Indian Internet Journal of Forensic Medicine & Toxicology
Vol. 10, No. 4 October-December 2012, 104-106
DOI : 10.5958/j.0974-4487.10.4.030

Brief Communication

Cephalic Index of the Northern Bangalore: A Preliminary Study

R Dayananda[1]*, P Sampath Kumar[2]
[1]Assistant Professor, Department of Forensic Medicine, Sri Devaraj Urs Medical College, Tamaka, Kolar
[2]Professor and Head of Department, Sri Ramamchandra Medical College and Research institute, Chennai, Tamil Nadu, India

*E mail Id: drdaya.r@gmail.com

ABSTRACT

The cephalic index is the ratio of the maximum breadth of head to its maximum length. Cephalic index is very useful anthropologically to find out racial difference. The present study was carried out on 200 subjects (100 males and 100 females) in Hymanshu Jyothikala Vidyapeetha, Bangalore. The mean cephalic index was 83.5. The mean cephalic index for male was 81.7 and for female was 85.3. Cephalic index of the female is higher than the male. The difference between male and female cephalic index was significant. Majority of the study group were brachycephalic.

Keywords: Cephalic index, head length, head breadth.

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[1]. So far, many studies have been conducted in various parts of India and abroad applying the techniques of anthropometry. The science of anthropology uses many parameters that can be measured and compared with various subjects. Cephalic index is one among the lot.

Cephalic index is the terminology used in anthropology for having an easy identifying module or numerical to distinguish the given sample or individual, either into race, sex or even as identity of the individual[2]. Cephalic index was first identified by Swedish Professor Anders Rczitus, who used physical anthropology to classify ancient human remains found in Europe. For more than 150 years, cephalic index was used as a tool to classify individuals into racial categories. This helps us to determine the identity of a person in conditions of mass disasters. This evidence can be utilised as it is not time consuming, easy and cost effective[3].

MATERIALS AND METHODS

The present study was carried out with 200 (100 males and 100 females) students of Hymanshu Jyothikala Vidyapeetha, Bangalore, with prior ethical clearance. Only students belonging to northern regions of Bangalore were selected for the study.

The anatomical landmarks, glabella (g), inion (I) and euryon (eu) were marked. The anatomical landmarks were defined as follows:

Glabella: A point above the nasal root between the eyebrows and intersected by mid-saggital plane.

Inion: The distal most point placed on the external occipital protuberance in the mid-saggital plane.

Euryon: The lateral most point on the side of the head.

All the measurements were taken with subjects sitting on the chair; head in anatomical position. The each measurement was taken to the nearest 1 mm. The head length was measured with spreading caliper with scale from glabella to inion. Head breadth was measured as the maximum transverse diameter between the two euryons using spreading caliper with scale. The process

of measurements was explained to each and every subject. The written consent obtained from each and every subject before taking measurements.

Cephalic index was calculated as maximum breadth of head / maximum length x 100.

The results were tabulated and analysed.

RESULTS

The minimum cephalic index in males and females was 72.3 and 75.1, respectively. Maximum cephalic index obtained in males and females was 88.1 and 95.4, respectively (Table 1). The mean cephalic index was 81.7 and 85.3 in males and females, respectively. The difference in sex was statistically significant. The mean cephalic index was 83.5.

Table 1: Comparison of cephalic index between the genders of the study population

Sex	Minimum cephalic index	Maximum cephalic index	Mean cephalic index
Male	72.3	88.1	81.7
Female	75.1	95.4	85.3

The maximum length of the skull ranged from 14.2 to 21.7 cm in males and 14.4 to 21.9 cm was the range in females (Table 2). The maximum breadth varied from 11.9 to 17.8 cm and 11.7 to 17.5 cm in males and females, respectively (Table 3). Majority of the males were mesocephalic (75–79.9; 45%) and brachycephaly (80–84.9; 53%) was most common in females (Table 4).

Table 2: Comparison of head length of males and females

Sex	Minimum length of the skull	Maximum length of the skull	Mean length of the skull
Male	14.2	21.7	18.5
Female	14.4	21.9	18.1

Table 3: Comparison of head breadth in males and females

Sex	Minimum breadth of the skull	Maximum breadth of the skull	Mean breadth of the skull
Male	11.9	17.8	15.6
Female	11.7	17.5	14.5

Table 4: Cephalic phenotypes of the study population

	Male	Female	Total
Dolichocephalic (65–74.9)	09	00	09
Mesocephalic (75–79.9)	45	23	68
Brachycephalic (80–84.9)	29	53	82
Hyperbrachycephalic (85–89.9)	17	21	38
Ultrabrachycephalic (90–94.9)	00	03	03
Total	100	100	200

DISCUSSION

Gender and racial variation in the cranium were recorded by Williams *et al.*[4], who studied 500 (302 males and 198 females) medical students of Gujarat. The mean cephalic index for male was 80.42 and for female was 81.20. Most of their subject belongs to mesocephalic group[4]. Except for the male cephalic index, others are not similar to the results obtained in our study, this could be because human body are affected by ecological, biological, geographical, racial, gender and age factors.

Lobo *et al.*[5] studied 267 (157 males and 110 females) subjects of Gurung village, Nepal. The mean cephalic index for male was 83.10±6.08 and for female was 84.60±5.14. Most of their subject belongs to brachycephalic group[5]. The mean cephalic index of males is slightly more compared to our study, but the cephalic index of females and brachycephaly was similar to our study.

Mahajan *et al.*[6] studied 400 medical students of Punjab aged 17–23 years. The mean cephalic index for male was 81.34 and for female was 85.75[6]. The difference between the mean cephalic index of male and female of

Table 5: Comparison of cephalic index in different populations

Population	Cephalic index
West Africa[7]	77.89
Sri Lanka[8]	78.54
Bayelsa, Nigeria[5,9]	72.96
Southwestern Nigeria[10]	72.54
Bengal, India[11]	79.5
Central India[12]	79.8
Gujarat, India[13]	80.42
Saurashtra, India[14]	73.89
Bombay, India[14]	77.9
Present study	83.5

Punjab was statistically significant. Punjabi community can be categorised as brachycephalic. The results were similar to the results obtained in our study.

The cephalic index for males was significantly lower when compared to females. The smaller breadth of the head could be the reason for lower cephalic index in males when compared to females.

Cephalic index in the present study was higher than that described in other studies on different populations in abroad[7–10] and in India[11–14]. In the present study, the dominant cephalic phenotype was the brachycephalic. Table 5 shows the comparison of cephalic indices in different populations. The West African[7] and Sri Lankan[8] populations have commonly showed mesocephalic type, whereas Bayelsa[9] and Southwestern[10] population from Nigeria commonly showed dolicocephalic type of head. Indian populations from Bengal[14], Central India[12] and Bombay[7] have commonly showed the mesocephalic type of head. Whereas Gujarat[6] and Saurashtra populations[7] have commonly showed brachycephalic and dolichocephalic types, respectively.

It is clear from the above discussion that cephalic index differs in different regions of the country and obviously in different regions of the world. The reason for this could be attributed to evolutionary changes occurring in the growth of the head as some of these studies were conducted about 40–50 years ago. Also, this could be due to difference in the growth pattern, which depends on the environmental factors and habits. We recommend similar studies involving more number of subjects to create most recent cephalic index databases for different regions in India.

CONCLUSION

- The mean cephalic index was 81.7 and 85.3 in males and females, respectively.
- The majority of males and females were mesocephalic and brachycephalic, respectively.
- Majority of the Northern Bangaloreans were brachycephalic with mean cephalic index 83.5.
- The cephalic index was higher for females as compared to males.
- The difference between male and female heads cephalic index was significant.

REFERENCES

1. Eickstedt EV. The races and types of the western Himalayas. Man in India 1926; 6: 237.
2. Rao NG. Text book of Forensic Medicine and Toxicology. 2nd Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi; 2010: pp 93-94.
3. Vijayanath V, Anitha MR, Raju K, Vijayamahantesh V. Cephalic index of the western Indian population: A preliminary study. J SIMLA 2012; 4(1): 15-18.
4. Williams PL, Bannister LH, Dyson M, Collin, Dussek JE and Ferguson JWM. Gray's Anatomy, 38th Edition, Chur-chill Livingstone, Edinburgh, London 1995: pp 609-612.
5. Lobo SW, Chandrasekhar TS, Kumar S. Cephalic index of Gurung community of Nepal – an anthropometric study. KUMJ 2005; 3(3): 263-265.
6. Mahajan A, Khurana BS, Batra APS. The study of cephalic index in Punjab students. J Punjab Acad Forensic Med Toxicol. 2009; 9(2): 15-17
7. Odokuma EI, Akpuaka FC, Igbigbi PS, Otuaga PO, Ejebe D. Patterns of cephalic indexes in three West African populations. Af J Biotechnol 2010; 9: 1658-1662.
8. Ilayperuma I. Evaluation of cephalic indices: a clue for racial and sex diversity. Int J Morphol 2011; 29: 112-117.
9. Eroje MA, Fawehinmi HB, Jaja BN, Yaakor L. Cephalic Index of Ogbia Tribe of Bayesla State. Int J Morphol 2010; 28: 389-392.
10. Adejuwon SA, Salawu OT, Eke CC, Femi-Akinlosotu W, Odaibo AB. A craniometric study of adult human skulls from southwestern Nigeria. Asian J Med Sci 2011; 3: 23-25.
11. Arbinda B. Anthropometry of the Kayasthas of Bengal with reference to Vangaja Kayastha. J Anat Soc Ind 1963; 12: 20-25.
12. Indra B, Kher GV. A comparative anthropometric study of Bhils and Barelas of central India. J Anat Soc Ind 1961; 10: 31-33.
13. Sha GV, Jadhav HR. The study of Cephalic Index in students of Gujarat. J Anat Soc Ind 2004; 53: 25-26.
14. Kate BR. Anthropometry of sickle cell anemia patients. J Anat Soc Ind 1977; 26: 99-101.