



# Facial Index of Tehran University of Medical Sciences' Medical Students; an Anthropometric Study

## ARTICLE INFO

### Article Type

Original Research

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### How to cite this article

Dodangheh M, Mokhtari T, Mojaverrostami S, Nemati M, Zarbakhsh S, Arabkheradmand A, Hassanzadeh Gh. Facial Index of Tehran University of Medical Sciences' Medical Students; an Anthropometric Study. GMJ Medicine. 2025;4(1):13-17.

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### Article History

Received: August 12, 2024

Accepted: December 15, 2024

ePublished: February 3, 2025

## ABSTRACT

**Aims** Facial anthropometry is useful in individual identification and reconstructive surgery. In the present study, we aimed to determine the facial characteristic of the Iranian population through anthropometric study.

**Materials & Methods** In a cross sectional study, 200 (100 male and 100 female) volunteer medical students (aged 20-25 years) of Tehran University of Medical Sciences were selected. The facial variables including total facial height, upper facial height and facial width were measured and accordingly the total facial index and upper facial index were calculated. The data were analyzed using statistical software (SPSS).

**Findings** The mean age of subjects was 22.97±1.12 years. The mean total facial height, upper facial height, facial width, total facial index, and upper facial index were 11.155cm, 7.05cm, 11.68cm, 95.75 and 60.55, respectively. The most common types of face were hyperleptoprosopic (54%) and hyperleptene (54%). There were significant differences in total facial height ( $p<0.0001$ ), upper facial height ( $p<0.0001$ ), facial width ( $p=0.02$ ), total facial index ( $p<0.0001$ ), and upper facial index ( $p<0.0001$ ) between males and females.

**Conclusion** The most frequent face type is hyperleptoprosopic in Iranian population. Additionally, the values of facial characteristics are higher in males than females. So, sexual dimorphism was recorded according to the facial measurements of Iranian population which can be considered in the reconstructive surgeries.

**Keywords** Anthropometry; Face; Facial Index; Iranian Population

## CITATION LINKS

[1] Anthropometric study of nasal index in Hausa ethnic population of ... [2] Facial anthropometric norms of the young Iranian ... [3] Comparative anthropometric analysis of facial dimensions and types in Qazvin, Iran ... [4] Automated craniofacial landmarks detection on 3D image using geometry characteristics ... [5] Estimation of stature from the anthropometric measurement of lower ... [6] Effect of stature and other anthropometric parameters on eye size and refraction in a population-based study of ... [7] The application of anthropometric indices in forensic photography: Three ... [8] The value of the anthropometric parameters of the tibia in the forensic identification of the Iranian population ... [9] Craniofacial anthropometric norms of Malaysian ... [10] Anthropometric characteristics of craniums in residents of Qazvin, Iran and Dera Ghazi Khan, Pakistan ... [11] Stature estimation from facial measurements in medical students of Tehran university of Medical Sciences ... [12] Predictive value of craniofacial and anthropometric measures in obstructive ... [13] Anthropometric and craniofacial sexual dimorphism in obstructive sleep apnea patients ... [14] Craniofacial characteristics of thalassemia major ... [15] Craniofacial anthropometric analysis in Down ... [16] Craniofacial anthropometric analysis in Down's syndrome ... [17] Nasofacial anthropometric study among students of Shiraz university of medical sciences ... [18] Nasofacial anthropometry of adult Bini tribe in ... [19] Anthropometric and aesthetic analysis of the Indian American ... [20] Stature estimation from forearm length: An anthropological study ... [21] Stature estimation based on fingers anthropometry in ... [22] Facial, upper facial, and orbital index in Batak, Klaten, and Flores students of ... [23] Relationship between pterygopalatine fossa volume and cephalic and upper ... [24] Correlation between morphological facial index and canine relationship ... [25] Determination of stature from upper arm length in medical ... [26] A study of facial index among Malay ... [27] A study on measurement and correlation of cephalic and facial ... [28] Before we are born: Essentials of embryology and birth ... [29] The effect of ethnicity on facial anthropometry in Northern ... [30] Facial indices in Chinese ethnic students ... [31] Anthropometric measurements of the external nose in 18-25-year-old Sistani and Baluch aborigine women in the ... [32] Nasofacial morphometric analysis for nasal ... [33] A study of cephalic index and facial index in Visakhapatnam ...

## Introduction

Anthropometric studies are scientific methods and techniques for displaying different measurement and observation on the human being as well as skeleton [1]. It is known as an applicable branch of scientific studies which deals with these type of measurements [2]. This is performed in two forms of direct measurements and indirect via radiography, magnetic resonance imaging (MRI), computed tomography (CT), ultrasonic methods [3, 4].

Anthropometry is crucial to determine anthropometric measurements for each specific population due to the genetic and environmental influences [4-6]. Numerous studies have introduced several acceptable usages of the anthropometry in medical and forensic sciences [7, 8]. Craniofacial anthropometry is a subgroup of anthropometry, which is associated with the anatomical measurements of the face and head [9, 10]. Facial anthropometry has an important role in cosmetic surgeries, orthogenetic surgeries and forensic medicine to identify the sex and age [11].

These characteristics have been introduced as predictive values in obstructive sleep apnea (OSA) [12, 13]. Additionally, the craniofacial characteristics have been determined in different patient groups such as patients with thalassemia, Down syndrome, etc [14-16].

To use facial anthropometry in cosmetic surgery or forensic medicine, anthropometric data for each populations needs to be determined; because of anatomical differences which existed between the different populations and sex groups [17]. Several studies have reported the population differences in anthropometric measurements [18, 19]. Besides, our previous studies have confirmed the population differences in Iran [17, 20, 21].

Knowledge on facial measurements can help scientists in different aspects, including individual identification of decomposed body, appropriate and symmetric design of face reconstructive surgery and improving the result of rhinoplasty [11]. To compare and distinguish the face shapes, different anthropometrical indices have been introduced, such as Total Facial index (TFI), Upper facial index (UFI), Nasal index and Orbital index [22]. TFI and UFI are the two most common and reliable indices which are used in the facial anthropometric studies [23, 24]. According to the TFI, the shape of the face is divided into 5 types; Hypereuryprosopic (TFI:  $\leq 79.9$ ), Euryprosopic (TFI: 80.0-84.9), Mesoprosopic (FI: 85.0-89.9), Leptoprosopic (TFI: 90.0-94.9) and Hyperleptoprosopic (TFI:  $\geq 95.0$ ) [22].

Also, according to the UFI, the skull shape is divided into 5 types; Hypereuryene (UFI:  $\leq 49.9$ ), Euryene (UFI: 45-49.9), Mesene (UFI: 50-54.9), Leptene (UFI: 55-59.9) and Hyperleptene (UFI:  $\geq 60.0$ ) [22].

Considering the importance of the subject there is little information available on the facial

anthropometry measurement of Iranian population. The aim of this study was to indicate the facial and upper facial indices among medical students of Tehran University of medical sciences. Also, the distribution of different face types of the target population was determined.

## Materials and Methods

In a cross sectional study, 200 subjects from Tehran University of Medical Sciences (age range of 20-25 years old) were randomly selected from the volunteer students. This study was approved by the ethical committee of Tehran university of Medical Sciences (IR.TUMS.MEDICINE.REC.1396.3659).

All medical students with the age of 20 to 25 years studying at Tehran University of Medical Sciences in 2018 with normal craniofacial configuration were included, and all subjects with any craniofacial abnormalities such as trauma, congenital malformation, as well as subjects with facial plastic surgery were excluded. Each subject was asked to sign an informed consent form.

To calculate Total Facial index (TFI) and Upper facial index (UFI), we firstly measured the total facial height (TFH; distance between Nasion and Gnathion), upper facial height (UFH; distance between Nasion and Prosthion) and facial width (FW; distance between two Zygions) using a standard spreading caliper according to the facial landmark points was listed as follows:

Nasion: the midpoint of the nasofrontal suture.

Gnathion: Midpoint on the lower border of the mandible.

Zygion: Most lateral point of the zygomatic arch.

Prosthion: most anterior point in the midline of the alveolar process.

FI was calculated by dividing the facial height by the facial width multiplied by 100 [17]. UFI was calculated by dividing the upper facial height by the facial width multiplied by 100 [22]. Finally, the distribution of different face and skull types among the target population in both sexes were demonstrated.

**Table 1.** Face classification based on total facial index and upper facial index

Face classification	Facial Index
Hypereuryprosopic	$\leq 79.9$
Euryprosopic	80-84.9
Mesoprosopic	85-89.9
Leptoprosopic	90-95.9
Hyperleptoprosopic	$\geq 95$
Face classification	Upper Facial Index
Hypereuryene	$\leq 44.9$
Euryene	45-49.9
Mesene	50-54.9
Leptene	55-59.9
Hyperleptene	$\geq 60$

The statistical analysis was done by using SPSS 22 software. The differences between men and women were carried out by using independent t test.

## Findings

In this study, 200 volunteer medical students (100 males and 100 females) from Tehran University of Medical Sciences were selected. The mean age of subjects was  $22.37 \pm 3.06$  (ranged from 20-25 years). The results consisting of the statistical analysis with respect to the measurement of facial variables such as TFH, UFH, FW, TFI and UFI were summarized in Table 2.

**Table 2.** Basic descriptive statistic of facial anthropometric characteristics among the medical students of Tehran University of Medical Sciences

Parameters	Mean	SD	Min	Max
Age (Year)	22.97	1.12	20	25
Total Facial Height (cm)	11.155	0.982	8.850	13.100
Upper facial height (cm)	7.05	0.55	5.54	8.81
Facial Width (cm)	11.68	0.71	8.31	13.93
Total Facial Index	95.75	8.80	77.29	123.35
Upper Facial Index	60.55	5.58	46.79	82.07

Mean age was compared between males and females and no significant difference was observed in the mean age of sex groups ( $p=0.012$ ; Table 3).

**Table 3.** Comparison of the facial anthropometric measurements of males and females among students of Tehran University of Medical Sciences, Iran

Parameters	Male	Female	p Value
Age (Year)	$22.97 \pm 1.12$	$22.77 \pm 1.76$	0.12
Total Facial Height (cm)	$11.92 \pm 0.58$	$10.39 \pm 0.65$	<0.0001
Upper facial height (cm)	$7.33 \pm 0.38$	$6.77 \pm 0.56$	<0.0001
Facial Width (cm)	$11.79 \pm 0.62$	$11.56 \pm 0.78$	0.02
Total Facial Index	$101.26 \pm 6.05$	$90.24 \pm 7.60$	<0.0001
Upper Facial Index	$62.31 \pm 4.25$	$58.80 \pm 6.20$	<0.0001

The most frequent face type was related to hyperleptoprosopic type in male group and equally mesoprosopic and leptoprosopic in female group (Table 4).

**Table 4.** Distribution of facial classifications based on total facial index in all, male and female medical students

Parameters	Total		Male		Female	
	No.	%	No.	%	No.	%
Hypereuryprosopic	9	4.5	0	0	9	9
Euryprosopic	13	6.5	1	1	12	12
Mesoprosopic	29	14.5	0	0	29	29
Leptoprosopic	41	20.5	13	13	28	28
Hyperleptoprosopic	108	54	86	86	22	22

The most frequent face type was related to hyperleptene type in both sexes (Table 5).

**Table 5.** Distribution of facial classifications based on Upper facial index in all, male and female medical students

Parameters	Total		Male		Female	
	No.	%	No.	%	No.	%
Euryene	5	2.5	0	0	5	5
Mesene	30	15	5	5	25	25
Leptene	57	28.5	24	24	33	33
Hyperleptene	108	54	71	71	37	37

There were strong significant correlations between TFH and UFH ( $r=0.743$ ;  $p<0.0001$ ), between TFH

and TFI ( $r=0.76$ ;  $p<0.0001$ ), and between UFH and UFI ( $r=0.738$ ;  $p<0.0001$ ; Table 6).

**Table 6)** The correlation between facial measurements obtained from medical students

Parameters	5	4	3	2	1
1- Total Facial Height	0.432	0.76	0.292	0.743	1
2- Upper facial height	0.738	0.604	0.160	1	
3- Facial Width	-0.541	-0.393	1		
4- Total Facial Index	0.527	1			
5- Upper Facial Index	1				

## Discussion

In the present study, the facial anthropometric features of 200 medical students from Iranian population were evaluated. Anthropometry is known as the human individual measurements [25] which is essential in reconstructive surgery and forensic identification [26]. Human facial contour has always been an attractive topic for artists, anthropologists, anatomists, and plastic surgeons [27]. Face is developed from different bony structures, in which its final characteristics depend mainly on the changes in the proportion and position of these facial components [28]. It has been confirmed that the development and growth of humans are affected by different factors such as sex, race, age geography, and geocology [29, 30]. Each population has special features for example in their facial dimensions which are important for identification of an individual and as well in the operational planning for patients with facial defects due to tumor, trauma, or congenital malformations [28].

Based on our findings, the mean TFH, UFH, FW, TFI and UFI of medical students was 11.155 cm, 7.05 cm, 11.68 cm, 95.75 and 60.55, respectively. Additionally, the most frequent face class was hyperleptoprosopic type based on TFI and hyperleptene based on UFI in this population. Recently, Jaberi *et al.* (2019) stated that the mean FH, FW and FI of the Iranian population (Students of Shiraz University of Medical Sciences) was 11.3 cm, 12.2 cm and 92, respectively. They showed that the most frequent face class was hyperleptoprosopic [17]. Their findings confirmed the findings of present study, which performed on the Iranian population. In a similar study by Heidari *et al.* (2009), the most frequent type of face was the leptoprosopic type in the Iranian population (Sistani and Baluch groups) [31]. Yasmin *et al.* (2014) conducted a study to estimate the FI among the Malay population. They reported that the mean FH and FW were 111.9 and 127.3 mm, respectively. They found that the most frequent class of face was mesoprosopic among their population [26]. This findings also confirmed that the differences exists among various populations. According to our findings, the values related to the fiscal characteristics were significantly higher in males than females. These findings confirmed the existence of sexual dimorphism in facial

characteristics of medical students in the Iranian population.

In a study, the facial nasofacial characteristics of males and females were compared with that of Shiraz University of Medical Sciences students (Iranian population) by Jaber *et al.* and they found almost similar results [17]. Furthermore, Yasmin *et al.* [32] and Din *et al.* [26] in their studies on the Malay population demonstrated that facial values in males were higher than females. The study of Omotoso *et al.* showed significant differences in the mean FL based on the gender [18]. Their findings are comparable to the present study.

Moreover, the most frequent face class of male subjects was hyperleptoprosopic (86%) and hyperleptene (71%) based on TFI and UFI, respectively. However, the most frequent face classes of female subjects were mesoprosopic (29%) and leptoprosopic (28%) based on TFI and hyperleptene (37%) based on UFI. In an Indian population, Kumari *et al.* reported that the most common face type in males was mesoprosopic and in females was euryprosopic [33]. Yasmin *et al.* showed that the most frequent face type was equally mesoprosopic among Malaysian males and females [26]. In a similar study among Chinese ethnic population of Indonesia, Kurnia *et al.* demonstrated that the common face classification was leptoprosopic type in male and mesoprosopic in female [30]. These findings from various populations showed that environment affect their facial characteristics. A strong correlation was recorded between TFH and UFH as well as TFI. Additionally, UFH and UFI correlated strongly. The strongest correlation was between TFI and UFI.

## Conclusion

The most common type of face among the Iranian population is hyperleptoprosopic. Additionally, there is also sexual dimorphism in the facial characteristics of the Iranian population and the values of males were higher than females.

**Acknowledgements:** The information contained in this article was extracted from the medical doctoral (MD) dissertation (Masoumeh Dodangeh).

**Ethical Permission:** Compliance with ethical guidelines, this study was approved by the ethical committee of Tehran university of Medical Sciences (IR.TUMS.MEDICINE.REC.1396.3659). Informed consent has been obtained from all participant included in this study.

**Conflicts of Interests:** None declared by the authors.

**Authors' contributions:** All authors contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all the aspects of this work.

**Funding/Support:** This study was supported by a grant from Tehran University of Medical Sciences (No.: 9111215140).

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