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Original Article

# Evaluation of soft tissue norms on lateral cephalograms in babol

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## Abstract

**Introduction:** Soft tissue has a prominent role in diagnosis and treatment plan in orthodontics. Facial proportions are measurable on lateral cephalograms. The purpose of this study was to compare the means of the normal soft tissue proportions of babol people with the norms of Caucasians.

**Materials & Methods:** In this cross-sectional study, 100 cases with normal occlusion and proportional facial profile were participated from babol. After taking radiographs and tracing, the soft tissue variables were analyzed to find means and standard deviations. The data were compared with Caucasian's norms using T-test.

**Results:** The norms of following variables in babol people were significantly different from those of Caucasians: facial convexity, nasolabial angle, upper lip thickness, chin soft tissue thickness and protrusion of lower lip.

**Conclusion:** In babol, people have a more convex profile, more prominent nose and lower lip than caucasians.

**Keywords:** Cephalometry, Tissue, Treatment, Orthodontics

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# ارزیابی مقادیر نرمال بافت نرم در رادیو گرافی های لترال سفالومتری درشهر بابل

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## چکیده

**مقدمه:** بافت نرم نقش مهمی در تشخیص و طرح درمان در ارتودنسی دارد. نسبت های صورتی از طریق رادیوگرافی لترال سفالومتری قابل اندازه گیری هستند. هدف از این مطالعه، مقایسه میانگین نسبتهای بافت نرم نرمال در شهر بابل با مقادیر نرمال در کاکازینها می باشد.

**مواد و روش ها:** در این مطالعه مقطعی، ۱۰۰ نفر با اکلوژن و نیم رخ با نسبتهای نرمال ازشهر بابل شرکت کردند. بعد از گرفتن رادیوگرافی لترال سفالومتری و انجام تریسینگ، متغیرها جهت یافتن میانگینها و انحراف معیار آنالیز شدند. داده ها با مقادیر نرمال کاکازین به کمک ، T test مقایسه شدند.

**یافته ها:** اعداد به دست آمده برای متغیرهای زیر با مقادیر نرمال در پروفایل بافت نرم نرمال کاکازینها متفاوت بودند: تحدب صورت، زاویه نازولبیال، ضخامت لب بالا ، ضخامت بافت نرم چانه و بیرون زدگی لب پایین.

**نتیجه گیری:** در بابل، افراد نرمال نیمرخ محدبتر و بینی و لب پایین برجسته تری نسبت به کاکازینها دارند.


**واژگان کلیدی:** سفالومتری ، بافت، درمان، ارتودنسی

## Introduction

Evaluation of soft tissue in patients demanding esthetic procedures such as orthodontics and orthosurgery has a prominent role in diagnosis and treatment planning. Beforehand, hard tissue and teeth were in focus in orthodontics and orthosurgery and now, soft tissue proportions have higher importance. [1, 2] According to the importance of facial proportions in esthetics and patient's expectation, the efforts have led to evaluate the soft tissue proportions. [3] At first, means of soft tissue proportions were driven from Caucasian population and considered as a criterion for comparison in cephalometric analysis. [1, 4- 6] Afterwards, several researches on different ethnics suggested the differences between Caucasian's norms and norms of other races. [7-11] Racial studies evaluated the norms of soft tissue proportions in different Iranian populations. A study in Ahwaz showed a more convex profile and more prominent nose in Khuzestan compared to European standards. Lips and chin are more retruded than nose in this area. [12] Moghbel et al. in Tehran found that facial profile is more convex and chin soft tissue is thicker in Iranian population than Caucasians. [13] There is no published data on the soft tissue norms in babol. Therefore, the purpose of this study was to evaluate the soft tissue proportions of normal facial profile in Babol to drive means in this region and to compare these normative data with norms of Caucasian race.

## Materials &Methods

One hundred of students and adult patients (34 males and 66 females) aged from 20 to 30 years, [8] referred to babol school of dentistry participated in this cross-sectional descriptive- analytical study. All persons were from mazandaran and had normal facial proportions in clinical evaluation, normal class I occlusion, minimal anterior crowding, without history of orthodontics and esthetic procedures and surgeries. After getting informed consent, all cases were referred to one radiologic center with a specific magnification by a single technician. Cephalograms were in neutral head position with lips in rest and teeth in maximum intercuspation. All the steps of tracing and measurement of variables were done by a single orthodontist. According to Holdaway analysis [14] (Fig. 1), Epker's soft tissue relations [15] (Fig. 2) and Legan-burstone soft tissue analysis [4, 5] (Fig. 3), soft tissue variables were measured.

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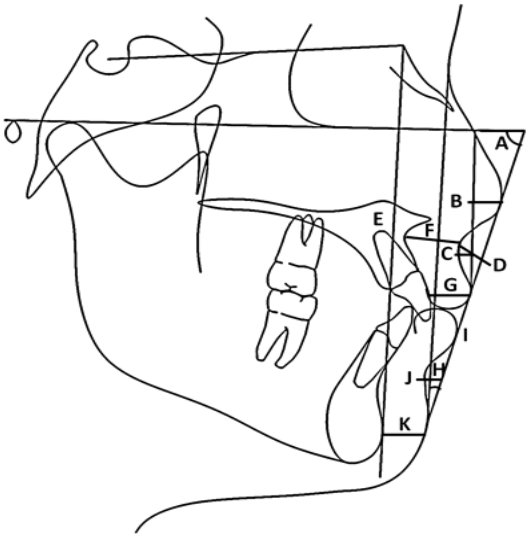


**Fig 1. Holdaway soft tissue analysis measurements. A, soft tissue facial angle; B, nose prominence; C, superior sulcus depth; D, soft tissue subnasale to H line; E, skeletal profile convexity; F, upper lip thickness; G, upper lip strain; H, H angle; I, lower lip to H line; J, inferior sulcus to H; K, soft tissue chin thickness**

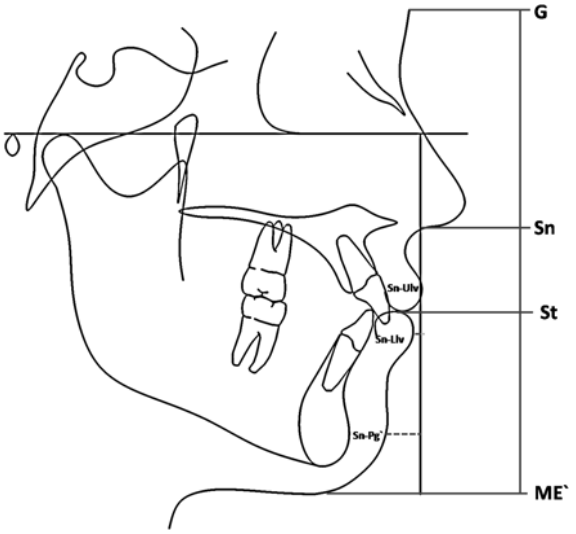


**Fig 2. Epker's soft tissue relations. G, glabella; Sn, subnasale; St, stomion; ME, menton**

All data were analyzed using the statistical package for social sciences (version 11; SPSS Inc., Chicago, Illinois, USA). Means and standard deviations were calculated for each measurement. To compare Mazandaranian and Caucasian norms, independent T-tests were used .P<0.05 was considered as significant level.

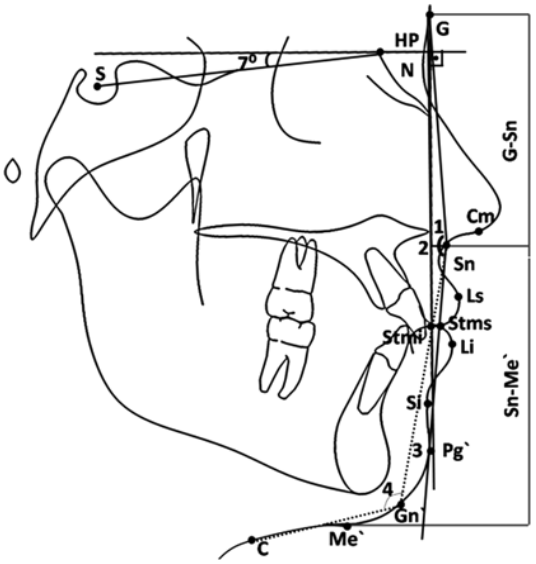


**Fig 3. Legan–Burstone soft tissue analysis. Horizontal reference plane (HP), constructed by drawing a line through nasion (N) 7 degrees up from the sella–nasion line. 1, facial convexity angle (G–Sn–Pg'); 2, maxillary prognathism (G vertical–Sn); 3, mandibular prognathism (G vertical–Pg'); 4, lower face–throat angle (Sn–Gn'–C); vertical height ratio (G–Sn/Sn–Me'), lower vertical height–depth ratio (Sn–Gn'/C–Gn'), nasolabial angle (Cm–Sn–Ls), upper lip protrusion (Ls to Sn–Pg'), lower lip protrusion (Li to Sn–Pg'), mentolabial sulcus (Si to Li–Pg'), vertical lip–chin ratio (Sn–Stms/Stmi–Me'), maxillary incisor exposure (Stms–UI), interlabial gap (Stms–Stmi).**

## Results

Means and standard deviations of each variable in all cases of the study are presented in Table 1.

According to T-test, values in Mazandaranians and Caucasians were not significantly different expect for in soft tissue facial convexity, nose prominence, nasolabial angle, upper lip thickness, lower lip to E line and H line and soft tissue chin thickness( p<0.05).

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**Table 1.Means and standard deviations of soft tissue parameters**

| Soft tissue parameters | Mean | Standard deviation | Max | Min | Number |
|---|---|---|---|---|---|
| Facial convexity | 157.9100 | 5.6409 | 180.00 | 146.00 | 100 |
| Nose prominence | 17.8600 | 3.2004 | 2900 | 11.00 | 100 |
| Nasolabial angle | 104.8900 | 13.3613 | 139.00 | 70.00 | 100 |
| lower vertical height | 69.1200 | 7.0758 | 89.00 | 51.00 | 100 |
| Upper lip length | 20.0900 | 3.4615 | 29.00 | 11.00 | 100 |
| Upper lip thickness | 12.8200 | 2.4137 | 20.00 | 7.00 | 100 |
| Maxillary incisor exposure | 4.1150 | 1.8988 | 9.00 | 1.00 | 100 |
| Interlabial gap | 2.4700 | 0.6506 | 4.00 | 1.00 | 100 |
| Lower lip – menton height | 46.1500 | 5.8592 | 64.00 | 30.00 | 100 |
| Lower lip thickness | 14.4300 | 2.2574 | 20.00 | 8.00 | 100 |
| Lower lip protrusion | 2.5400 | 1.5467 | 6.00 | -2.00 | 100 |
| Sub nasal perpendicular to Chin | 3.1950 | 1.5191 | 9.00 | 0.00 | 100 |
| Lower face throat angle | 117.7600 | 9.5305 | 137.00 | 86.00 | 100 |
| Throat length | 61.5600 | 10.9104 | 85.00 | 28.00 | 100 |
| Lower lip to E line | 2.2500 | 2.0871 | 11.00 | -2.00 | 100 |
| Superior sulcus depth | 2.3150 | 0.8308 | 5.00 | 0.00 | 100 |
| Soft tissue sub nasal to H line | 9.5900 | 2.5824 | 15.00 | 2.00 | 100 |
| H angle | 7.6800 | 1.0999 | 9.00 | 5.00 | 100 |
| Lower lip to H line | 6.4900 | 2.4225 | 12.00 | 2.00 | 100 |
| Chin thickness | 12.0400 | 2.6777 | 20.00 | 4.00 | 100 |
| Middle to lower third | 0.7904 | 0.1117 | 1.10 | 0.50 | 100 |
| Sub nasal- stomion to stomion- menton | 0.6796 | 0.1291 | 1.02 | 0.39 | 100 |
| Vertical height ratio | 1.1554 | 0.1672 | 1.67 | 0.67 | 100 |
| Lower vertical height depth ratio | 1.1475 | 0.1897 | 1.68 | 0.81 | 100 |
| Vertical lip Chin ratio | 0.4751 | 0.2888 | 0.78 | 0.32 | 100 |

## Discussion

Facial esthetics is based on both soft and hard tissues. Soft tissue features such as thickness, length, vertical and horizontal positions and the angles among constructed planes on soft tissue are measurable. The purpose of the present study was to evaluate the soft tissue proportions of normal facial profile

The mean of facial convexity according to Legan-Burstone analysis in Iranian population was 157.91° lower than Caucasian [6] and Japanese norms [8] and expressing more convex profile in north Iranian population. Nose prominence in Holdaway analysis was 17.86 millimeters lower than Caucasian norm. [4, 5] Nose prominence was greater in this study than the norms in Japanese [6], Turkish [16], and Saudi Arabian populations. [8] Nasolabial angle in this research was more obtuse than Caucasians [6] and Brazilian soft tissue norms [9], but was lower than Japanese norm. [7] The differences among these studies indicate the racial difference.

Upper lip length in this research was lower than the norms of Japanese [7] and Turkish population [16] but had no significant difference with Caucasians. [15] Upper lip thickness was lower than norms of Caucasian [6], and Japanese populations. In Mazandaran, people have thinner upper lip, but-there was no significant difference between north Iranian population and Caucasians in terms of lip length. The distance of lower lip to E line was more this research than Caucasians [4, 5] and Japanese adults.[7] In addition, the distance of lower lip to H line was more than Caucasians, [4, 5] indicating more prominent lower lip in north Iranian population.

Thickness of chin soft tissue was more in mazandaranians than Caucasians [4, 5] but lower than norm in Japan. [7] Because the number of males and females was not the same, the comparison of the soft tissue norms between sexes was impossible; therefore, it

is suggested to compare the norms between two sexes in further studies.

## Conclusion

In comparison with Caucasians, people in Mazandaran have a more convex profile, greater nasolabial angle, more prominent lower lip, thicker chin soft tissue and shorter upper lip.

**Conflict of interest:** There is no conflict of interest.

## Authors' Contributions

The study was designed by Manouchehr Rahmatikamel and Valiollah Arash. The study data were collected by Abbasali Ostadrahimi. Analysis and interpretation of data, drafting of the manuscript and critical revision of the manuscript for important intellectual content were performed by Abbasali Ostadrahimi and Reza Ghorbanipour. Study supervision was conducted by Manouchehr Rahmatikamel.

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