

The study of Cephalic Index in Haryanvi population

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ABSTRACT

Cephalic index is an important parameter to find out the race and sex of an unidentified human skeletal remains. Cephalic index and head shape are affected by geographical, gender, age and racial factors. The study was conducted in Department of Anatomy, MM institute of Medical Sciences & Research, Mullana (Ambala), on 600 Haryanvi adults of Bania caste, comprising of 300 males and 300 females. Prior informed written consent was obtained from subjects. Inclusion and exclusion criteria for the study were predefined. The measurements were taken by using standard anthropometric instruments. The purpose of study was to access the maximum head length, maximum head breadth, and to find out the cephalic index. The data were then analyzed by statistical software. The mean CI for males was 66.72 and for females was 72.25. Based on cephalic index, the head shape of 85% of males were Dolichocephalic, 10.66% Mesocephalic, 3.33% Brachycephalic and 1% Hyperbrachycephalic. In females 69.34% were Dolichocephalic, 23.34% Mesocephalic, 6.33% Brachycephalic and 1% were hyperbrachycephalic. The research showed that Haryanvi Baniyas have typical dolichocephalic phenotype and these data presented can be useful in forensic science, anthropology and in genetics.

Key Words: *Cephalic index, dolichocephalic, brachicephalic, mesocephalic.*

INTRODUCTION

Cephalometry is one of the important part of anthropometry in which dimensions of head and face are measured. Cephalometric results are used in pediatrics, forensic medicine, plastic surgery, oral surgery, dentistry and diagnostic comprehension between patient and normal populations¹. Human body dimensions are affected by ecological, geographical, racial, gender, and age factors^{2,3}. On the basis of above factors, anthropometric studies are conducted on the age, sex and racial groups in certain geographical zones¹. The shape of vault is not directly related to the cerebral growth but to the genetic factors. This is supported by the great range of cranial indices and shapes in racial groups however sexual differences are minimal¹.

Cephalic index is very useful anthropologically to find out racial differences. It can also be utilized to find out sexual differences. Comparison of changes in cephalic index between parents, offsprings and siblings can give a clue to genetic transmission of inherited characters.⁴ On the basis of cephalic index head shapes group to four international categories, that includeing dolichocephalic, brachicephalic, mesocephalic and hyperbrachicephalic¹.

Evidence shows a clear racial trend in the cranial dimensions and cephalic indices among different populations such as Caucasians, Indians, turkman and native Fars groups, Kosov and Albanians, Iranians, Japanese, Serbs, Greek, Bulgarians, Mapuche individuals in Chile, Nigerians, Caucasians^{5,6,7}. Anthropometric study of head is useful in designing various equipments of head and face like helmets, head phones, goggles etc by formulating standard sizes⁸.

MATERIAL AND METHODS

The present study was conducted on 600 adult Haryanvi Baniyas (300 of either sex). Prior informed consent both in English & Vernacular were obtained from subjects in writing. The subjects of age group 18 years and above were included in the study .The subjects were apparently healthy and without any craniofacial deformity.

A series of three somatometric landmarks and two anthropometric measurements were taken on 600 Haryanvi Baniyas. The methodology for head measurements was adopted from Krishan and Kumar⁹

SOMATOMETRIC MEASUREMENTS

1. **Maximum head length:**– It measures straight distance between glabella & opisthocranium.
2. **Maximum head breadth:-** It is the maximum biparietal diameter & is the distance between the most lateral points on the parietal bones.

The measurements were taken with the help of a spreading caliper.

$$\text{Cephalic index} = (\text{Head Breadth/ Head Length}) * 100$$

Above indices were determined on the basis of international anatomical descriptions (Williams et al, 1995) Depending upon these indices the types of head were classified as given by Williams et al, 1995.

Head shape	Range of cephalic index (CI) (%)
Dolicocephalic	<74.9
Mesocephalic	75-79.9
Brachicephalic	80-84.9
Hyperbrachicephalic	85-89.9

OBSERVATIONS AND RESULTS

From data statistical analysis was done and observations & results are presented in tabulated form. The mean cephalic index was 66.72 in males & 72.25 in females. The minimum cephalic index was found to be 51.2 in males and 61.37 in females. The maximum cephalic index was found to be 94.54 cm in males & 89.74 cm in females.

Table: 1 Head length

Group	HEAD LENGTH(CM)			Range	
	Mean	S.D	S.E.M	Min	Max.
Males	18.80	1.055	0.0611	16	22.2
Females	17.85	0.779	0.0451	13.6	20

MEAN, STANDARD DEVIATION, STANDRAD ERROR OF MEAN AND RANGE OF TOTAL HEAD LENGTH (CM) IN MALES AND FEMALES

Table: 2 Head Breadth

Group	HEAD BREADTH(CM)			Range	
	Mean	S.D	S.E.M	Min	Max.
Males	12.96	1.095	0.0634	10.6	16
Females	12.89	0.823	0.047	10	14.7

MEAN, STANDARD DEVIATION, STANDRAD ERROR OF MEAN AND RANGE OF HEAD BREADTH (CM) IN MALES AND FEMALES

Table: 3 Cephalic Index

Group	CEPHALIC INDEX			Range	
	Mean	S.D	S.E.M	Min	Max.
Males	66.72	7.642	0.441	51.2	94.54
Females	72.25	5.035	0.291	61.37	89.74

Table: 4 The frequency & % Age of head phenotypes among the 300 males and 300 females

PHENOTYPE	FREQUENCY		%AGE	
	Males	Females	Males	Females
Dolichocephalic	255	208	85	69.34
Mesocephalic	32	70	10.67	23.34
Brachycephalic	10	19	3.33	6.33
Hyperbrachycephalic	3	3	1	1

Table: 5 Comparison of cephalic index (Mean) with other population

Research workers	Country/ people	Cephalic index
Bhargava& Kher, 1960	Bhils of central india	76.98
Bhargava & Kher, 1961	Berelas of central india	79.80
Shah & Jadhav 2004	Gujrat population	80.81
Del Sol, 2005	9 th region of Chile	80.42
Oladipo and Olotu (2006)	Ijaw males	80.98
	Ijaw females	78.24
Oladipo and Olotu (2006)	Igbo males	79.04
	Igbo females	76.83
Golalipour et al ,2006	Gorgan-North of Iran	84.00
Anupama et al(2009)	Medical students of Punjab	85.53
Eroje et al 2010	Ogbia , Niegria	72.96
Ilayperuma I, 2011	Srilankan males	78.04
	Srilankan females	79.32
Jadav et al(2011)	Gujrat population	80.20
Anitha et al(2011)	North Indian popn(Males)	79.14
	North Indian popn(Females)	80.74
Yogain VK et al(2012)	Indians students(Males)	77.92
	Indians students(females)	80.85
Present study (2012)	Haryanvi Baniyas(Males)	66.72
	Haryanvi Baniyas(Females)	72.25

DISCUSSION

The variations in cephalic indices between and within population have been attributed to a complex interaction between genetics and environmental factors¹⁸. In the present study the mean cephalic index in males was 66.72 and in females 72.25. So the dominant type of head shape in male was dolichocephalic(85%) and in female was 69.34%. The findings of dolichocephalic was similar to study done on (Anitha et al,2011) North Indians in which 40.6 % was dolichocephalic and 15.6% was hyperdolichocephalic but the percentage was more than this study & the mean cephalic index is more in previous study. North and central Indian population have Dolichocephalic predominance (Singh & Bhasin, 2006). This is in agreement with the present study.

The similar studies were conducted in different groups and CI was found to be different for different groups due to genetics and geographical factors. The value of mean cephalic index (males & females) in present study is lower as compared to other study however Ogbia Population of Nigeria have value close to Haryanvi population.

CONCLUSION

The mean cephalic index in males was 66.72 and in females was 72.25. So Haryanvi Baniyas showed predominance of Dolichocephalic phenotype in both sexes, 85% (males) and 69.34% (females) and Mesophalic phenotype was 10.67% in males and 23.34% in females and Brachycephalic phenotype was 3.33% in males and 6.33% in females and Hyperbrachycephalic phenotype was about 1% in both sexes. The data for the present study can be used in various branches of sciences like forensic sciences, plastic surgery and oral surgery.

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