

## Facial Soft Tissue Values in Persian Adults with Normal Occlusion and Well-Balanced Faces

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### ABSTRACT

**Objective:** To determine the mean soft tissue facial profile for Persian adults as determined by the Holdaway analysis.

**Materials and Methods:** Lateral cephalometric radiographs for 62 Persian adults with normal occlusion were used.

**Results:** Persian adults have the same values of Holdaway soft tissue norms except for the skeletal profile convexity, H angle, basic upper lip thickness, and soft tissue chin thickness, which were increased in Persians in relation to Holdaway norms. When comparing men with women, the nose prominence ( $P < .001$ ), basic upper lip thickness ( $P < .001$ ), upper lip thickness ( $P < .001$ ), inferior sulcus to H line ( $P < .001$ ), and soft tissue chin thickness ( $P < .01$ ) were significantly increased in Persian men compared with Persian women.

**Conclusions:** Persian adults differ from Holdaway's soft tissue norms in an increased skeletal profile convexity, H angle, basic upper lip thickness, and soft tissue chin thickness. These are recommended for use when formulating a treatment plan for this ethnic group. (*Angle Orthod.* 2009;79:491–494.)

**KEY WORDS:** Holdaway norms; Persian adults

### INTRODUCTION

Facial harmony and balance are determined by the facial skeleton and its soft tissue drape. Most previous studies were routinely used to evaluate the position of the teeth in relation to the skeletal components. However, sporadic attempts were made to include an element of soft tissue profile assessment, such as Ricketts esthetic plane,<sup>1</sup> Holdaway analysis,<sup>2</sup> and Burstone's soft tissue analysis.<sup>3</sup>

Facial and dental esthetics has become ever increasingly important during the last decade. Recently, the field of orthodontics has experienced a paradigm shift to focus more on esthetics, with specific emphasis on soft tissues around the mouth. Evaluation of facial

esthetics is considered to be subjective, because balance and harmony of facial components do not necessarily mean an attractive face.

Holdaway<sup>4</sup> emphasized that "understanding how important is the psychological development of young persons and how their social development is related to attractiveness and favorable self-image, it is imperative that we take very seriously the matter of giving our patients the best possible balance and harmony of facial lines."

Several attempts have been made to investigate the differences in the faces of various ethnic groups including Caucasian,<sup>5</sup> Mexican American,<sup>6</sup> Chinese,<sup>7–9</sup> Japanese,<sup>9–13</sup> Korean,<sup>14,15</sup> Puerto Rican,<sup>16</sup> and Turkish.<sup>17</sup>

In the literature, very few studies have been carried out to determine soft tissue cephalometric norms for Persians. Those studies focused mainly on the dentofacial patterns rather than on the soft tissue analysis. Hajighadimi et al<sup>18</sup> compared Persian children with Tweed's and Steiner's standards. They found that Persians have a more convex soft tissue profile compared with Tweed's and Steiner's standards, and this result was partly related to the shape of the nose and the form of the lips.

The purposes of this study were (1) to study soft

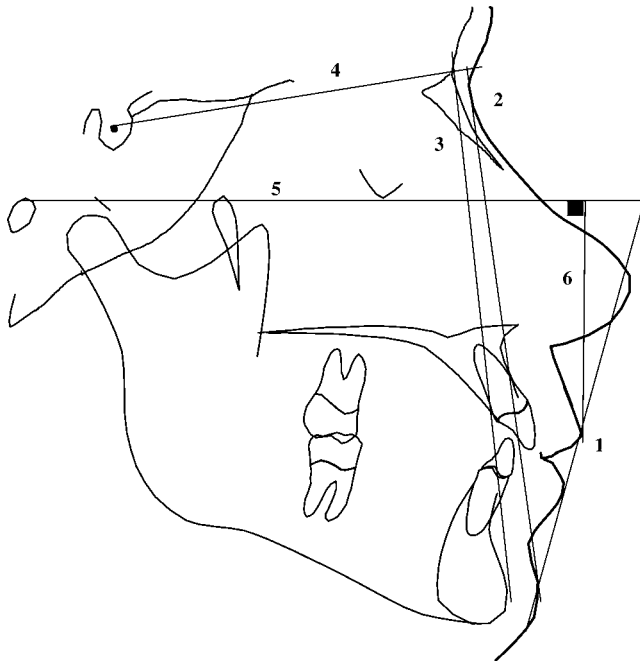
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**Figure 1.** The planes used: (1) H line or harmony line: drawn tangent to the soft tissue chin and the upper lip. (2) Soft tissue facial line: drawn from soft tissue nasion to the point on the soft tissue chin overlying Ricketts suprapogonion. (3) Hard tissue facial plane. (4) Sella-nasion line. (5) Frankfort horizontal plane. (6) A line running at a right angle to the Frankfort plane down tangent to the vermilion border of the upper lip.

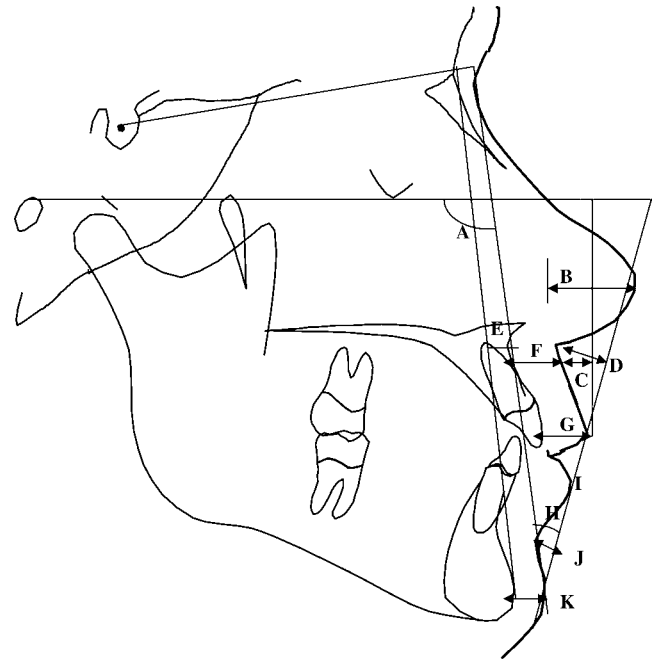
tissue facial profile for Persian adults using the Holdaway analysis, (2) to compare Persian soft tissue values with Holdaway norms, and (3) to determine any sexual differences between the soft tissue facial profile of Persian men and women.

## MATERIALS AND METHODS

Lateral cephalometric radiographs were taken from 62 nongrowing Persian adults (34 women and 28 men). The average age of the women was 21 years, with a standard deviation of 0.5 year, and for the men 22 years with a standard deviation of 0.8 year. All subjects were selected from the dental students of Ajman University of Science and Technology on the basis of the following criteria:

- Persians with Persian grandparents.
- Balanced facial profiles with competent lips.
- Class I occlusion with minimum or no crowding.
- Normal overjet and overbite.
- No history of previous orthodontic treatment.

All cephalometric radiographs were taken with the lips in light contact and teeth in centric occlusion. Tracings of the radiographs were made on 8" × 10" 0.003" matte acetate sheets (Orthotrace, Rocky Mountain Orthodontics, Denver, Colo). All cephalometric radio-



**Figure 2.** The angular and linear measurements: (A) Soft tissue facial angle: the inner angle formed by the intersection of soft tissue nasion–soft tissue suprapogonion line with the Frankfort horizontal plane. (B) Nose prominence: the distance from a line perpendicular to Frankfort horizontal and running tangent to the vermilion border of the upper lip to the tip of the nose. (C) Superior sulcus depth: measured to a perpendicular to Frankfort and tangent to the vermilion border to the upper lip. (D) Soft tissue subnasale to H line: the distance from subnasale to H line. (E) Skeletal profile convexity: measurement from point A to the hard tissue line Na-Pog. (F) Basic upper lip thickness: the distance from a point about 3 mm below point A to the drape of the upper lip. (G) Upper lip thickness: the distance from the labial surface of upper incisors to the vermilion border of the upper lip. (H) H angle: angular measurement of the H line to the soft tissue facial plane. (I) Lower lip to H line: the distance from the lower lip to H line. (J) Inferior sulcus to the H line: measured at the point of greatest incurvation between the vermilion border of the lower lip and the soft tissue chin and is measured to the H line. (K) Soft tissue chin thickness: the distance between the two vertical lines representing the hard tissue and soft tissue facial planes at the level of Ricketts suprapogonion.

graphs were traced by hand by a single author to avoid interobserver variability, and were reviewed by other authors for accurate landmark identification. All measurements were taken to the nearest 0.5 mm.

In this study, two angular and nine linear measurements were made on each radiograph. The landmarks were located according to the definitions of Holdaway.<sup>4</sup> The planes used in this study are depicted in Figure 1, and the angular and linear measurements made are depicted in Figure 2.

Descriptive statistics (mean and standard deviation) were calculated using the SPSS program version 12.0 (SPSS Inc, Chicago, Ill). The results were tabulated and compared with Holdaway norms. To compare the

**Table 1.** Mean and SD of Cephalometric Measurements for 62 Persian Adults

	Holdaway Norms	Mean	SD
Soft tissue facial angle, degrees	91 ± 7	92.13	3.74
Nose prominence, mm	14 to 24	16.72	3.54
Upper lip sulcus depth, mm	3 (1 to 4)	3.51	1.15
Soft tissue subnasale to H line, mm	5 ± 2	5.71	1.95
Skeletal profile convexity, mm	0	1.56	2.07
Basic upper lip thickness, mm	15	16.53	2.44
Upper lip thickness, mm	13 to 14	13.82	2.92
H angle, mm	10 (7 to 14)	15.47	4.21
Lower lip to H line, mm	0 to 0.5 (-1 to 2)	0.96	1.75
Inferior sulcus to H line mm	No norms	5.30	2.28
Soft tissue chin thickness, mm	10 to 12	13.48	2.51

measurements between men and women, an independent samples *t*-test was used.

## RESULTS

The results of this study showed that, except for four variables, Persian adults have the same soft tissue norms as reported by Holdaway (Table 1). The skeletal profile convexity and H angle were larger than Holdaway norms, indicating that Persians have a slightly more convex profile compared with Holdaway norms. Also, the basic upper lip thickness and soft tissue chin thickness were increased in Persians in relation to Holdaway norms.

An independent samples *t*-test was used to compare men with women. Table 2 compares the mean and standard deviation of the cephalometric measurements between men and women. Five of 11 measurements showed significant differences between men and women. These parameters included nose prominence ( $P < .001$ ), basic upper lip thickness ( $P < .001$ ), upper lip thickness ( $P < .001$ ), inferior sulcus to H line ( $P < .001$ ), and soft tissue chin thickness ( $P < .01$ ).

These five values were statistically increased in Persian men when compared with Persian women. The results showed no significant differences between sexes in the other values.

## DISCUSSION

For centuries, facial esthetics has been a subject of interest to people of all cultures. The world is full of evidence of what human beings have done since antiquity to make themselves more beautiful and attractive.

Nowadays, large numbers of Persian adults are seeking orthodontic treatment including orthognathic surgery all over the world, so it is important to determine soft tissue cephalometric norms for this particular ethnic group and to base our treatment plans accordingly.

Few studies have been carried out to define the cephalometric soft tissue norms of Persian adults, and to determine if there are any differences between Persians and whites. In our study, we used Holdaway<sup>4</sup> analysis because it presents the soft tissue more in details with simplicity and directness in mind, and it is widely used for evaluation of soft tissue profiles.

When we compared Holdaway norms with Persian adult values, we found that they were similar except for the skeletal profile convexity, H angle, basic upper lip thickness, and soft tissue chin thickness.

According to Holdaway,<sup>4</sup> 10° is the ideal H angle when the convexity measurement is 0 mm. However, as the skeletal convexity increases, the H angle must also increase if a harmonious drape of soft tissues is to be realized in varying degrees of profile convexity.

Our results showed that the H angle was increased to 15.47° ± 4.21, and the skeletal profile convexity was also increased (1.56 ± 2.07 mm). These results suggest that Persian adults have slightly more convex profiles when compared with Holdaway norms. These

**Table 2.** Comparison of Mean and SD Differences Between Men and Women

	Holdaway Norms	Men (n = 28)		Women (n = 34)		<i>t</i> Value	<i>P</i> Value
		Mean	SD	Mean	SD		
Soft tissue facial angle, degrees	91 ± 7	91.29	3.00	92.82	4.17	1.63	.108
Nose prominence, mm	14 to 24	18.91	2.97	14.91	2.90	-5.34	.000***
Upper lip sulcus depth	3 (1 to 4)	3.66	1.06	3.21	1.16	-0.93	.322
Soft tissue subnasale to H line, mm	5 ± 2	5.93	1.99	5.53	1.92	-0.80	.426
Skeletal profile convexity, mm	0	1.34	2.56	1.75	1.58	0.77	.441
Basic upper lip thickness, mm	15	18.09	2.21	15.25	1.81	-5.57	.000***
Upper lip thickness, mm	13 to 14	15.59	2.90	12.37	2.02	-5.14	.000***
H angle, mm	10 (7 to 14)	14.57	4.21	16.21	4.13	1.54	.130
Lower lip to H line, mm	0 to 0.5 (-1 to 2)	0.57	1.74	1.28	1.72	1.60	.113
Inferior sulcus to H line	No norms	6.63	1.95	4.19	1.93	-4.92	.000***
Soft tissue chin thickness, mm	10 to 12	14.50	2.77	12.54	1.89	-3.30	.002**

\*  $P < .05$ ; \*\*  $P < .01$ ; \*\*\*  $P < .001$ .

findings were similar to the results of Hajighadimi et al<sup>18</sup> who found that Persians have a more convex soft tissue profile compared with Tweed's and Steiner's standards.

In another study carried out to determine the soft tissue cephalometric norms for Japanese adults, similar results were obtained by Alcalde et al,<sup>11</sup> where the H angle was 15.51°, and the skeletal profile convexity was 2.42 mm. Moreover, Hwang et al<sup>14</sup> found that the Kwangju sample has an H angle that was significantly larger than that found in Holdaway values.

The norm value for upper lip thickness for Persians was 16.53 ± 2.44 mm, while soft tissue chin thickness value was 13.48 ± 2.51 mm. Both values were larger than Holdaway norms, but were closer to the values obtained for the Anatolian Turkish adults.<sup>17</sup>

Five of 11 measurements showed a significant difference between Persian men and women. The nose prominence in Persian men was 18.91 ± 2.97 mm and for women 14.91 ± 2.90 mm. Both values were within the normal range provided by Holdaway<sup>4</sup> (14–24 mm).

Persian men have a thicker upper lip compared with Persian women. Holdaway<sup>4</sup> stated that the inferior sulcus contour should fall into harmonious lines with the superior sulcus form, and this is measured at the point of greatest incurvation between the vermilion border of the lower lip and the soft tissue chin as measured to the H line. Our results showed that this value was increased significantly in men (6.63 ± 1.95 mm) compared with women (4.19 ± 1.93 mm). This was attributed to the increased thickness of both the lower lip and soft tissue chin in men compared with women.

The soft tissue chin thickness was significantly larger in men than in women. Similar results were obtained by Basciftci et al<sup>17</sup> who reported that Anatolian Turkish men have a more prominent chin than women.

These differences should be considered when formulating an orthodontic diagnosis and treatment plan for patients of a Persian background.

## CONCLUSIONS

- Persian adults have the same values of Holdaway soft tissue norms except for the skeletal profile convexity, H angle, basic upper lip thickness, and soft tissue chin thickness.
- In comparison of sexes, significant differences were found in nose prominence, upper lip thickness, basic upper lip thickness, inferior sulcus to H line, and soft tissue chin thickness.

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