar population. It will give us cephalometric soft tissue norms for this population, which will aid in optimal diagnosis and treatment planning of orthodontic cases.

METHODOLOGY

The lateral cephalometric radiographs of 150 individuals (78 males and 72 females) were included in this study. These radiographs were obtained from the

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Department of Orthodontics Khyber College of Dentistry, Peshawar. Their age range was 19-29 years. The criteria used for sample selection included: (1) normal occlusion with bilateral Class I molar and canine relationship with normal overjet and overbite (1-4mm). (2) well aligned upper and lower dental arches with minor rotations and/or spacing (less than 1mm). (3) balanced facial profile, with competent lips, relaxed closed lip relation, and with no excessive protrusion or retrusion of the profile. (4) no previous history of orthodontic treatment or maxillofacial surgery. The cephalometric radiographs were taken using SS White cephalometric machine, each subject was radiographed in the standing position with the head adjusted so that the FH plane is parallel to the floor and the midsagittal plane perpendicular to the floor. All radiographs were traced and measured by the same investigator. The H angle, Soft tissue facial angle, Nose prominence, Upper lip sulcus depth (upper lip curl), Basic upper lip thickness, Upper lip thickness, Upper lip strain, Skeletal profile convexity, Soft tissue subnasale to H line, Lower lip to H line, Inferior sulcus to the H line (lower lip sulcus depth), and Soft tissue chin thickness measurements were analyzed using the definitions provided by Holdaway¹⁰ (Fig 1).

The data were analyzed using SPSS software package (version 20.0). The minimum, maximum, mean and SD were calculated for each variable. The differences between males and females were determined using independent sample t-test.

RESULTS

One hundred & fifty patients were included in the current study in which 72 were females and 78 were males. The mean age in this group was 19.18 ± 3.43 years. Table 1 shows descriptive statistics for Holdaway norms, means, and SD are given. Most of the values in this study were similar to the Holdaway's soft tissue norms. For H angle, nose prominence, upper

lip thickness, and basic upper lip thickness, there were variation from the Holdaway's norms.

Table 2 shows the descriptive statistics stratified by genders. The males and females had almost similar means for soft tissue norms except for H angle, skeletal profile convexity and upper lip thickness. Upper lip thickness and basic upper lip thickness was statistically different between males and females ($P < 0.001$). Upper lip thickness and basic upper lip thickness measurement of the males was larger than those of the females. Soft tissue facial angle, nose prominence, H angle, soft tissue subnasale to H line, lower lip to H line, inferior sulcus to H line, soft tissue chin thickness, and basic upper lip thickness were not statistically different by gender (Table 3).

DISCUSSION

In orthodontic practice, various analysis are used to evaluate cephalometric radiographs. Soft tissue values are often as important as hard tissue values, when assessing the success of orthodontic treatment. Therefore, soft tissue values must accurately reflect ideal norms throughout treatment. It was thought that a study to determine the soft tissue norms in a sample of Peshawar population would be beneficial for orthodontic diagnosis and treatment planning.

The purpose of this project was to define current soft tissue norms in a sample of Peshawar population. An aim of this study was to determine the Holdaway norms for Peshawar individual with esthetically pleasing appearance and ideal skeletal relationship in anteroposterior and vertical direction. It was hypothesized that Holdaway's²¹ soft tissue norms and the Peshawar population values were generally similar, except in H angle, nose prominence, upper lip thickness and basic upper lip thickness measurements.

The H angle is formed by a line tangent to the chin and the upper lip with the NB line. Holdaway⁶ said the

TABLE 1: DESCRIPTIVE STATISTICS OF CEPHALOMETRIC SOFT TISSUE PARAMETERS

Soft tissue parameters	N	Minimum	Maximum	Mean	Std. Deviation	Holdaway norms
Soft tissue subnasale to H-line (mm)	150	2.00	10.00	5.1600	2.02030	5±2
Soft tissue facial angle (degree)	150	89.00	97.00	92.5600	2.33133	91±7
H angle (degree)	150	6.00	22.00	16.6300	4.41593	10 (7-14)
Skeletal profile convexity (degree)	150	2.00	15.00	6.4600	2.70875	0 (-3 to 3)
Soft tissue chin thickness (mm)	150	7.00	17.00	12.5000	1.90504	10-12
Lower lip to H line (mm)	150	-2.00	2.00	.2000	1.12486	0-0.5 (-1 to 2)
Inferior sulcus H-line (mm)	150	3.00	7.00	4.7600	1.02140	3-7
Nose prominence (mm)	150	10.00	20.00	12.6800	2.41965	14-24
Upper lip sulcus depth (mm)	150	1.00	6.00	3.2600	1.10306	3 (1-4)
Basic upper lip thickness (mm)	150	9.00	16.00	12.9400	1.93158	15
upper lip thicknes (mm)	150	8.00	16.00	11.7400	2.11708	13-14

TABLE 2.COMPARISON OF MEAN AND SD DIFFERENCES OF CEPHALOMETRIC SOFT TISSUES MEASUREMENT BETWEEN MALES AND FEMALES

Soft tissue parameters	Gender of patient	N	Mean	Std. Deviation	Std. Error Mean
Facial angle (degree)	male	78	92.6154	2.28621	.25886
	female	72	92.1250	2.42021	.28522
Soft tissue subnale to H-line(mm)	male	78	5.5769	2.23618	.25320
	female	72	4.7083	1.65672	.19525
Lower lip to H-line (mm)	male	78	.2963	1.17689	.22529
	female	72	.0870	1.08357	.22521
H angle (degree)	male	78	17.1224	4.19816	.84703
	female	72	15.4783	4.43357	.78758
Soft tissue chin thickness (mm)	male	78	11.7778	1.64862	.31728
	female	72	10.3910	1.90076	.41650
Skeletal profile convexity (degree)	male	78	8.2593	2.67859	.55329
	female	72	6.3478	2.74984	.32407
Nose prominence (mm)	male	78	12.4075	1.98750	.38215
	female	72	13.0000	2.86039	.59546
Upper lip sulcus depth (mm)	male	78	3.3333	1.14354	.22008
	female	72	3.1739	1.08689	.16809
Inferior sulcus H-line (mm)	male	78	4.8889	.84753	.16307
	female	72	4.6087	1.19765	.25709
Basic upper lip thickness (mm)	male	78	14.4815	2.65785	.39302
	female	72	12.3089	1.79835	.37601
Upper lip thickness (mm)	male	78	12.7037	1.97708	.38049
	female	72	10.6087	1.69864	.35419

TABLE 3: INDEPENDENT T TEST OF HOLDAWAY'S NORMS BETWEEN MALES AND FEMALES

Soft tissue variables	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error difference	95% Confidence Interval	
						Lower	Upper
Facial angle (degree)	1.276	148	.204	.49038	.38430	-.26903	1.24980
Soft tissue subnasale to H-line (mm)	2.685	148	.008	.86859	.32351	.22930	1.50788
Lower lip to H-line (mm)	.654	148	.510	.20934	.33456	-.43621	4.13384
H angle (degree)	1.312	148	.190	1.63245	1.124388	-8.91454	4.32263
Soft tissue chin thickness(mm)	2.126	148	.008	1.84295	.50834	.37744	2.3994
Skeletal profile convexity (degree)	2.730	148	.007	1.92372	.64339	.55247	3.9990
Nose prominence (mm)	-.861	148	1.394	-.59259	.68840	-1.9765	.7953
Upper lip sulcus depth (mm)	.505	148	.617	.15987	.31563	-.47454	.79979
Inferior sulcus H-line (mm)	.966	148	.339	.28019	.29002	-.30294	.86332
Basic upper lip thickness (mm)	3.540	148	.000	2.1729	.48493	1.79620	3.18796
Upper lip thickness (mm)	7.649	148	.000	2.45513	.32098	1.82084	3.08942

ideal face has an H angle of 7-150, which is dictated by the patient's skeletal convexity. H angle values in a sample of Peshawar population were greater to those given by Hold away.¹⁰

According to Hold away, upper lip sulcus depth has an acceptable range of 1-4 mm, with the mean of 3mm being ideal. The measurement of soft tissue subnasale to H line has an acceptable range of 3-7 mm, with mean values 5 mm being ideal. The distance between the lower lip and H line has an acceptable range between 1 and 2 mm, with the ideal between 0 and 0.5. Holdaway¹⁰ also specified that "the contour in the inferior sulcus area should fall into harmonious lines with the superior sulcus form" therefore a range of 3-7 mm will also be acceptable as normal for the inferior sulcus to the H line. According to all given values as stated above, the Peshawar population has ideal values for soft tissue angle, upper lip sulcus depth, soft tissue subnasale to H line, lower lip to H line and inferior sulcus to H line measurement. It was found that approximately all of the Holdaway's soft tissue measurements in males and females were similar to those of this study's sample. However, upper lip thickness and basic upper lip thickness measurements were statistically significant by gender. Upper lip was more protrusive in males than in females in relation to Holdaway's H line. In northern Mexican population the Holdaway soft tissue facial angle was significantly greater in 13-year-old boys than in girls, indicating a more convex soft tissue profile.²² However, in the present study, no statistically significant gender differences were found for soft tissue facial angle for Peshawar population.

According to Holdaway,¹⁰ nose prominence has an acceptable range of 14-24 mm. Holdaway⁵ suggested that nose less than 14 mm is small, and those above 24 mm are large or prominent. In the present study it was found that nose prominence values were less than Hold away norms. In our study upper lip thickness and basic upper lip thickness values are also less than Holdaway's norms. These differences may due to ethnic and genetic variations

CONCLUSION

- 1 H angle, nose prominence, upper lip thickness and basic upper lip thickness were differed from Holdaway's norms.
- 2 Males have relatively prominent upper lip thickness and basic upper lip thickness than do the females.
- 3 Orthodontist and surgeons should consider these variations in mind while formulating camouflage and surgical orthodontic treatment to achieve optimal esthetics.

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| 4 Mohammad Saood: | Data collection |
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