

Study of cephalic index in students of rural area in Maharashtra

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Abstract

Background: Cephalic index and head shape are greatly affected by geographical, sex, age and racial factors. **Objectives:** To study various skull types and cephalic indexes in medical students. **Material and Methods:** This cross sectional study on 100 medical students was carried out to rural medical campus in Marathwada region. Cephalic index was calculated by breadth of the skull multiplied by 100 divided by the length. Data was analyzed using SPSS version 17. **Results:** Out of total 100 students, male were 50 (50%) and 50 (50%) were females. cephalic index most commonly seen was mesocephalic in 48 (48%), next common was brachycephalic in 29 (29%), least common was hyperbrachycephalic in 3 (3%). The mean length of skull in males was 18.76 ± 3.74 and mean breadth was 15.23 ± 2.71 cm. The mean length of skull in females was 17.30 ± 1.82 cm and mean breadth was 13.55 ± 1.91 cm. The mean cephalic index \pm SD in males and females was 81.1 ± 2.1 and 78.3 ± 3.3 respectively. The overall mean cephalic index of the study was 79.7 ± 4.7 SD. No statistical significance between two gender. **Conclusions:** Our study concludes that values of CI in different genders varies but not to great extent. Mesocephalic type of CI was seen in this study.

Keywords: Cephalic index, Dolichocephalic, Mesocephalic, Brachycephalic

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INTRODUCTION

Cephalic index also called as cranial index or Index of breadth is one of the important parameter that helps to differentiate between different human races.¹ The most important of cephalometric dimension are height and breadth of head that they used in cephalic index determination. Cephalic index is very useful anthropologically to find out racial and sexual differences.^{2,3} The human body dimensions are affected by ecological, biological, geographical, racial, sex, and

age factors.⁴ The cephalic index (CI) is calculated as the breadth of the skull multiplied by 100 divided by the length. Cephalic index is classified in three broad categories- dolichocephalic (<75), mesocephalic (75-80) and brachycephalic (>80). Australian aborigines and native southern Africans are dolichocephalic, Europeans and the Chinese skulls are mesocephalic and Mongolians and the Andaman Islanders have brachycephalic skulls.^{3,5} It has forensic as well as Anthropological importance where variation in race and sex can be determined.⁶ Cephalometry is of paramount importance in studying remains of the cranial bone which can be compared with same photographs of the same. It also helps in identifying disputed identity.⁷ There were less data available on this topic in this areas so we conducted this study to find out variation in shapes of skulls.

MATERIAL AND METHODS

This descriptive, cross sectional study was carried on 100 medical students in Swami Ramanand Teerth Rural Government Medical college, Ambajogai. Out of 100

students we have taken 50 males and 50 females for comparison. The age of the students was ranged from 20 to 25 years. Measurements for cephalic index were taken with the students sitting on chair. The method used for assessing the cephalic index is Hrdlicka’s method. All the students were informed about study procedure and asked to sit in a relaxed state, straight and looking forward. Head measurements were determined using spreading calipers. Ethical committee clearance was taken prior to

study. The anatomical landmarks, glabella (point above the nasal root between the eyebrows and intersected by mid sagittal plane), inion (distal most point placed on the external occipital protuberance in the mid sagittal plane) and euryon (lateral most point placed on the side of the head) were marked. **Head length:** measured from glabella to inion. **Head breadth:** measured as the maximum transverse diameter between the two euryons.

RESULTS

$$\text{Cephalic index} = \frac{\text{Head Breadth}}{\text{Head Length}} \times 100$$

Table 1: Types of head shapes are as follows³

Type of skull	Cephalic Index Range
Dolichocephalic	< 74.9
Mesocephalic	75 - 79.9
Brachycephalic	80 - 84.9
Hyperbrachycephalic	85 - 89.9

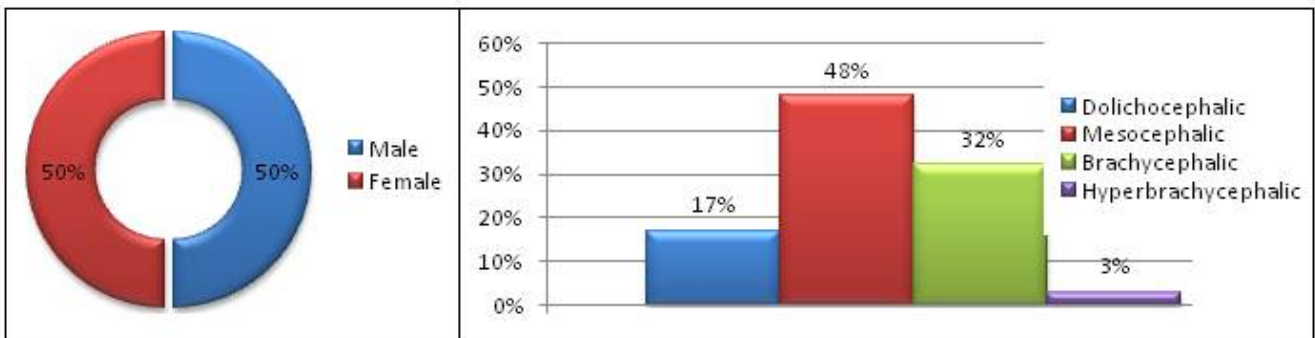


Diagram 1: Distribution as per gender

Diagram 2: Distribution as per cephalic index

In this study we have taken 50 (50%) males and 50 (50%) females for comparison.

Most common skull type as per cephalic index seen was mesocephalic in 48 (48%), next common was brachycephalic in 29 (29%), least common was hyperbrachycephalic in 3 (3%).

Table 1: Head length and breadth in males

Variables	Minimum (cm)	Maximum (cm)	Mean±SD (cm)
Head length	16.3	20.5	18.76±3.74
Head breadth	13.5	16.3	15.23±2.71

The mean length of skull in males was 18.76±3.74 and mean breadth was 15.23±2.71 cm.

Table 2: Head length and breadth in females

Variables	Minimum (cm)	Maximum (cm)	Mean±SD(cm)
Head length	15.9	19.1	17.30±2.82
Head breadth	11.8	15.8	13.55±2.91

The mean length of skull in females was 17.30±1.82 cm and mean breadth was 13.55±1.91 cm.

Table 3: Gender distribution of cephalic index

Gender	Total	Cephalic index		
		Minimum	Maximum	Mean ± SD
Male	50	57.9	93.7	81.1 ± 2.1
Female	50	55.8	92.3	78.3 ± 3.3
Total	100	56.9	93	79.7 ± 4.7

The maximum and minimum cephalic index in males was found to be 57.9 and 93.7 respectively, while in females it was 55.8 and 92.3 respectively. The mean cephalic index \pm SD in males and females was 81.1 ± 2.1 and 78.3 ± 3.3 respectively. The overall mean cephalic index of the study was 79.7 ± 4.7 SD. Means skulls type in this study was mesocephalic.

DISCUSSION

In India, various studies have been done on the North Indians, West Indians and South Indians groups. However there is relative lack of literature on Cephalic Indices in the East Indian populations, hence our study targeted specifically students of rural Marathwada region of Maharashtra. Out of total 100 medical students selected for this study, 50 were males and 50 females. Similar was seen with Sanjay Gupta *et al*⁸ study with 1:1 male to female ratio. While higher male percentage of 74% was seen with Ghosh R⁹ study. In this study the most common skull type as per cephalic index seen was mesocephalic in 48 (48%), students, next common was brachycephalic in 29 (29%), dolichocephalic 17 (17%) least common was hyperbrachycephalic in 3 (3%). This finding was supported by various other studies. A study done by Shema K Nair *et al*⁷ in Bhopal also had mesocephalic skull as most common type seen in 43.6% cases. Shah GV *et al*² study from Gujarat also who found mean cephalic index as mesocephalic. Swapnali Khair *et al*¹⁰ study in Mumbai also supported our findings. Unlike our finding in a study done by Ghosh R⁹ most common skull type seen was Brachycephalic group in 68 (34%) among the total number of 200 students. Yagain VK *et al*¹¹ study from Manipal found brachycephalic skull in 33% cases. In the present study the mean length of skull in males was found to be 18.76 ± 3.74 cm. The minimum and maximum value for length of skull in males was 16.3 cm and 20.5 cm respectively. In a study by Mahajan A *et al*¹² in Punjab the head length in males varied from 14.01 cm to 21.92 cm and the mean head length was 18.58 cm. In Yagain VK *et al*¹¹ study mean length in males was 18.76 cm. In present study head breadth in males varied from 13.5 cm to 16.3 cm with mean head breadth of 15.23 ± 2.71 cm. Similarly in Mahajan A *et al*¹² study the head breadth varied from 12.03 cm to 17.92 cm, and the mean head breadth being 15.68 cm. In Yagain VK *et al*¹¹ study it was 14.59 cm. In this study the mean length of skull in females was 17.30 ± 2.82 cm (range 15.9-19.1 cm) and mean breadth was 13.55 ± 2.91 cm (range 11.8-15.8), this finding was supported by Yagain VK *et al*¹¹ study with mean length of 17.67 and mean breadth of 14.17 in their study. The mean cephalic index \pm SD in present study in males and females was 81.1 ± 2.1 and 78.3 ± 3.3 respectively and the overall cephalic index was 79.7 ± 4.7

(ranged 56.9- 93). In Shah GV *et al*² the mean cephalic index in both sex was 80.81 (ranging from 71.10 to 89.77). Bhargava I *et al*¹³ found mean cephalic index of 76.98 and Basu A *et al*¹⁴ found index of 79.50. In west Bengal study by Ghosh R⁹ the mean overall CI was 81.09 ± 3.42 . In Yagain VK *et al*¹¹ study in Manipur it was found to be 77.92. All these studies were in support of our study finding. Also when compared with various countries findings such as European (81.19), North of Europe (79.72) (Garcia HF *et al*¹⁵), Chile (81.51) (Garcia HF *et al*¹⁶), Iran 80.4 (Golalipour MJ *et al*¹⁷), all these studies had higher cephalic index than our study. This was may be because of racial variations.

CONCLUSION

Cephalic index is incredibly helpful anthropologically to search out racial and sexual variations. However we've not found any important distinction of CI in either of the genders. It's necessary in measuring indices, in diagnostic data between the patient and traditional populations and within the medico-legal cases of forensic pathology.

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