# Cephalic Index of Eastern Part of Indian Population

**Vijayanath.V***

**Anitha M.R****

**Raju G.M*****

**Vijayamahantesh S.N.******

## ABSTRACT

**Background and objectives:** Cephalic Index is an important parameter for deciding the race and sex of an individual whose identity is unknown. The present study was undertaken : 1) To determine the Cephalic Index in students coming from Eastern region of India, 2) To know the distribution and role of sex on Cephalic Index. **Methods:** Students were selected in the age group of 17-20 years coming from Eastern region of India. Maximum head breadth and maximum head length were taken using spreading caliper and Cephalic Index was determined. **Results:** Mean Cephalic Index of the students coming from Eastern region of India is 80.74. Distribution of Mean Cephalic Index among males was 80.20 and females 81.72. **Conclusion:** The results of these measurements are used in Pediatrics, Forensic Medicine, Plastic surgery, Oral surgery, Dentistry and Diagnostic comprehension between patient and normal population.

**Key words:** Race; Anthropology: Cephalic Index;

## INTRODUCTION

Charles Darwin defined evolution as "Descent with modification". It is simply genetic change over time. The principles of modern evolutionary theory have withstood years of scrutiny and scientific challenges. Physical anthropology is a science founded on evolutionary and genetic principles. It is important to realize that evolution is a documented fact. The relative frequencies of genes change over time because of several evolutionary processes or mechanisms. Mutation, genetic drift, migration, hybridization, gene flow and isolation are important among them. Natural selection is the guiding force of evolution.

Biological anthropology is the science that considers human as biological organisms in terms of both their evolutionary history and biological variation.

$$\text{Cephalic Index}^1 = \frac{\text{Maximum head breadth}}{\text{Maximum head length}} \times 100$$

**Author's Affilation:** *Associate Professor, Department of Forensic Medicine & Toxicology, ** Assistant Professor, Department of Anatomy, S.S. Institute of Medical Sciences & Research Centre, Davangere-577005. ***Assistant Professor, Department of Forensic Medicine & Toxicology, J.J.M.Medical College, Davangere-577004. ****Associate Professor, Department of Forensic Medicine, S. Nijalingappa Medical College, Navangar, Bagalkot-587102.

**Reprint's request: Dr. Vijayanath.V**, MBBS, MD, DNB, MNAMS, Associate Professor, Department of Forensic Medicine & Toxicology, S.S. Institute of Medical Sciences & Research centre, Davangere-577005, Karnataka. E-mail; drvijayanath@rediffmail.com, Contact No;-99866-16961

Cephalic Index was studied by Franz Boas between 1910 and 1912 that most effectively challenged the value of the method. Boas studied the children immigrants to the United States noting that children's Cephalic Index differed significantly from their parents implying that local environmental condition has a significant impact on the development of the head shape.[2] Present study was undertaken to find out the cephalic index of the eastern region of India.

## MATERIALS AND METHODS

To study Cephalic Index (CI) of eastern region of India, students were selected in the age group of 17-20 years coming from different regions of India. As per the survey of India outline map, India as a whole has been divided into four regions, they are North, East, West and South. States, which are included in the eastern region are, Assam, Bihar, Orissa, West-Bengal and Jharkand.

### Source of data

1.  Medical students studying in J.J.M. Medical College, Davangere.

2.  Medical students studying in S.S Institute of Medical Sciences and Research Center, Davangere.

3.  Dental students in College of Dental Sciences, Davangere.

4.  Dental students in Bapuji Dental College and Hospital, Davangere.

Consent of the students was taken to measure the head length and head breadth, and they were asked to fill the proforma before taking the measurements. They have also consented for their names to be included in master chart to be published. College Ethical Committee clearance has been taken for the above study.

### Data collected

*Maximum breadth of the head.

*Maximum length of the head.

## Method of collection of data

Head measurements are determined by Spreading caliper with subject sitting in relaxed condition and head in Anatomical position. Spreading caliper is used for taking measurements of head. It consists of two long arms which are curved outwards and bounded at one end. This is having both side blunt ends, which is used for taking measurements from livings. A meter scale is fixed to one of the arms, which passes through a socket on the other arm.

Land marks taken to determine the maximum head breadth and maximum head length[8]:

1.  Glabella: the most prominent point in the mid sagittal plane between the eyebrows.

2.  Opisthocranion: the point of most backward projection of the head in the mid plane.

3.  Eurion; the most lateral point on the side of the head.

Maximum head length is the distance between the glabella and the opisthocranion and maximum breadth is calculated between the eurion of both side found at a point over each parietal bone.

The landmark must be the horizontal and frontal plane. Hold the spreading caliper in such a manner either behind or in front of the subject that the joint of the caliper is in the mid-sagittal plane of the head. Now slide the tips of the caliper from forward to backward and vice versa in zigzag manner. Take the maximum reading. Note that the line joining the two tips of the caliper must be at right angles to the mid sagittal plane.[2]

## RESULTS

The collected data statistically analyzed and the results are presented in the table with Mean, Standard deviation, Number and Percentages. The table -1 depicted that in the Eastern region of India out of 130 males the maximum were mesocephalic (41.5%) followed by brachycephalic (40.0%), hyperbrachycephalic (10.85) and dolichocephalic (7.7%). While in female maximum were brachycephalic (48.6%), followed by mesocephalic (28.65), hyperbrachycephalic (14.3%),

ultrabrachycephalic (5.7%) and only 2.9% were dolichocephalic.

**Table 1: Different types of cephalic phenotypes of Males and Females in eastern part of India**

| Cephalic phenotype | Cephalic Index | Male | | Female | | Total | |
|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % |
| Ultradolichocephalic | 55.0 to 59.9 | - | - | - | - | - | - |
| Hyper dolichocephalic | 60.0 to 64.9 | - | - | - | - | - | - |
| Dolichocephalic | 65 to 74.9 | 10 | 7.7 | 02 | 2.9 | 12 | 6 |
| Mesocephalic | 75 to 79.9 | 54 | 41.5 | 20 | 28.6 | 74 | 37 |
| Brachycephalic | 80 to 84.9 | 52 | 40.0 | 34 | 48.6 | 86 | 43 |
| Hyperbrachycephalic | 85 to 89.9 | 14 | 10.8 | 10 | 14.3 | 24 | 12 |
| Ultrabrachycephalic | 90.0 to 94.9 CI < 94.9 | - | - | 04 | 5.7 | 04 | 02 |
| Total | | 130 | 100 | 70 | 100 | 200 | |

It showed in table-2 that the maximum Cephalic Index (CI) in male was 89.90 units and in female 90.80 units; and minimum Cephalic Index in male was 71.60 units and in females 67.40 units. Mean Cephalic Index in male was 80.20 units and in females 81.72 units. Predominant Cephalic phenotype found in this region was brachycephalic.

**Table 2: Comparison of Cephalic Index in Males and Females**

| Region | Gender | No. of subjects | Cephalic Index | | | Ref. Range (95% CI) | Male Vs Female | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | Mean ± SD | | Mean Diff. | t-value* | P |
| Eastern India | Male | 130 | 71.6 | 89.9 | 80.20 ± 3.75 | 72.70 – 87.70 | 0.14 | 1.79 | 0.08 (NS) |
| | Female | 70 | 67.4 | 90.8 | 81.72 ± 4.58 | 72.56 – 90.88 | | | |
| | Total | 200 | 67.4 | 90.8 | 80.74 ± 4.11 | 72.52 – 88.95 | | | |

* Student's t-test

P < 0.05, Significant

P > 0.05 not Significant

## DISCUSSION

Recently morphological methods have been employed for devising proper equipment for industry and defence forces. Combining with Physiologists, Psychologists and Engineers, Anthropologists have helped in designing the spaceship for convenience of astronauts. They have made valuable contribution in the designing of aircrafts, uniforms and other specialized equipments for defence personnel. Anthropometrical surveys provide norms about

the physique of national populations. Trends of change are studied by such consecutive surveys for number of years. Estimates for some physiological functions like basal metabolism, vital capacity, nutritional requirements etc. can be estimated by means of anthropometrical data. They help to indicate the need for medical and public health programmes.

In the present study conducted in Eastern region of India mean head breadth in males was 14.06 cms and in females 13.80 cms; mean length in males was 17.51 cms and in females 16.92 cms. Maximum Cephalic Index in male was 89.90 units and in female 90.80 units; minimum Cephalic

Index in male 71.60 units and in females 67.40 units. Mean Cephalic Index in male was 80.20 units and in females 81.72 units. Predominant Cephalic phenotype found in this region was brachycephalic which is quite different from the study conducted earlier, which had showed predominance of mesocephalic group.[4]

According to study conducted in 1963 of Kayashtas in Bengal[4] (Eastern region of India) mean head breadth varied among sub groups of Kayastha from 14.12 cms to 14.95 cms, head length varied from 18.32 cms to 18.52 cms, mean Cephalic Index varied between 76 and 80 units, which put them in the mesocephalic group.

### Cephalic Index in different Indian groups compared with present study

| Sl. No. | Population | Workers | Sample No. | Mean Cephalic Index |
|---------|-----------|---------|-----------|---------------------|
| 1 | K. Vangaja | Basu (1963)[4] | 100 | 79.50 |
| 2 | Bhils | Bhargav and Kher (1960)[5] | 100 | 76.9 |
| 3 | Barelas | Bhargav and Kher (1961)[6] | 100 | 79.80 |
| 4 | Gujarati | Shah GV and Jadhav HR (2004)[7] | 302 | 80.42 |
| 5. | Mahers | Karte (1951)[8] | 100 | 73.89 |
| 6. | Bombay | Karte (1951)[8] | 100 | 77.9 |
| **Present study** | | | | |
| 7. | Eastern Indians | Present study | 200 | 79.72 |

## CONCLUSION

Mean Cephalic Index of the students of eastern part of Indian origin was studied using spreading caliper and the finding was – 79.72. Eastern regions showed predominance of  mesocephlaic phenotype in both the sexes. Mean Cephalic Index among males was 79.14 in females it was 80.74

This shows that there was no significant gender difference in the Cephalic Index in subjects from eastern part of India. Although the components of cephalic index are rarely used alone for the race determination, these measurements are the foundations for several prominent approaches.

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.

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