

ANTHROPOMETRIC STUDY OF CEPHALIC INDEX IN SOUTH INDIAN STUDENTS

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ABSTRACT: Cephalic indexes are important components of craniofacial anthropometry. The normal values of these indexes derived from the measured parameters are also important tool to anatomists and craniofacial surgeons for a successful reconstruction in the cranial area. In the present study cranial index of total 500 medical students from 3 medical colleges in south India is studied. The results revealed a significant difference in the cranial index between male and female subjects. The cephalic index recorded a statistical significant difference between males and females. Mean Cephalic Index of the students of south Indian origin was studied using spreading caliper and the finding was 80.64. South Indians shows predominance of mesocephlaic phenotype in both the sexes. Mean Cephalic Index among males was 79.66, in females it was 81.26. The results of this study will be of use in the craniofacial related surgeries.

KEYWORDS: Anthropometry, Cephalic Index, Head length, Head Breath.

INTRODUCTION: Cephalic index is a useful tool for identification and was first identified by Swedish Professor of Anatomy Anders Rezitus (1796-1860). The human body dimensions are affected by ecological, biological, geological racial, sex, and age factors (Golalipour et al, 2003)¹. Cephalic index is very useful anthropologically to find out racial differences (Shah and Jadhav, 2004.)² It can also be utilized to find out sexual differences (Williams et al, 1995)³. The cephalic index is the ratio of the maximum breadth of head to its maximum length.

By means of cephalic index; persons can be classified into following on the basis of international description (Williams et al, 1995).

1. Dolicocephalic: cephalic index below 74.9
2. Mesocephalic: cephalic index between 75 – 79.9
3. Brachycephalic: cephalic index between 80 – 84.9
4. Hyperbrachycephalic: cephalic index above 85.

Variation between and within the population is attributed to complex interaction between genetic and environmental factors (Kasai et al., 1993)⁴. It is also used to analyze evolution of human species in archeology (Douglas, 1990)⁵. It is especially important in forensic practice where cranial remains are compared with existing photographic and radiographic records (Williams et al., 1995)³

MATERIALS AND METHODS: In this study 500 medical students from 3 medical colleges in south India, that is 200 students from S. Nijalingappa medical college, bagalkot in north part of

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Karnataka state, 200 students from Srinivas institute of Medical Sciences mangalore in south part of Karnataka state and 100 students from DM-Wayanad Institute of Medical Sciences, Wayanad in north part of Kerala state were taken as subjects. Among 500 Indian students 300 were male students and 200 were female students. The study included students of south Indian origin and was from all religions, with age group between 18–22 years in a normal healthy state. Study was carried out with protocol presentation and followed by ethical committee clearance.

Instruments used in the study were manual spreading calipers and pencil. Calipers were manufactured in India by UNA and CO, scale reading up to 60cms. Students were informed about the study design, its benefits and privacy of the data collected. Consent form was given to each student and consent was taken.

Students were asked to sit in a relaxed state, straight and looking forward. Head measurements, which were determined by spreading caliper, were included:

Head length = Summit of glabellas to inions (occipital point). Head breadth = maximum horizontal diameter.

Cephalic index was calculated using the formulae: Cephalic index= head breadth/Head length X 100.

Children with craniofacial malformations or a history or signs of craniofacial syndromes were excluded from the study.

RESULTS: From the collected data, statistics were analyzed; observations and results are presented in the tabular form. Results are expressed as Mean, Standard deviation, Number and Percentages.

Cephalic Phenotype	Cephalic Index	Number of students (500)	Percentage
Dolicocephalic	below 74.9	55	11%
Mesocephalic	between 75 – 79.9	225	45%
Brachycephalic	between 80 – 84.9	180	36%
Hyperbrachycephalic	above 85	40	8%

Table 1: Different types of Cephalic phenotypes

Cephalic Phenotype	Cephalic Index	Number of students- Male		Number of students- Female	
		Number	Percentage	Number	percentage
Dolicocephalic	below 74.9	39	13	16	8
Mesocephalic	Between 75 – 79.9	141	47	84	42
Brachycephalic	between 80 – 84.9	102	34	78	39
Hyperbrachycephalic	above 85	18	6	22	11
Total		300	100	200	100

Table 2: Different types of cephalic phenotypes of Males and Females

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Gender	No of subjects	Cephalic index			Between male & female		
		Minimum	Maximum	Mean	Mean difference	t* value	P
Male	300	65.21	92.56	79.66 ± 4.46	1.6	1.72	0.009
Female	200	73.34	91.78	81.26 ± 3.78			
Total	500	65.21	92.56	80.64± 4.28			

Table 3: Comparison of Cephalic Index in Males and Females

* Student's t-test

P < 0.05, Significant

P > 0.05 not Significant

DISCUSSION: In present study, involving subjects from south part of India, 300 males and 200 females were studied, mean and standard deviation of Cephalic Index for males 79.66 ± 4.46 and for females 81.26 ± 3.78.

In males 13% dolichocephalic, 47% mesocephalic, 34% brachycephalic and 6% Hyperbrachycephalic.

In females 8% dolichocephalic, 42% mesocephalic, 39% brachycephalic and 11% Hyperbrachycephalic.

Predominance of mesocephalic head was noticed in both males and females with cephalic index between 75 and 79.9. On comparison of Cephalic Index of males and females the value were found to be not statistically significant.

Sl. No.	Race	Workers	Number	Mean cephalic index
1	kayasthas of Bengal	Basu (1963)	100	79.50
2	Bhills of Madya Pradesh	Bharghav & Kher (1960)	100	76.98
3	Gujarati	Shah, G.V. & H. R. Jadhav (2004)	302	80.42
4	Indian	Yagain A et al (2012)	100	80.85
5	North Indian	Anita M. R. et al (2011)	100	80.74
6	South Indian	Present study (2014)	500	80.64

Cephalic Index in different Indian groups compared with present study

This study showed that the mean cephalic index of female was significantly higher than those of male. Comparing previous records of cephalic index with recent work proves tendency towards "Mesecephalisation" - evidence of continuous growth of brain more in the lateral direction (Shah and Jadhav)⁶. Also, in tropical zones head form is longer (dolichocephalic), but in

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temperate zones the head form is more round (mesocephalic or brachycephalic) (Bharati et al., 2001)⁷. Since India is in the partly in temperate and tropical zone, the present classification shows tendency to mesocephalization from dolicocephalic.

The variations of head shape may be due to hereditary factor or environmental which may act as secondary effect (Golalipour et al., 2007)¹. The kind of diet taken could also play a role in influencing the dominant head shape. Head shapes can also change from one generation to the other. For instance, in the first generation of Japanese immigrants in Hawaii it was noticed that they had an increased head breadth, a decreased head length and a higher cephalic index than their parents (Heravi & Zieaee, 2002)⁸. With the help of above statistics the sex as well as race of the deceased can be determined accurately. This knowledge is of immense importance to anthropologists as well as forensic science experts.

CONCLUSION: Mean Cephalic Index of the students of south Indian origin was studied using spreading caliper and the finding was 80.64. South Indians shows predominance of mesocephalic phenotype in both the sexes. Mean Cephalic Index among males was 79.66, in females it was 81.26. This shows that there was no significant gender difference in the Cephalic Index in subjects from southern regions of India. The data from the present study can be used in various branches of medicine like forensic medicine, plastic surgery, oral surgery, pediatrics, dentistry for comparison between patient and normal population. The observations and results of this study may provide platform for similar extended cephalometric studies based on various geographical zones.

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