

# The effect of ethnicity on facial anthropometry in Northern Iran

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## ABSTRACT

**Introduction:** The evaluation and measurement of human body dimensions are achieved by physical anthropometry. Cephalometry is a branch of anthropometry science in which the head and face anatomical dimensions are measured. This research was conducted in view of the importance of anthropometric indices of the face in forensic medicine, surgery, paediatrics and medical imaging.

**Methods:** This descriptive and cross-sectional study was set up to determine and compare the face shapes in Fars and Turkman ethnic groups of 808 normal 17- to 20-year-old males and females in Gorgan, North Iran (Fars group 407, male 200 and female 207; Turkman group 401, male 198 and female 203). The length and width of faces were determined by using classic cephalometry technique with Martin spreading callipers, and the shape of faces in the ethnic group of Fars and Turkman in both sexes was compared.

**Results:** The dominant type of face shape in both the native Fars and Turkman females was euryprosopic (37.7 and 51.7 percent, respectively). The dominant type of face shape in the native Fars and Turkman males was mesoprosopic (44 and 38.4 percent, respectively).

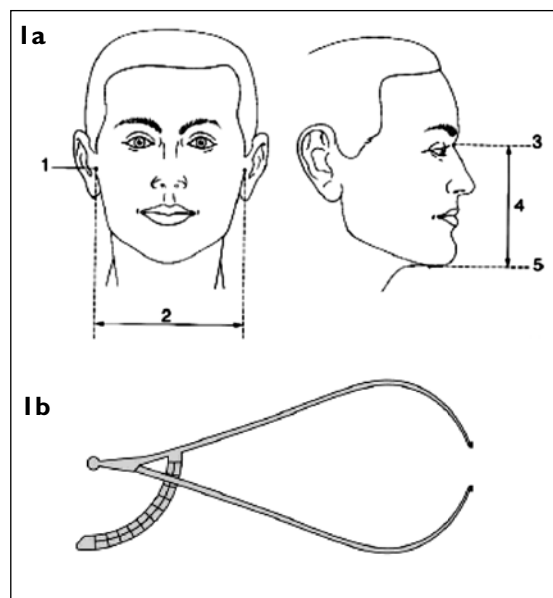
**Conclusion:** This study determined the possible effect of ethnicity on the diversity of face shapes in young males and females in this region.

**Keywords:** cephalometry, facial anthropometry, prosopic index

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## INTRODUCTION

Studying intra- and interpopulation variations in different morphological characters have long been an interest of anthropologists.<sup>(1)</sup> The evaluation and measurement of human body dimensions are achieved by physical anthropometry.<sup>(2,3)</sup> The dimensions of the human body are affected by ecological, biological, geographical, racial,



**Fig.1** Illustrations show (a) how the face length and face width were measured, (b) by using Martin spreading callipers. 1: zygoma; 2: face width; 3: nasion; 4: face length; 5: gnathion

gender and age factors.<sup>(4-7)</sup> On the basis of the above factors, anthropometrical studies have been conducted on the age, gender and racial groups in certain geographical zones.<sup>(4,8-10)</sup> Cephalometry is one of the important parts of anthropometry, in which the dimensions of the head and face are measured. Cephalometric results are used in forensic medicine, plastic surgery, oral surgery, paediatrics, dentistry, and diagnostic knowledge between the patient and normal populations.<sup>(2)</sup>

Although anthropometric studies of newborns, other age groups and their relationship in health and disease have been achieved, there is currently a background for research in different geographical and racial groups. Despite previous determinations of the shapes of faces in newborns in our area,<sup>(10)</sup> there has not been any documented study on 17–20-year-olds in this area. The present study aimed at determining the normal range of face shapes in the youths aged 17–20 years in the native Fars and Turkman ethnic groups in the southeast of the Caspian Sea border.

## METHODS

This study was conducted in Gorgan, North Iran. The total population in Gorgan is 200,000, and this research was

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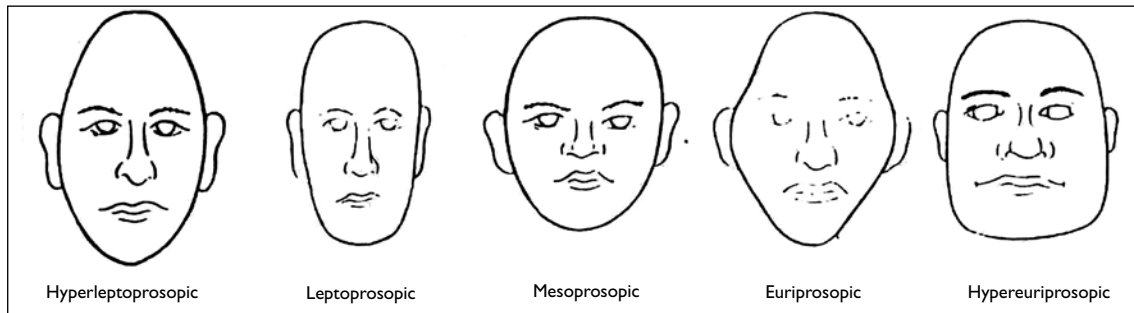


Fig. 2 Illustration shows the different types of face shapes.

done on 808 normal young (17–20 years of age) male and female subjects with randomised selection (Fars group 407, male 200 and female 207; Turkman group 401, male 198 and female 203). The dominant population in Iran is native Fars, and there are some minority ethnic groups such as Turkman in the North, Kord in the West, Sistani and Baluchi in the East of Iran. In the Turkman group, the Turkman people have been living in this area for more than two centuries, previously emigrated from central Asia. The Turkman people only marry among themselves due to religious and ethnic reasons. They are therefore almost a “pure” ethnic group. For the native Fars group, the native Fars were selected from three generations who have lived in this region.

The study was performed with the understanding and consent of each subject. The face measurements, determined with Martin spreading callipers (Fig. 1b), included:

- Face length = nasion – gnathion height (Fig. 1a-4).
- Face width = bizygomatic breadth (Fig. 1a-2).
- Prosopic index (PI) =  $\frac{\text{Face length}}{\text{Face width}} \times 100$

The above index was determined on the basis of international anatomical descriptions.<sup>(4)</sup> Based on this index, the types of face shapes were categorised according to Banister’s classification<sup>(2)</sup> (Fig. 2):

Face shape	PI range (%)
Hypereuriprosopic (very broad face)	≤ 79.9
Euriprosopic (broad face)	80–84.9
Mesoprosopic (round face)	85–89.9
Leptoprosopic (long face)	90–94.9
Hyperleptoprosopic (very long face)	≥ 95

The data for each person was recorded and then analysed by EPI 6. To determine the morphological indices in each ethnic group, we used the chi-square test, and for comparison of the means of the anthropometric measurements, Student’s *t*-test ( $p = 0.05$ ) was used.

## RESULTS

The findings of this study are depicted on Tables I and

II. The mean and standard deviation (SD) of the PI in Turkman males and females were  $87.25\% \pm 5.18\%$  and  $81.48\% \pm 5.28\%$ , respectively. The mean and SD of the PI in Fars males and females were  $88.22\% \pm 5.21\%$  and  $84.48\% \pm 5.85\%$ , respectively. The dominant type of face shape in both native Fars and Turkman females was euriprosopic (37.7% and 51.7%, respectively). The dominant type of face shape in both native Fars and Turkman males was mesoprosopic (44% and 38.4%, respectively). There were no significant gender and racial differences between the dominant types in the two groups. The rare type of face shape was hyperleptoprosopic (5.8%) in the native Fars females and leptoprosopic (3%) in Turkman females. The rare type of face shape in the native Fars males was hyperleptoprosopic and hypereuriprosopic (4% each) and in Turkman males, it was hypereuriprosopic (8.6%).

## DISCUSSION

Our results showed that the dominant type of face shape in both the native Fars and Turkman female groups was euriprosopic, and the rare types were hyperleptoprosopic and leptoprosopic, respectively. On the other hand, the dominant type of face shape in both the native Fars and Turkman male groups was mesoprosopic, and the rare types of face shapes were hyperleptoprosopic and hypereuriprosopic in the native Fars and hypereuriprosopic in the Turkman male groups.

In another study (2003) in Northeast Iran, the PI for Fars-Gorgani and Turkman baby boys were  $71.19\% \pm 10.89\%$  and  $78.15\% \pm 10.78\%$ , respectively. Dominant and rare types in the Turkman male newborns as well as in the Fars male newborns were hypereuriprosopic (34.60% Turkman and 71.9% Fars) and hyperleptoprosopic (0.90% Turkman and 2.5% Fars), respectively.<sup>(10)</sup> It was interesting to note that in this region, the dominant face shape was hypereuriprosopic in both the male Fars and Turkman newborns while it was mesoprosopic in both Fars and Turkman adults.

In a previous study in 2005 on female newborns, the

**Table I. The distribution of face shapes in 17–20-year-old females in the Fars and Turkman groups.**

Face shapes	No. (%) Fars	No. (%) Turkman	p-value
Hypereuryprosopic	43 (20.8)	71 (3.5)	0.001
Euryprosopic	78 (37.7)	105 (51.7)	0.004
Mesoprosopic	46 (22.2)	14 (6.9)	0.000
Leptoprosopic	28 (13.5)	6 (3)	0.000
Hyperleptoprosopic	12 (5.8)	7 (3.4)	NS
Total	207 (100)	203 (100)	

NS: not significant

**Table II. The distribution of face shapes in the 17–20-year-old males in the Fars and Turkman groups.**

Face shapes	No. (%) Fars	No. (%) Turkman	p-value
Hypereuryprosopic	8 (4)	17 (8.6)	0.059
Euryprosopic	32 (16)	53 (26.8)	0.09
Mesoprosopic	88 (44)	76 (38.4)	NS
Leptoprosopic	64 (32)	34 (17.2)	0.001
Hyperleptoprosopic	8 (4)	18 (9.1)	0.04
Total	200 (100)	198 (100)	

NS: not significant

mesoprosopic type (36.01%) and hyperleptoprosopic type (1.89%) were respectively dominant and rare in the Turkman newborns, while they were hypereuryprosopic (71.22%) and hyperleptoprosopic (4.24%), respectively, in native Fars newborns.<sup>(11)</sup> These points indicate that the form of face under ageing can change. In Noori Mugahi et al's study, the mean and SD of PI was 86.79%  $\pm$  5.87% and 86.53%  $\pm$  6.76% for Sistani and Baluchi subjects, respectively. According to the PI, the dominant face type among Sistani subjects was the euryprosopic type (42.6%). In the Baluchi group, the dominant face type was also euryprosopic (39.2%).<sup>(12)</sup> These findings differed from our research. In Heidari et al's study, the PI was significantly different in Sistani (Fars) and Baluchi women, and the dominant face type in Sistani (Fars) and Baluchi women were euryprosopic, with a statistically significant difference between them. The rare types were hypereuryprosopic and hyperleptoprosopic in the Sistani and hyperleptoprosopic in the Baluchi groups.<sup>(13)</sup> These findings also differed from our research.

Our findings were similar to Farahani and Emami's study in Tehran, Iran. They reported that the dominant type of face shape of males aged 19–20 years was mesoprosopic.<sup>(14)</sup> Also, our findings differed from Farahani and Abolhasani's study in Kerman, Iran. In their study, the dominant type of face shape of females (16 years of age) was mesoprosopic,<sup>(15)</sup> whereas in our study, the dominant type of face shape in the native Fars female group was euryprosopic. Our findings resembled Mehran-nia's study in Kermanshah, Iran. Her finding about face shapes in adult males (aged 16–55 years) were similar to that of our male Fars group.<sup>(16)</sup>

Ghosh and Malik's study on the Indian population reported that the hypereuryprosopic and euryprosopic types of facial forms are present in the highest and equivalent percentages in Santhals. However, females are generally hypereuryprosopic, while males are euryprosopic in their total facial index. It reflects that Santhal females have a relatively broader face than their male counterparts. The hyperleptoprosopic face is the rarest type of facial form in both genders. The gender difference is statistically significant in their total facial index.<sup>(11)</sup> It seems that the Iranian people in our area have a globular face, compared to the Indian population.

The study on the face shapes in different parts of Iran indicates that the geographical factor, similar to ethnical factor, can affect the form of the face. Normally, various facial types are encountered in every population so that a certain number of people have thin, broad or small faces. In children, the PI is lower than in the adults and through growing up, they gain a longer and narrower face.<sup>(10,13)</sup>

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