Int. J. Morphol.,
34(3):904-908, 2016.

Evaluation of Face Shape in Turkish Individuals

Evaluacion de la Forma de la Cara en Individuos Turcos

Esın Ozsahın[*]; Emıne Kızılkanat[**]; Neslıhan Boyan[**]; Roger Soames[***] & Ozkan Oguz[**]

OZSAHIN, E.; KIZILKANAT, E.; BOYAN, N.; SOAMES, R. & OGUZ, O. Evaluation of face shape in Turkish individuals. *Int. J. Morphol., 34(3)*:904-908, 2016.

SUMMARY: The aim of this study was to determine the types of face shape in the Turkish population. Knowledge on face shape is important in anthropology and for planning medical procedures such as in aesthetic, maxillofacial and orthodontic surgery. The study group consisted of 1003 healthy subjects (470 male, 533 female) aged 18–68 years. Mean height, weight and body mass index (BMI) were 1.74 m, 78.65 Kg, 25.80±3.50 kg/m^2 and 1.62 m, 60.55 kg, 22.87±3.49 kg/m^2 in males and females, respectively. Face length (FL; the distance from nasion to gnathion) and face width (FW; bizygomatic breadth) were measured, from which a Prosopic Index (PI) was determined using the following formula: (PI= FL/FW x 100). The types of face shape were classified according to Banister's classification Type I (hypereuryprosopic), Type II (euryprosopic), Type III (mesoprosopic), Type IV (leptoprosopic), Type V (hyperleptoprosopic) in both males and females. PI was 84.31 (FL: 12.07 cm; FW: 14.34 cm) in males and 85.25 (FL: 11.30 cm; FW: 13.28 cm) in females. In males and females Type I face shape was observed in 18.1 % and 15.6 %; Type II in 35.3 % and 34.3 %; Type III in 33.2 % and 34.3 %; Type IV in 8.7 % and 11.8 %; and Type V in 4.7 % and 3.9 %, respectively. The determination of types of face shape as presented in this study may be useful for aesthetic surgical procedures as well as medical and anthropological investigations.

KEY WORDS: Prosopic index; Face length; Face width; Face shape.

INTRODUCTION

Most dimensions in the human body are determined by factors related to ecology, biology, geography, race, sex and age; therefore anthromopetry is by far the most important research tool in biological and forencis anthropology (Mane *et al*., 2010).

Many anthropometric studies on age, sex and race have been undertaken in certain regions of the world (Farkas *et al*., 2005). Studying the intra and interpopulational variations in morphological characteristics has long been an interest of anthropologists (Jahanshahi *et al*., 2008; Fang *et al*., 2011) who are aware of the differences of facial measurements between races and ethnic groups (Farkas *et al*.).

Morphological assessment parameters of the face are the results of cephalometric and anthropometric methods obtained from the skeleton and soft tissues, respectively (Arslan *et al*., 2008; Budai *et al*., 2003). An important component of physical anthropology is craniofacial morphometrics which includes the dimensions of head and face (Hossain *et al*., 2011; Oguz,1996).

A knowledge of facial measurements is essential to determine the degree of deviation from normal morphologic defects and anomalies of the head and face (Farkas *et al*.). In order to establish a precise method of surgery to maintain and preserve facial harmony surgeons demand objective parameters of the face (Özdemir *et al*., 2009). Anthropometric measurements are used in many medical branches, such as forensic medicine, plastic and oral surgery, pediatrics, dentistry and imaging procedures (Fang *et al*.; Hossain *et al*.; Jahanshahi *et al*.; Oguz; Raji *et al*., 2010).

The human face, with its compliacted and dynamic structure, is the initial step to get to recognizing an individual. The facial phenotype is biologically a product of genetics and the environment which in specific regions determines the features of populations (Mane *et al*.). Therefore anthropometric studies regarding the face are important in terms of both clinical and anthropologic perspectives.

[*] Baskent University, Adana Research and Teaching Hospital, Department of Anatomy, Adana, Turkey.
[**] Cukurova University, Faculty of Medicine, Department of Anatomy, Adana, Turkey.
[***] Centre for Anatomy and Human Identification, College of Art, Science and Engineering, University of Dundee, Dundee, United Kingdom.

We believe that the findings regarding face types for Turkish individuals obtained in this study can form the basis of a future database, as well as be used as a reference for many surgical procedures and anthropologic studies in this population.

MATERIAL AND METHOD

The study was conducted at Baskent University Adana Practice and Teaching Hospital on 1003 individuals (470 male, 533 female, aged 18–68 years) admitted to the outpatient clinic in relation to occupational health. Informed consent of the participants were taken. The height and the weigth were measured and the body mass indexes of the cases were calculated. Face type, face length and face width of each participant was determined by using Martin spreading callipers. Face length was measured from nasion to gnathion and face width was taken as the bizygomatic distance (Fig. 1). Prosopic index was determined using the following formula:

Prosopic index: (Face length/Face width) x 100 (Jahanshahi *et al*.).

The prosopic index determined for each individual was grouped according to Bannisters' face typing classification (Table I) and then evaluated. The height and weight of each participant was also determined.

Table I. Bannister's classification, based on the proscopic

	Bannister Classification Face Types	PI (%)
Type I	Hypereuryprosopic	≤79.9
Type II	Euryprosopic	80–84.9
Type III	Mesoprosopic	85–89.9
Type IV	Leptoprosopic	90–94.9
Type V	Hyperleptoprosopic	≥95

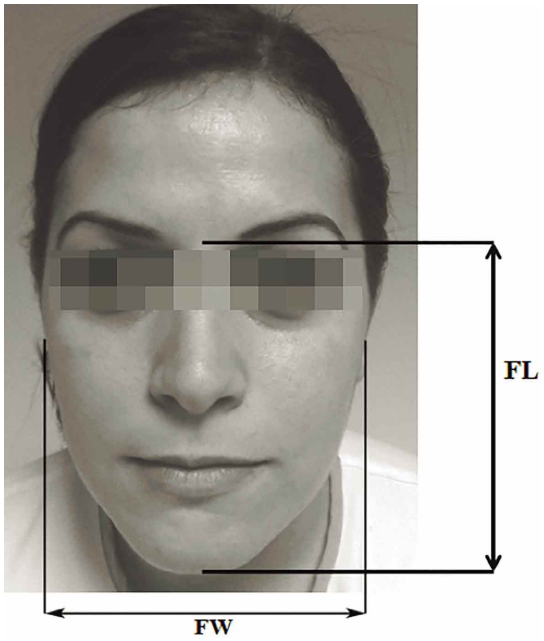

Fig. 1. The determination of face length (FL) and face width (FW).

RESULTS

The mean height, weight, body mass index, face length and face width were significantly different ($p < 0.001$) between males and females, but there was no difference for mean PI (Table II). In females the most common face types were types II and III, each being 34.33 % of the population studied, followed by Type I (15.6 %), Type IV (11.8 %) and Type V (3.94 %). In males Type II was the most common (35.3 %), followed by Type III (33.2 %), Type I (18.1 %), Type IV (8.7 %) and Type V (4.7 %) (Table III).

Table II. The mean, standard deviation and range of values for height, weight, face length, face width and proscopic index of male and female participants.

Parameters	Male (n= 470)		Female (n= 533)	
	Range	Mean±SD	Range	Mean±SD
Height (m)	1.56–1.93	1.74±0.06	1.45–1.82	1.62±0.06
Weight (Kg)	48–125	78.65±12.01	42–100	60.55±9.71
BMI (Kg/m^2)	16.61–37.74	25.80±3.50	15.57–38.67	22.87±3.49
Face Length (cm)	10–13.6	12.07±0.61	8.5–13	11.3±0.61
Face Width (cm)	11–17	14.34±0.73	11–16	13.28±0.62
Prosopic Index	70–109.09	84.31±5.6	66.67–109.09	85.25±5.48

Table III. The number and percentage of individulas in the present study with each face type according to Bannister's classification.

Face Type		Males		Females	
		n	%	n	%
Type I	Hypereuryprosopic	85	18.1	83	15.6
Type II	Euryprosopic	166	35.3	183	34.33
Type III	Mesoprosopic	156	33.2	183	34.33
Type IV	Leptoprosopic	41	8.7	63	11.8
Type V	Hyperleptoprosopic	22	4.7	21	3.94
Total		470	100	533	100

DISCUSSION

Facial phenotype is a consequence of genetics and the environment that reflect features of populations in specific regions. Hence the face is a dynamic structure that can display a wide range of characteristics. A primary focus of facial identification research is to isolate features that can be considered as individualization factors (Mane *et al*.; Miyazato *et al*., 2014).

Morphologic features of the face between populations, as well as their diversity in any given society, have attracted attention from anthropologists and have also been significant in forensic science, maxillary, oral and plastic surgery (Mane *et al*.; Jahanshahi *et al*.).

It is perhaps not surprising that there were differences in height and weight between males and females as, in general, males tend to be taller and heavier in most populations. Given these differences in FL and FW would also be expected, as indeed was the case; however no difference in mean PI was observed suggesting that FL and FW remain proportional in the Turkish popluation as a whole. In this study, using Bannisters' face type classification, the most dominant face types in both males and females were Type II (Euryprosopic) (35.3 % male, 34.33 % female) and Type III (Mesoprosopic) (33.2 % male, 34.33 % female). This is different from the findings of Çiner (1960), which showed that the leptoprosopic type was dominant in Turkish females. Arslan *et al*., assessed face types in a Turkish population as leptoprosopic, euryprosopic, mesoprosopic with euryprosopic being dominant in females and leptoprosopic in males. In present study, dominancy for males was euryprosopic in 35.3 %, mesoprosopic in 33.2 %; for females; euryprosopic 34.33 % and mesoprosopic 34.3 %.

In other studies conducted on different races the observations were similar to those presented here. The dominant face type in both native Fars (37.7 %) and Turkman (51.7 %) females was euryprosopic, while in males the dominant face type in native Fars (44 %) and Turkman (38.4 %) was mesoprosopic (Jahanshahi *et al*.). Given that Turkish, Fars and Turkmans are races of related origin, this may account for the similarity.

Studies conducted using different methodologies have also been undertaken. A study on an Indian population showed that both males (20/50) and females (28/50) had a hyperleptoprosopic face type according to the Martin and Saller face type classification (Mane *et al*.). This classification of facial types is as follows; mesoprosopic type (84.0–87.9), euryprosopic type (79.0–83.9), hypereuryprosopic type (<78.9), leptoprosopic type (88.0–92.9), hyperleptoprosopic type (>93.0) (Mane *et al*.). India is the home of one of the oldest civilizations, and as such has laid the foundation for the development of multifaceted societies, resulting in a variety of complex face forms in individuals (Mane *et al*.). However, the hyperleptoproscopic face type was the least common in the present study, being only 3.94 % for females and 4.7 % for males. This suggests a different, racial origin of the Indian and Turkish populations.

The protohistoric Japanese population was long-headed, with a broad face and strong prognathism. Craniofacial morphology is commonly described by cephalic and prosopic indices (Hossain *et al*.). Hossain *et al*. reported that the face types for Japanese adult females was mesoprosopic (30.53 %), euryprosopic (25 %) and hypereuryprosopic (28.85 %), a finding different to the present study.

The report of dominant face type for Japanese males by Inaba *et al*. (2005) was analogous to this study, being mesoprosopic and for females euryprosopic according to Garson's facial index method. Garson's facial index is determined using the following formula: [the distance from the root of the nose to the chin/cheekbone width x 100]. In the Garson classification of facial index there are five types:

hypereuryprosopic (≤78.9), euryprosopic (79.0 to 83.9), mesoprosopic (84.0 to 87.9), leptoprosopic (88.0 to 92.9), and hyperleptoprosopic (≥ 93.0) (Inaba *et al*.). The studies of Hossain *et al*. and Inaba *et al*. raise the interesting question of why there should be similarities in face types between Turkish and Japanese people.

Bianchini *et al*. (2007), reported face types in a South American sample with ages between 15 and 18 years. They observed face type as leptoprosopic (13.45 %) for females and hyperleptoprosopic (27.73 %) for males in a Brazilian population. According to this study Turkish face types are somewhat different from this.

A study on a North-Eastern Nigerian population by Raji *et al*., showed that the hyperleptoprosopic face type was dominant in both sexes (70 % in males, 57.3 % in females). This shows diverse facial type compared with this study.

The face types of both the Fars and Turkman ethnic groups and the Japanese population appear to be similar, whereas the Turkish population exhibits diversity. The current study demonstrates that the Turkish race has a different face type than those of South American, African, Far Eastern and Asian populations. These differences most probably arise from racial and ethnic differences, which in turn are also influenced by ecological, biological and geographical factors, as well as gender, age and nutritional background (Raji *et al*.).

Studies on different races have shown considerable differences in facial proportions (Arslan *et al*.; Budai *et al*; Çiner; Farkas *et al*.). Therefore when planning maxillofacial surgery, surgeons must keep population specific factors in mind. For maxillofacial deformities the evaluation of soft and hard tissues is also essential. In order to obtain satisfactory aesthetic outcomes orthodontists, together with surgeons, must thoroughly assess skin changes, cartilaginous and soft tissues.

Orthodontists and maxillofacial surgeons can gain great benefit from the results presented here, especially with respect to Turkish patients. This study will also be of enormous benefit to plastic surgeons in enabling them to identify the most suitable nose type for the face of a given patient. Besides the present findings will be an important source of data for mandibular revision according to the face type of patients whose chewing function has detoriated either physiologically or traumatologically.

In conlusion the results of this study can be used in plastic, reconstructive and aesthetic surgery, oral and maxillofacial surgery whenever a face related procedure is planned. They are also of value in forensic science and anthropological investigations.

OZSAHIN, E.; KIZILKANAT, E.; BOYAN, N.; SOAMES, R. & OGUZ, O. Evaluación de la forma de la cara en individuos turcos. *Int. J. Morphol., 34(3)*:904-908, 2016.

RESUMEN: El objetivo fue determinar los tipos de forma de la cara en la población turca. El conocimiento de la forma de la cara es importante en antropología y para la planificación de los procedimientos médicos como la cirugía estética, maxilofacial y ortodoncia. Se analizó un grupo de 1003 sujetos sanos (470 hombres y 533 mujeres), con edades entre 18 a 68 años. La talla, peso e índice de masa corporal (IMC) fueron 1,74 m, 78,65 kg, 25,80±3,50 kg/m^2 y 1,62 m, 60,55 kg, 22,87±3,49 kg/m^2 en hombres y mujeres, respectivamente. Se midió el índice prosopo (IP) y se determinó la longitud de la cara (LC: la distancia desde Nasion a Gnathion) y el ancho de la cara (ancho bicigomático: AC) utilizando las siguientes fórmulas: (IP = [LC/AC] x 100). Los tipos de forma de la cara se clasificaron de acuerdo a la clasificación de Banister [Tipo I (hipereuriprosopo), Tipo II (euriprosopo), tipo III (mesoprosopo), Tipo IV (leptoprosopo) y Tipo V (hiperleptoprosopo)], tanto en hombres como en mujeres. El IP fue de 84,31 (LC: 12,07 cm; AC: 14,34 cm) en los hombres y 85,25 (LC: 11,30 cm; AC: 13,28 cm) en las mujeres. En hombres y mujeres se observó la forma Tipo I en 18,1 % y 15,6 %; Tipo II en 35,3 % y 34,3 %; Tipo III en 33,2 % y 34,3 %; Tipo IV en 8,7 % y 11,8 %; y Tipo V en 4,7 % y 3,9 %, respectivamente. La determinación de los tipos de forma de la cara presentados en este estudio pueden ser útiles para los procedimientos quirúrgicos estéticos, así como para las investigaciones médicas y antropológicas.

PALABAS CLAVE: Indice prosópico; Largo de la cara; Ancho de la cara; Forma de la cara.

REFERENCES

Arslan, S. G.; Genç, C.; Odabas¸, B. & Kama, J. D. Comparison of facial proportions and anthropometric norms among Turkish young adults with different face types. *Aesthestic Plast. Surg., 32(2)*:234-42, 2008.

Bianchini, A. P.; Guedes, Z. C. & Vieira, M. M. A study on the relationship between mouth breathing and facial morphological pattern. *Braz. J. Otorhinolaryngol., 73(4)*:500-5, 2007.

Budai, M.; Farkas, L. G.; Tompson, B.; Katic, M.; Forrest, C. R. Relation between anthropometric and cephalometric measurements and proportions of the face of healthy young white adult men and women. *J. Craniofac. Surg., 14(2)*:154-61, 2003.

Çiner, R. Türkiye kadınlarının antropolojisi. *Ankara Üniversitesi Dil Tarih Cografya Fakültesi Dergisi, 18(3-4)*:161-206, 1960.

Fang, F.; Clapham, P. J. & Chung, K. C. A systematic review of interethnic variability in facial dimensions. *Plast. Reconstr. Surg., 127(2)*:874-81, 2011.

Farkas, L. G.; Katic, M. J.; Forrest, C. R.; Alt, K. W.; Bagic, I.; Baltadjiev, G.; Cunha, E.; Cvicelová, M.; Davies, S.; Erasmus, I.; Gillett-Netting, R.; Hajnis, K.; Kemkes-Grottenthaler, A.; Khomyakova, I.; Kumi, A.; Kgamphe, J. S.; Kayo-daigo, N.; Le, T.; Malinowski, A.; Negasheva, M.; Manolis, S.; Ogetürk, M.; Parvizrad, R.; Rösing, F.; Sahu, P.; Sforza, C.; Sivkov, S.; Sultanova, N.; Tomazo-Ravnik, T.; Tóth, G.; Uzun, A. & Yahia, E. International anthropometric study of facial morphology in various ethnic groups/races. *J. Craniofac. Surg., 16(4)*:615-46, 2005.

Hossain, M. G.; Saw, A.; Ohtsuki, F.; Lestrel, P. E. & Kamarul, T. Change in facial shape in two cohorts of Japanese adult female students twenty years apart. *Singapore Med. J., 52(11)*:818-23, 2011.

Inaba, R.; Aizawa, K. & Kodate, K. Proposal of meta-data in a database for identification using face images. *Syst. Comput. Jpn., 36(3)*:53-64, 2005.

Jahanshahi, M.; Golalipour, M. J. & Heidari, K. The effect of ethnicity on facial anthropometry in Northern Iran. *Singapore Med. J., 49(11)*:940-3, 2008.

Mane, D. R.; Kale, A. D.; Bhai, M. B. & Hallikerimath, S. Anthropometric and anthroposcopic analysis of different shapes of faces in group of Indian population: a pilot study. *J. Forensic Leg. Med., 17(8)*:421-5, 2010.

Miyazato, E.; Yamaguchi, K.; Fukase, H.; Ishida, H. & Kimura, R. Comparative analysis of facial morphology between Okinawa Islanders and mainland Japanese using three-dimensional images. *Am. J. Hum. Biol., 26(4)*:538-48, 2014.

Oguz, Ö. The proportion of the face in younger adults using the thumb rule of Leonardo da Vinci. *Surg. Radiol. Anat., 18(2)*:111-4, 1996.

Özdemir, S. T.; Sigirli, D.; Ercan, I. & Cankur, N.S. Photographic facial soft tissue analysis of healthy Turkish young adults: anthropometric measurements. *Aesthestic Plast. Surg., 33(2)*:175-84, 2009.

Raji, J. M.; Garba, S. H.; Numan, A. I.; Waziri, M. A. & Maina, M. B. Morphological evaluation of head and face shapes in a North-Eastern Nigerian population. *Aust. J. Basic Appl. Sci., 4(8)*:3338-41, 2010.

Correspondence to:
Prof. Dr. Ozkan OGUZ
Cukurova University
Faculty of Medicine
Department of Anatomy
01330 Balcali
Adana
TURKEY

Tel: 90 533 6514415
Fax: 90 322 3386572

Email: ozoguz@cu.edu.tr

Received: 18-02-2016
Accepted: 04-05-2016