The Study of Cephalic Index in Living Subjects in Gujarat Region.

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Abstracts: Background and objectives: The cephalic index exhibits sexual differences and different shapes of head. This information will be highly important for Plastic surgeons, Forensic Scientists, Anatomists, Human Biologists, Criminologists & Physical Anthropologists.Method: The present study was performed on 510 living subjects of Gujarat (243 male and 267 female) of 18 to 30 years in the year of 2011 with the objective to study the sex differences in cephalic index. Cephalic index was investigated with the help of head length and width with the use of spreading caliper.Result: The study showed that mean head length and width were higher in males than in females , while mean cephalic index was higher in females than in males. Interpretation and Conclusion: Predominant head type was mesocephalic in both sexes and there was no significant gender difference (p value > o.o1). [Sapana S et al NJIRM 2012; 3(4) : 54-56]

Key Words: cephalic index, mesocephalic.

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Introduction Anthropometry is a series of systematized measuring techniques that express quantitatively the dimensions of the human body and skeleton[1]. Measurement of cephalic index is important for studies of human growth, population variation and aesthetic surgery. The morphometry of head is the main distinguishing features between different populations, due to their easily discernible features such as hair color, head shape etc.

The most important cranial dimensions are length and width of head that determine the cephalic index. This is used by western and also by Indian researchers in their studies. Cephalic index is calculated as Maximum head breadth / Maximum head length x 100. This provides a data base of craniofacial measurements useful for orofacial surgeons in craniofacial reconstruction.

In the present study, we have calculated cephalic index in the persons from Gujarat.

Material and Methods: The present study has been carried out with the permission from ethical committee and consent of subjects in areas of Gujarat region on a total of 510 (243 males & 267 females) living subjects. The subjects taken for study were medical students, students of other faculties, staffs, patient's relatives from Sir T. Hospital, Bhavnagar and other persons belonging to different regions of Gujarat. The participants who volunteered in the study were healthy and without any obvious craniofacial abnormalities like congenital, developmental or acquired through any form of trauma and had no history of plastic or reconstructive surgery. The age group of 18-30 years was selected.

The method used for assessing the cephalic index in this study is in accordance with Hooten's[1]. The subject was asked to sit in a chair in a relaxed position keeping the mouth closed and teeth in central occluded position and head in anatomical position. Measurements which have been taken are, head width & head length. All the measurements were taken with spreading caliper. Head width was taken from the most lateral point on each side of the skull in the area of the parietal and temporal bones. Head length was taken from glabella (g), the most prominent point between the eyebrows, to Opisthocranium (op), which is situated in the occipital region of the head, most distant from the glabella.

Result: Study was done on 510 living subjects. The gender wise distribution of cranial parameters and cephalic index is shown in table-1.

Table – 1 shows the highly significant difference in head width and length in both sex, but in cephalic

index there is no statistically significant difference in gender.

Table-1 Gender - wise distribution of cranial parameters and cephalic index

Parameters (cm) & index	Mean		Standard Deviation		p value
	M (243)	F (267)	M (243)	F (267)	
Head Width	14.55	14.05	0.82	0.57	**0.000***
Head Length	18.51	17.80	0.76	0.58	**0.000***
Cephalic Index	78.59	78.99	4.30	3.45	**0.242**

(*p < 0.01, Highly significant statistically, M = Male , F = Female)

With the help of cephalic index the study group is divided into different phenotypes of head.This classification is used by western and also by Indian researchers in their studies. [2, 3]

Dolichocephalic = up to 74.9 = relatively long head
Mesocephalic = 75 – 79.9 = head of medium breadth
Brachycephalic = 80 – 84.9 = short head
Hyperbrachycephalic = 85 – 90.9 = very short and wide head
Ultrabrachycephalic = >= 91= extremely round/ short/ broad head

Tabel – 2 shows the different head shapes according to cephalic index.This shows in present study most predominant head shape is mesocephalic in both male and female.

Table-2 Distribution of Cephalic Index (Head Shapes of Present Study)

Phenotype	Sex		Total
	Male	Female	
Dolichocephalic	38	25	63
	60.32%	39.68%	12.35%
Mesocephalic	115	149	264
	43.56%	56.44%	51.77%
Brachycephalic	77	80	157
	49.04%	50.96%	30.78%
Hyperbrachycephalic	13	13	26
	50.00%	50.00%	5.10%
Total	243	267	510
$\chi 2$	**p = 0.11**		

Discussion: Racial and ethnic differences in craniofacial traits of various races have been reported by many researchers. One of the biggest comparative data on various ethnic groups/races in the world was published in 2005 by the late Professor Farkas.[4]

The comparison between present study and the study in Malaysian Indians by Ngeow W C Aljunid,[2] is shown in table – 3.

Table-3 Comparison of the cranial anthropometric norms between Malaysian Indians and present study:

Parameter	Sex	Present study Mean cms. ± SD	Malaysian Indians[2] Mean cms. ± SD
Head width	M F	14.5485± 0.81759 14.0499± 0.56674	15.09± 0.53 14.28± 0.51
Head length	M F	18.5087± 0.76159 17.7992± 0.58334	18.54± 0.68 17.27± 0.58

(M = Male , F = Female)

The comparison of mean values of cephalic indices between different studies and present study is done in Table – 4.

In this study, the cephalic index is not significantly different in both genders. However various studies in other countries have shown gender difference for cephalic index. This may be attributed to the admixture of populations and interaction between genetic and environmental factors.

In present study, we found mesocephalic 51.77%, brachycephalic 30.78%, dolichocephalic 12.35% and hyperbrachycephalic 5.10% (Table – 2). This finding is not similar in other studies in India.

Shah and Jadhav (2004)[6] in India reported that dolichocephalic was 3%, mesocephalic 39.4%, brachycephalic 49% and hyperbrachycephalic 21.7%.

Table-4 Comparison of Cephalic Indices between different studies and present study

Workers	Race	Sample size	Mean cephalic index
Ngeow W.C. & Aljunid [2]	Malaysian Indian	100	82.15
Priyanka Singh and Ruma Purkait [3]	Madhya Pradesh	377	71.45
Golalipour, M.J. Haidari, K. Jahanshahi, M. Farahani, R.M.[5]	Iran-Gorgan New borns	420	Turkman: 77.00 Fars: 77.97
Present Study	Gujarati Population	510	78.80

Garba SH, Numan AI, Mishara IG[7] have found that the dolicocephalic type of head shape was dominant in the Kanuri males (66.7%) and females (43.3%), while the mesocephalic type was dominant in the Babur/Bura males (50%) and females (63.3%).The rare types of head shape observed in this study were the brachycephalic and hyperbracycephalic type being completely absent in the males of both ethnic groups.

Conclusion: There is a highly significant difference found between either sex with values being higher for males than for females. Cephalic index does not show any significant difference in both genders. Distribution according to head shape, show predominantly mesocephalic type in both males and in females; and there is no gender difference.

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