

# Morphological Evaluation of Head in Turkman Males in Gorgan-North of Iran

Evaluación Morfológica de la Cabeza en Hombres Turcos en Gorgan del Norte de Irán

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**SUMMARY:** Cephalometry or measurement of human head is used in identification, forensic medicine, plastic surgery, orthodontics, archeology and examine the differences between races and ethnicities.

This descriptive investigation was undertaken on 198 young Turkman males to determine the cephalic index and head phenotype among them in Gorgan, North of Iran. In this study cephalic index was determined by classic cephalometric method. Mean and standard deviation of cephalic index was  $80.4 \pm 4$ . Based on the cephalic index, the head shape of 42.4% of individuals were brachycephalic, 7.6% hyperbrachycephalic, 40.9% mesocephalic and 8.1% dolicocephalic.

This research showed that Turkman individuals have typical brachycephalic phenotype. In comparison to other studies, we can conclude that the ethnic factor has an effective role on head phenotype in North of Iran.

**KEY WORDS:** Craniofacial forms; Cephalometry; Cephalic index; Male.

## INTRODUCTION

The study of the craniofacial relations and variations in man has long been used to different various racial groups in physical anthropology. Morphology features of different races and ethnic groups aren't randomly distributed but appear in geographic clusters (Argyropoulos & Sassouni, 1989).

The method currently availed craniofacial form include anthropometry, photogrametry, cephalometry, ultrasound, computed tomographic (CT) scanning magnetic imaging (MRI) and optical surface scanning (Grant & Peter, 2003).

Arguably, cephalometry continues to be the most versatile technique in the investigation of the craniofacial skeleton because of its validity and practicality (Grant & Peter). The name cephalometry is given to the morphological study of all the structures present in a human head (Grau *et al.*, 2001).

Cephalometry is the scientific measurement of the dimensions of the head, usually through the use of

standardized lateral skull radiographs or cephalograms (El-Feghi *et al.*, 2004).

Comparison of the measurements with the standards for the same age, race, and sex is a valuable tool for diagnosis, treatment monitoring and prediction of orthodensity treatment results (Grau *et al.*).

Also cephalometry is helpful in identification, forensics head and face reconstruction, plastic surgery, oral and maxillofacial surgery, orthodontics and clinical diagnosis and treatment planning (Williams *et al.*, 1995; Will *et al.*, 1995; Sakakibara *et al.*, 1999).

Conducting anthropometrical studies with the aim of obtaining the characteristics of ethnical groups inhabiting a particular geographical region, not only assist in understanding the frequency distribution of human morphologies but also in providing the basis for a comparison among different races (Heidari *et al.*, 2006; Golalipour *et al.*, 2003, 2005a,b; Golalipour, 2006; Zaidi, 1989; Evereklioglu *et al.*, 2002).

On the basis of above factors, anthropometrics studies are conducted on the age, sex and racial/ethnic groups in certain geographical zones (Williams *et al.*; del Sol, 2005; Shah & Jadhav 2004; Golalipour *et al.*, 2003, 2005a,b; Golalipour & Heydari 2005; Golalipour; Heidari *et al.*).

The most important of cephalometric dimension are length and width of head that with them determine cephalic index.

On basis of cephalic index head shapes group to four international categories, that including dolichocephal, brachycephal, mesocephal and hyperbrachycephal (Williams *et al.*; del Sol).

Although some investigations carried out to determine the type of head shape in various ages in Iran and other countries (Golalipour *et al.*, 2003; del Sol; Shah & Jadhav; Heidari *et al.*; Golalipour). But by regarding the effect of racial/ethnic and geographical factors on head dimensions and lack of documented research about Turkman males in this area. This study aimed at applying well-know international cephalometric methods to assess and compare cranioccephal morphological characteristics of young Turkman men (17-20 years old), in North of Iran.

**MATERIAL AND METHOD**

The current cross-sectional descriptive study was performed on 198 normal young Turkman males (17-20 years old) who resident in Gorgan- North of Iran, during the spring of 2002.

Turkman’s population is living in more than two centuries ago in this area, who immigrated from central Asia. Turkman people are only marrying in intra -group because of religious and ethnic beliefs.

Using the classical cephalometry (Williams *et al.*), the morphological dimensions of head (maximum length and breadth) were, respectively, measured with a scaled cephalometer and at precision levels of 0.5 mm. The measurements included maximum head length (glabella to inion), maximum head breadth (between right and left euryons). All data were recorded in data sheets along with the cephalic that were calculated using the following equation (Williams *et al.*; Golalipour *et al.*, 2003).

$$\text{Cephalic index} = \frac{\text{Maximum head breadth}}{\text{Maximum head length}} \times 100$$

Then, the craniofacial typing was done through comparing this index with the craniofacial phenotypic classification and the result was recorded (Table I).

Table I. Craniotyping based on the cephalic index.

Cephalic phenotype	Cephalic index (CI)
Dolichocephalic	≤ 70 - 74.9
Mesocephalic	75 - 79.9
Brachycephalic	80 - 84.9
Hyperbrachycephalic	≥ 85 - 89.9

The data for each person was recorded in a special form and then analyzed by EPI6.

**RESULTS**

Mean and SD of cephalic index in Turkman group was 80.4 ± 4. The morphological classification of the head was done according to the cephalic index. Among Turkmans the dominant type was hyperbrachycephalic with a frequency of 42.4% and the rare type was the dolichocephalic (8.1%) (Table II).

Table II. The frequency and percentage (%) of head phenotypes among the 198 Turkman males (17- 20 years) of Gorgan-North, Iran.

Phenotype	Frequency	%
Dolichocephalic	16	8.1
Mesocephalic	81	40.9
Brachycephalic	84	42.4
Hyperbrachycephalic	17	7.6

**DISCUSSION**

In this study, cephalic index was 80.4 ± 4. The cephalic index of this study was higher than Abolhasanzadeh study in Tehran- Iran with 75 (Abolhasanzadeh & Farahani, 2003), and is similar to other studies such as India with 80.42 (Shah & Jadhav), and Chile (80.42) (del Sol) and lower than a study in native Fars males with 84.8 (Golalipour).

García & Lips (1986 a,b) determined that cephalic index in Chile with average of 81.51 ± 6.46. Also, cephalic index reported, 81.19 ± 0.05 in European people in Mediterranean area, and 79.72 ± 0.97 in North of Europe (García & Lips, 1986 a,b).

In our study, dominant type of head shape was brachycephalic (42.4 %). This finding is similar to another study

in Iran (Abolhasanzadeh & Farahani) that dominant type was brachycephalic (36.6 %). Dominant type of head from this study is not similar to another study in India (Bhatia *et al.*, 1995) (dolichocephalic 58.5%), and del Sol study in Chile (del Sol) and other study (Marquer & Chamela, 1961) with mesocephalic type.

Bathia *et al.* on 806 samples in India reported that 19.2 % of them were hyperbrachycephalic, 58.5% dolichocephalic, 21% mesocephalic and less the 1% of them were brachycephalic.

Beside, in a study on 50 individuals adults reported that 66% of the individuals were mesocephalic, 28% brachycephalic, 4% hyperbrachycephalic and 2% dolichocephalic in the IX Región of Chile (del Sol).

In 2004, a study in India on 302 male students showed that 41% of the students were mesocephalic, 37% brachycephalic, 14% hyperbrachycephalic, and 7% dolichocephalic (Shah & Jadhav).

In other study that was done on 953 adult male (22-24 years old) in Tehran- Iran in 2003, reported that 36.6 % of the individuals were brachycephalic, 29.9 % hyperbrachycephalic, 24.5 % mesocephalic and 9% dolichocephalic (Abolhasanzadeh & Farahani).

Furthermore, in another study was done on native Fars males in North of Iran, reported that 52% of individuals were hyperbrachycephalic, 25% brachycephalic, 21.5% mesocephalic and 1.5% dolichocephalic (Golalipour, 2006).

In respect to the variations in head shape in various races and ethnicities and geographical zones, we believe that inherited factor primarily affects on the shape of head, however environment has secondary effect on it.

In the first glance it seems that inheritance determines the varieties of the cranium among different race. Environment

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**RESUMEN:** La cefalometría o mediciones de la cabeza humana son usadas en identificación, Medicina Forense, Cirugía Plástica, Ortodoncia, Arqueología y tiene la finalidad de examinar las diferencias entre razas y etnias.

Esta investigación descriptiva fue realizada en 198 hombres jóvenes turcos en Gorgan, Norte de Irán, para determinar el índice cefálico y el fenotipo de la cabeza. El índice cefálico fue determinado por el método de cefalometría clásica. La media y desviación estándar del índice cefálico fue de  $80.4 \pm 4$ . Basado en el índice cefálico, la forma de la cabeza era braquicefálica en el 42.4%, hiperbraquicefálica en el 7.6%, mesocefálica en el 40.9% y dolicocefálica en el 8,1% de los individuos.

Esta investigación mostró que los individuos turcos presentan un típico fenotipo braquicefálico. En comparación con otros estudios, podemos concluir que el factor étnico tiene un efectivo rol en el fenotipo cefálico en el Norte de Irán.

**PALABRAS CLAVE:** Formas craneales; Cefalometría; Index cefálico; Hombre.

is undoubtedly an effective determinant as well, but through a closer look, it can be concluded that it is actually the genotype of the population which dictates its response to the environmental stimuli (Heidari *et al.*; Golalipour *et al.*, 2003; Jordaan, 1976; Bharati *et al.*, 2001).

Interestingly, it was noticed that the first generation of Japanese immigrants in Hawaii had an increased head breadth, a decreased head length and a higher cephalic index than their parents (Heravi & Zieae, 2002).

Also in addition to inheritance, geographical factors play a certain role (Heidari *et al.*, 2004; Golalipour *et al.*, 2003; Jordaan; Bharati *et al.*; Jagr *et al.*, 1998).

The influential of time must also be considered as a probability. Furthermore, in a study it was observed that over a period of 30 years, the residents of an area in Japan developed some changes in the form of their cranium toward an increase in the head breadth in the subsequent generation (Nakashima, 1986). Time can also induce the gradual expression of genetic characteristics in individuals. A group of black Africans tends to become more dolichocephalic than their white peers within the first 2 years of life (Okanlawon *et al.*, 1990). In addition, in Czech Republic, it was observed a natural decrease in the cephalic index within the first 3 years of life (Krasnicanova, 1990).

It must be remembered that the reaction to a given environment represents the interaction of the genotype of the population being researched with the environment (Jordaan).

With regard to the findings of this study and other investigations in Iran we can conclude that trend of brachycephalization and hyperbrachycephalic was happened during some centuries on consequents generations of people.

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