Cephalic and Facial Indices Among Kosovo-Albanian Population

Índices Cefálico y Facial en la Población Kosovar-Albanesa

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SUMMARY: Cephalic and facial indices are used to estimate the racial and sex differences. This study was carried out to establish standards for craniofacial variables and distribution of cephalic and facial indices in Kosovo - Albanian population. The study population consisted of 204 dental students (101 males and 103 females, aged 18 to 30). Four basic craniofacial variables (head length, head breadth, morphological face height and face breadth) were measured to obtained cephalic and facial indices. All measured craniofacial variables are considerably higher in males than in females (p<0.0001). In the Kosovo – Albanian population brachycephalic type of head (44.61 %) and hyperleptoprosopic type of face (63.34%) prevail.

KEY WORDS: Cephalic index; Facial index; Brachycephalic; Hyperleptoprosopic; Kosovo-Albanian Population.

INTRODUCTION

Human physical variability has been a subject of great interest for the scientists for a very long time and anthropometry evolved as a standard scientific technique for measuring human body dimensions (Eickstedt,1926). Human body dimensions are affected by ecological, biological, geographical, racial, sex, age and nutritional factors (Golalipour *et al.,* 2001; Rajlakshmi *et al.*, 2001; Radovic *et al.*, 2000; Tulli *et al.,* 1995; Okupe *et al.,* 1984).

Anthropometric 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). Anthropometric measurements are important for studying variation in human population. (Hardlika,1939; Montague,1960; Comas, 1960). Variation is one of the most important phenomenon occurring human populations on this globe (Pandey, 2006) Anthropometric variation has been a point of study not only in physical anthropology, but other fields such as genetics, anatomy, dentistry and for industrial purposes (Roberts,1956 & Kohn, 1991).

Cephalometry is one of important branches of anthropology in which the dimensions of head and face can be determined. The shape of the head and face depend on many factors, such as racial and ethnical affiliation, climate, surroundings, socio-economic, nutritional and genetics influences (Radovic *et al*., 2000). Measurement of the craniofacial variables is important for studies of human growth, population variation and clinical treatment.

Cephalic and facial indices are important parameters that are useful in anthropological studies for ascertaining the variation between different race, ethnic groups and sex (Williams *et al.*, 1955).

This study was aimed to establish standards for craniofacial variables of Kosovo – Albanian population and distribution of cephalic and facial indices.

MATERIAL AND METHOD

The study sample consisted of 204 subjects (101 males and 103 females) from the Dental School, Medical Faculty, University of Prishtina, Prishtina (Republic of Kosovo). The age of the subjects ranged from 18-30 years. Subjects who met the following criteria were included in this study: all subjects were native Kosovo-Albanian, normal craniofacial configuration, no know history of craniofacial surgery, trauma or craniofacial abnormalities in the family. We obtained permission to conduct the study from the authorities of the selected faculty and participating students were properly briefed on the purpose and the procedure of the research. Only verbally consenting volunteers were sampled for the study.

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Four basic craniofacial variables (head length, head breadth, morphological face height and face breadth) were taken on each subject following the techniques of Martin & Saller (1957) and designated as follows:

1. Head length (glabella-opisthocranion; g-op)
2. Head breadth (euryon-euryon; eu-eu)
3. Morphological face height (nasion-gnathion; n-gn)
4. Face breadth (zygion-zygion; zy-zy)

Craniofacial variables were measured using standard anthropometry instruments with great accuracy (GPM, anthropological instruments, Siber-Hegner & Co.AG and electronic digital caliper, Boss Hamburg-Germany). To reduce technical error of the measurements, each measurement was taken thrice and average taken.

On the base of the mentioned measurements the cephalic index (CI) and facial index (FI) was calculated according to Martin & Saller (1957) with following formulae:

$$CI = (\text{eu-eu} / \text{g-op}) \times 100$$

$$FI = (\text{n-gn} / \text{zy-zy}) \times 100$$

The obtained data were subjected to statistical analysis. Basic descriptive statistics, independent t-test, distribution of cephalic and facial types were calculated using computerized statistical analysis software - SPSS (Statistical Package for Social Sciences) version 11.0. The p-value of < 0.05 was considered statistically significant.

RESULTS

The results of the study were presented in tabular form. Basic descriptive statistics and differences between males and females in measured craniofacial variables are shown in Table I. The mean head length, head breadth, morphological face height and face breadth in male subjects was significantly higher than those in female subjects ($p<0.0001$).

Descriptive statistics showed minimum and maximum cephalic index to be 73.17-92.12 in males and 76.32-94.51 in females. Mean cephalic index were 84.37 ± 3.56 and 84.80 ± 3.80 for males and females respectively, and the difference is statistically insignificant ($p>0.05$). The mean cephalic index of 84.37 ± 3.56 and 84.80 ± 3.80 fall under the brachycephalic type of head according to Martin & Saller (1957) (Table II).

Descriptive statistics showed minimum and maximum facial index to be 83.00 – 114.47 in males and 78.44 – 110.32 in females. Mean facial index were 95.60 ± 6.67 and 93.41 ± 6.04 for males and females respectively, and the difference is statistically significant ($p<0.05$), (Table III). The mean facial index of 95.60 ± 6.67 and 93.41 ± 6.04 fall under hyperleptoprosopic type of face.

According to the cephalic index (CI) in Kosovo-Albanian population 44.61% were brachycephalic, 34.80% hyperbrachycephalic, 17.65% mesocephalic, 1.47% ultrabrachycephalic and 1.47 dolichocephalic (Table IV).

Table I Basic descriptive statistic of craniofacial variables.

Variable	Male	Mean ± SD	CV	Female	Mean ± SD	CV	t- value	p-value
gl-op	101	187.30±7.23	3.86	103	176.85±5.37	3.04	11.73	p<0.0001
eu-eu	101	157.86±5.58	3.53	103	149.85± .563	3.76	10.25	p<0.0001
zy-zy	101	131.93±6.72	5.10	103	123.93±5.59	4.51	9.25	p<0.0001
n-gn	101	125.82±6.37	5.06	103	115.57±5.00	4.33	12.79	p<0.0001

p<0.0001 * All measurements are given in millimeters

Table II. Descriptive statistics of cephalic index among Kosovo- Albanian population

Sex	N	Mean± SD	Range	95%CI	CV%	p-value
Male	101	84.37 ± 3.56	73.17 - 92.12	83.68 - 85.06	4.22	t=0.343
Female	103	84.80 ± 3.80	76.32 - 94.51	84.06 - 85.53	4.48	p>0.05
Total	204	84.59 ± 3.68	73.17 - 94.51	83.87 - 85.30	4.35	

Table III. Descriptive statistics of facial index among Kosovo- Albanian population

Sex	N	Mean ± SD	Range	95%CI	CV%	p-value
Male	101	95.60 ± 6.67	83.00 – 114.47	94.30 – 96.89	6.98	t=2.459
Female	103	93.41 ± 6.04	78.44 – 110.32	92.24 – 94.58	6.46	p<0.05
Total	204	94.49 ± 6.44	78.44 – 114.47	93.25 – 95.74	6.81	

Table IV. Distribution of cephalic index among Kosovo-Albanian population (Martin & Saller scale).

Cephalic index	Male n (%)	Female n (%)	Total n (%)
Dolichocephalic	1 (0.99)	2 (1.94)	3 (1.47)
Mesocephalic	12 (11.88)	24 (23.30)	36 (17.65)
Brachycephalic	49 (48.51)	42 (40.78)	91 (44.61)
Hyperbrachycephalic	38 (37.62)	33 (32.04)	71 (34.80)
Ultrabrachycephalic	1 (0.99)	2 (1.94)	3 (1.47)
Total	101 (49.51)	103 (50.49)	204 (100.00)

According to the facial index (FI) hyperleptoprosopia 63.24% is the most frequent feature in the Kosovo-Albanian population, followed by leptoprosopia 26.96%, mesoprosopia 7.35 % and euryprosopia 2.45% (Table V).

Table V. Distribution of facial index among Kosovo-Albanian population (Martin &-Saller scale)

Facial index	Male n (%)	Female n (%)	Total n (%)
Hypereuriprosopic	-	-	-
Euryprosopic	4 (3.96)	1 (0.97)	5 (2.45)
Mesoprosopic	8 (7.92)	7 (6.80)	15 (7.35)
Leptoprosopic	31 (30.69)	24 (23.30)	55 (26.96)
Hyperleptoprosopic	58 (57.43)	71 (68.93)	129 (63.24)
Total	101 (49.51)	103 (50.49)	204 (100.00)

DISCUSSION

This study focused on the craniofacial anthropometrical measurements of healthy Kosovo-Albanian population. Our research was oriented to identifying the average craniofacial variables and distribution of cephalic and facial indices.

The obtained data were separated according to sex. Sexual dimorphism was found to be statistically significant in all measured craniofacial variables p<0.0001 (Table I). Many authors have noticed significant differences in craniofacial variables among sex (Savara & Singh, 1968; Woodside & Linder-Aronson,1979; Foley & Mamandras, 1992; Ingerslev & Solow, 1975; Njemirovskij *et al*., 2000; Vidovic´, 1979; Nagle *et al.*, 2005).

In present study mean cephalic index of male subjects was 84.37. while in female subjects was 84.80. Similar result of cephalic index in Kosovo-Albanian population were found in studies of Pittard (1916) and Rexhepi & Meka (2008).

The mean cephalic index observed in this study (84.59) was higher than those observed for the Turkman: 80.4 (Golalipour *et al.*,

2007), Indians: 80.42 (Shah & Jadhav, 2004), Mapuche individuals in Chile: 80.42 (del Sol), European people in Mediterranean area: 81.19, North Europeans:79.72, Chileans: 81.51 (García & Lips, 1986a,b), Iranians:75 (Abolhasanzadeh & Farahani, 2003), Croatian:79.37. (Buteric´-Tomljanovic´ *et al.*, 2004). Cephalic index in study population was similar with native Fars:84.8 (Golalipour, 2006) and lower than Japanese: 87 (Nakashima,1996).

The mean facial index among Kosovo-Albanian Population (94.49) was higher than in the North Iranian Fars (Jahanshahi *et al.*, 2008), North Iran Turkman (Jahanshahi *et al*., 2008), Nigeran Tangale (Maina *et al*., 2012). Facial index in study population was lower than Nigerian/ Fulani, Nigeria/Tera, (Maina *et al*., 2012) and Northeaster Nigerian (Raji *et al*., 2010). Facial index in study population was similar with Croatian of south Dalmatian region: 93.37 (Njemirovskij *et al.*, 2000).

In our study, dominant head type of Kosovo – Albanian population was brachycephalic (44.61 %) followed by hyperbrachycephalic (34.80%). According to the facial index, dominant face type was hyperleptoprosopia (63.24%).

Cephalic and facial indices from our study is agreed by studies of Rexhepi & Meka (2008), Behluli (1987), Dhima (1985), Gluck (1897).

Anthropological studies have determinated that people from Africa, India, Australia, central part of Europe and north America are dolicocephalic. The head type of people in Pacific Ocean are brachycephalic type, while Middle East, Russia and central part of Europe are mesocephalic type (Chamela,1997; Golalipour *et al.,* 2003). Variation in cephalic indices between and within populations have bene attributed to a complex interaction of genetic and environmental factors (Kasai *et al*.,1993). Interestingly, even dietary habits have been shown to influence the craniofacial of a population (Kasai *et al*.,1993).

The values of all measured craniofacial variables can serve as standards for defined population group. Craniofacial variables are considerably higher in males then in females. In the Kosovo – Albanian population the mean value of the cephalic index (CI) is 84.59 with

insignificant differences in relation to sex, indicating the prevalence of brachycephalia. The mean value of the facial index (FI) is 94.49 with significant differences in relation to sex, indicating the prevalence of hyperleptoprosopia.

The results of this study will be useful in anthropology, genetics, forensic medicine and can be used as local standards for diagnostic and anthropometric evaluation.

RESUMEN: Los índices cefálicos y faciales se utilizan para estimar las diferencias raciales y de sexo. Este estudio se llevó a cabo para establecer estándares para las variables y la distribución de los índices cefálicos y faciales en la población de Kosovo-Albanesa. Se examinaron 204 estudiantes de odontología (101 hombres y 103 mujeres entre 18 y 30 años). Se midieron cuatro variables craneofaciales básicas (longitud de la cabeza, ancho de la cabeza, altura facial morfológica y ancho facial) para obtener los índices cefálicos y faciales. Todas las variables medidas craneofaciales fueron considerablemente más altas en los hombres que en las mujeres (p <0,0001). En la población Kosovo-Albania predomina la braquiocefalia (44,61%) y la hiperleptoprosopía (63,34%).

PALABRAS CLAVE: Índice cefálico; Índice facial; Braquicéfalos; Hiperleptoprosópicos; Población Kosovo-albanesa.

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