Cephalometry in 14-18 Years Old Girls and Boys of Shiraz-Iran High School

Cefalometría en Niñas y Niños de 14-18 Años de la Secundaria de Shiraz, Irán

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SUMMARY: Cephalometry or skull measurement are used in pediatrics, forensic medicine, plastic surgery, oral surgery and diagnostic comprehension between patient and normal populations. Cephalic index is an important parameter for detecting the race and sex of an individual whose identity is unknown. The most important of cephalometric dimension are height and width of head which determine cephalic index. On the basis of cephalic index four head shapes are determined in international categories, that including dolichocephal, brachycephal, mesocephal and hyperbrachycephal. With noticing the lack of documented research about 14-18 years old girls and boys in this area, this study was planned for determining normal range of head shapes in 867 girls and 960 boys in the age of 14-18 in fars-Iran. In regards of cephalic index our results showed that dominant type of head in girls was brachycephalic with 42.5% and in boys was hyperbrachycephalic with 34.3%, rare type of head shape in girls was dolichocephalic with 4.80% and in boys was 7.5%. There is significant difference between boys and girls cephalic index.

KEY WORDS: Cephalometry; Cephalic index; Student.

INTRODUCTION

Human physical variability had been a subject of interest for the scientists since a very long time. Anthropometry, the standardized scientific techniques of measuring human body was soon developed to make collection of data comparable (Eickstedt, 1926; Thurston, 1909).

Anthropometrics studies are conducted on the age, sex and racial/ethnic groups in certain geographical zones (Williams *et al.*, 1995; del Sol, 2005; Shah & Jadhav, 2004; Golalipour *et al.*, 2007). The name of cephalometry is given to the morphological study of all the structures present in a human head (Grau *et al.*, 2001).

The method currently availed craniofacial form include anthropometry, photogram entry, 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). 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.*).

The most important of cephalometric dimension are height and width of head that they used in cephalic index determination. On basis of cephalic index the head shapes classified to four international categories, that including dolichocephal, brachycephal, mesocephal and hyperbrachycephal (Williams *et al.*; del Sol). A few investigations carried out to determine the type of head shape in various ages in Iran and other countries. Regarding, the effect of racial, ethnic and geographical factors on head dimensions and lack of documented research about 14-18 years old girls and

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boys in this part of country, the present study was done to determine the cephalic index and the types of head shapes in students of South of Iran in Shiraz high school.

MATERIAL AND METHOD

This study was done on 867 normal girls and 960 normal boys, in Shiraz high school. Shiraz is center of Fars province and located in South of Iran. All the measurements were taken with the person sitting on chair, in relaxed condition and head in anatomical position.

Head measurements, which were determined by Martin spreading caliper, are as follows:

- Head length = Summit of glabella to furthest occipital point.
- Head width = Great breadth, at right angles to median plane.
- Cephalic index=Maximum head breadth /Maximum head length x 100

Cephalic index were determined on the basis of International Anatomical Descriptive (Williams *et al.*). Then, the craniofacial typing was determined through comparing this index with the craniofacial phenotypic classification (Table I) and the result was recorded and analysed by statistical formula. The data were subjected to statistical analysis.

Table I. Craniotyping based on the cephalic index.

Head shape	Cephalic index (CI)
Dolichocephalic	CI < 74.9
Mesocephalic	75 < CI < 79.9
Brachycephalic	80 < CI < 84.9
Hyperbrachycephalic	85 < CI < 89.9 and CI <

RESULTS

As the means of head length, width and cephalic index in girls and boys students were shown in Table II, there were significant difference between those of the girls and boys. Head length and width of boys are higher than girls ($P<0.00$). Comparision of cephalic index in girls and boys showed significant difference ($P<0.00$) (Table II).

Head was classified by cephalic index. Dominant and rare types of head in girls were brachycephalic (42.56%) and dolichocephalic (4.84%), respectively (Table III). The boys dominant and rare types were hyperbrachycephalic (34.3%) and dolichocephalic (7.5%), respectively (Table III, Fig. 1).

Table II. Means and SD of head length, head width and cephalic index in girls and boys.

Measurment	Girls	Boys
Head length	18.20±0.71	18.45±0.90
Head width	18.76±0.61	15.17±0.72
Cephalic index	81.20±4.33	82.40±5.45

Table III. The frequency and percentage (%) of head phenotypes among the 960 boys and 867 girls (14-18 year), in Shiraz –South of Iran.

Head shape	Girls	Boys
Dolichocephal	4.84	7.5
Mesocephal	32.76	28.4
Brachycephal	42.56	30.0
Hyperbrachcephal	19.84	34.3
Total	100.0	100.0

Fig. 1. Distribution of head shape in girls and boys in Shiraz high school.

DISCUSSION

In this study cephalic index in girls was 81.20. The cephalic index of this study was lower than Nakashima (1986) study on female students with 87, Gotalipour (2006a) study on native Fars group with 85, Turkman group 82.8 in gorgan North of Iran (Gotalipour, 2006b), higher than Abolhasanzadeh & Farahani (2003) study in Tehran- center of Iran with 75, Buretic'-Tomljanovic' *et al.* (2004) study in Croitia with 79.23 and similar to Shah & Jadhav report from India with 81.20.

In our study, the dominant type of head shape in girls was brachycephalic type with 42.5%. It is similar to other study in Tehran center of Iran (42.7 %) (Golalipour, 2006b), Turkman Groups in north of Iran (58.1%) (Golalipour *et al.*) and Shah & Jadhav study in India. But it is different to other study that were done on fars females hyperbrachycephal (53.6%) (Golalipour, 2006a).

In our study rare type of head in female was dolichocephal (4.84%) that was similar to Tehran- Iran (9.9%) (Abolhasanzadeh & Farahani), Fars (0.5%) (Golalipour, 2006a), Turkman in North of Iran (0.1%) (Golalipour *et al.*) and Shah & Jadhav in India (0.3%).

In this study, cephalic index in male was 82.4. The cephalic index of this study was higher than the study in Tehran- Iran with 75 (Abolhasanzadeh & Farahani), Turkman male in north of Iran (Golalipour *et al.*) and other studies such as India (Shah & Jadhav) with 80.42, Chile 80.42 (del Sol) and Buretic´-Tomljanovic´ *et al.* study in Croatian with 79.37.

Garcia & Lips (1986a and 1986b) determined that the cephalic index in Chile is 81.51. The cephalic index reported 81.19 in European people in Mediterranean area and 79.72 in North of Europe.

In our study, dominant type of head shape in male was hyperbrachycephal (34.3%) and brachycephalic (30%). This finding is similar to another study was done on Fars males in North of Iran, reported that 52% of individuals were hyperbrachycephalic, 25% brachycephalic (Golalipour, 2006a), and another study in Tehran- Iran, reported that 36.6% of the individuals were brachycephalic, 29.9 % hyperbrachycephalic that it differ from the study in India (Bhatia *et al.*, 1955), which reported the dominant type dolicocephalic (58.5%), del Sol study in Chile and other study with mesocephalic (Marquer & Chamela, 1961). In 2004, a study in India on 302 male students showed that 41% of the

students were mesocephalic, 37% brachycephalic, 14% heperbrachycephalic, and 7% dolichocephalic (Shah & Jadhav).

In our study rare type of head in male was dolichocephal (7.5%). It is similar to other studies were done on native Fars males in North of Iran (1.5%) (Golalipour, 2006a), Tehran-Iran (9%) (Abolhasanzadeh & Farahani), but Bathia *et al.* reported 0.1% dolichocephal in India.

In conclusion, respect to the variations in head shape in various races and ethnicities and geographical zones, we believe that inhereditary factor primarily affects on the shape of head, however environment has secondary effect on it (Heidari *et al.*, 2006; Golalipour *et al.*; Golalipour, 2006b). 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). Time can also induce the gradual expression of genetic characteristics in individual. 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).

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

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RESUMEN: La cefalometría o medición del cráneo se utiliza en pediatría, medicina forense, cirugía plástica, cirugía oral, diagnóstico del paciente y el entendimiento de las poblaciones normales. El índice cefálico es un parámetro importante para la detección de la raza y el sexo de una persona cuya identidad se desconoce. Las dimensiones cefalométricas más importantes son la altura y peso de la cabeza que determinan el índice cefálico. En base al índice cefálico cuatro formas de la cabeza son clasificadas en categorías internacionales: dolicocefálica, braquicefálica, mesocefálica e hiperbraquicefálica. Debido a la falta de información sobre las niñas y niños de 14-18 años, en este ámbito, se planificó el presente estudio para la determinar el rango normal de la forma de la cabeza, en 867 niñas y 960 niños, de 14 a 18 años de edad en Fars, Irán. Los resultados mostraron que el tipo dominante de cabeza en las niñas fue braquicefálico (42,5%) y en niños fue hiperbraquicefálico (34,3%). El tipo de cabeza de forma dolicocefálica en niñas en un 4,80% y en niños en el 7,5%. Existen diferencias significativas entre el índice cefálico de niños y niñas.

PALABRAS CLAVE: Cefalometría; Índice cefálico; Estudiantes.

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