THE STUDY OF CEPHALIC INDEX IN EASTERN ODISHA POPULATION

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ABSTRACT

BACKGROUND

Morphology of all living beings undergo some changes during life. It is variable in individuals in same species. Referring the various works on cephalic index and observing socioeconomic status of Eastern Odisha, this study was done to find out the distribution of cephalic index in the population of Eastern Odisha.

METHODS

This cross-sectional study covered 2050 outdoor patients of Eastern Odisha which includes the coastal districts of Odisha. Using spreading calipers maximum length and maximum breadth of the head were recorded. Cephalic Index= (Maximum Head Breadth/ Maximum Head Length)*100. Based on this calculated cephalic index, skulls are classified as Dolichocephaly, Mesocephalic, Brachycephalic and Hyper-brachycephalic.

RESULTS

From this present study, it was observed that mean cephalic index in females is higher than that of males. In males, maximum skulls were mesocephalic followed by dolichocephalic but in females, maximum were mesocephalic followed by brachycephalic. This study is in agreement with the study of Dr. Sunita Patro et al. e-ISSN:2279-0853, p-ISSN:2279-0861 vol. 13, Issue I, Ver VII (Jan, 2014) PP. 41-44 with a difference in measurements being on the higher side.

CONCLUSIONS

This may be accounted for social/nutritional influences on growth pattern. Dietary habit may also be a factor. This study is aimed to help surgery, FMT, Anatomy, Anthropology and the Study of Evolution.

HOW TO CITE THIS ARTICLE: Das RK, Mohanty S. The study of cephalic index in Eastern Odisha population. J. Evolution Med. Dent. Sci. 2019;8(13):965-968, DOI: 10.14260/jemds/2019/216

BACKGROUND

Changes are expected in all living beings on Morphology. In the same species also, changes may occur due to different factors like nutrition, culture, nature of work etc.¹⁴ Also, age and sex differences are marked.

Cephalometry is a simple procedure with less error and is very practical. The said index can be used as a tool for analysis of differences in individuals. This can be studied from information gathered from children and parents.^{2,10}

Regarding the effect of geography, ethnicity and racial factors on head dimensions, the present study was aimed to elucidate the norms of cephalic indices^{3,1}, the type of head shapes and sexual dimorphism in Eastern Odisha. Different dimensional measurements in anthropometry were taken into consideration and required calculations^{6,8,9} referring to the standard deviation in the system. The present study was done in Eastern Odisha population with reference to the study of Dr. Sunita Patro et. al. where they had conducted their study in another zone of the Odisha (Southern Odisha).^{9,11,16}

'Financial or Other Competing Interest': None.
Submission 09-12-2018, Peer Review 01-02-2019,
Acceptance 09-02-2019, Published 01-04-2019.

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DOI: 10.14260/jemds/2019/216

METHODS

Year of Study

2016.

Study Design

Cross Sectional Study

Samples were taken from 9 (nine) coastal districts of Eastern Odisha from where the patients and their accompanying relatives depended upon SCB Medical College and Hospital, Cuttack, Odisha. After obtaining consent from them, the due measurements were made. While taking measurements, some issues were noted early like deformities due to nutritional factors, genetic deformities, etc. Such cases were excluded from the present study. All the measurements were taken with the person sitting in the chair in relaxed condition and the head in the normal anatomical position. The method used for accessing cranial index was Hrdlick's Method.¹² The maximum head length was measured as the maximum antero-posterior diameter by spreading calipers from glabella to irion. The maximum head breadth was measured as the maximum diameter between the two euryons using spreading calipers (electronic width sensitivity of 0.1 mm).

All measurements were taken in millimeters to an accuracy of 0.1 fraction. The cephalic indices were calculated by multiplying the head breadth with 100 and dividing it by the head length. These indices express the type of head shapes which were classified as given by William's et. al., 1995.⁵ The variations have been reported to exhibit a clear

racial or zonal trend. The strategically important points during osteometry procedures which would enlighten the neural or vascular complications that might arise after any surgery on head and neck. The relevant data on cephalic index of a population is very much essential in designing various orthopedic and physiotherapy equipment of head and face like cranial remodeling band (helmet), headphones, goggles etc. by formulating standard sizes.

In the present study, 2050 outdoor patients of SCB Medical College and Hospital, Cuttack were included. Age of the patients ranged from 20 to 60 years. Cases of accident affecting face or cranium, deformities of face and cases with some abnormalities in the head and neck were excluded.

Key Words

- Glabella– A point above the nasal root between the eye brows and vertically intersected by mid-sagittal plane.
- Inion– The distal most point placed on the external occipital protuberance in the mid-sagittal plane.
- Euryon– The lateral most point placed on the side of the head.

Classification done as given by Williams et al 1995.

Sl. No.	Head Shape	Cephalic Index Range
1	Dolichocephalic	<75.0
2	Mesocephalic	75.0-79.9
3	Brachycephalic	80.0-84.9
4	Hyperbrachycephalic	85.0-89.9

Statistical Analysis

The data was analyzed by Microsoft Excel and all the statistical tests and the calculations were performed using the software GraphPad Prism Version 5. From the observations of the present study, the parametric data was analyzed using unpaired t-test (for two unmatched populations).^{20,21}

RESULTS

SD – Standard Deviation, calculated for maximum head length (MHL), maximum head breadth (MHB) and Cephalic Index (CI).

Sl. No.	Sex	No.	Mean $\pm$ SD		
			MHL (in cm)	MHB (in cm)	C.I.
1	Male	1120	197.1 $\pm$ 11.9	152.1 $\pm$ 9.7	77.16 $\pm$ 3.2
2	Female	930	192.0 $\pm$ 16.0	151.2 $\pm$ 13.8	78.79 $\pm$ 3.40

Table 1. Distribution of Male and Female

Sl. No.	Gender Group	Dolichocephalic	Mesocephalic	Brachycephalic	Hyper Brachycephalic	Row Total
1	Male	215 (19.19%)	754 (67.32%)	130 (11.60%)	21 (1.87%)	1120
2	Female	189 (20%)	427 (45.91%)	296 (31.83%)	21 (2.25%)	930

Table 2. Distribution of different head shapes in different sex

The mean cephalic index of Eastern Odisha population was 77.89 with SD $\pm$ 3.31. Mean cephalic index for male was 77.16 $\pm$ 3.25 and for female it was 78.79 $\pm$ 3.40.

The Index difference was significant in male and female ($P < 0.001$). The mean head length and breadth for male were 197.1 $\pm$ 11.4 mm and 152.1 $\pm$ 9.3 mm, for female 192.2 $\pm$ 15.3 and 151.2 $\pm$ 13.8 mm.

The difference was significant in head length ($P < 0.001$) but insignificant in head breadth ($P > 0.05$).

DISCUSSION

Study of cephalic index had been done by some workers as follows:

Sl. No.	Name of Workers	Population Studied	Mean Cephalic Index
1.	Oladipo and Olotu, 2006 ¹⁵	Ijaw Males	80.98
		Ijaw Females	78.24
2.	Oladipo and Olotu, 2006 ¹⁵	Igbo Males	79.04
		Igbo Females	76.83
3.	Oladipo and Olotu, 2009 ¹⁵	Ogonis Males	111.18
		Ogonis Females	75.09
4.	Odokuma et al, 2010 ⁴	West African Males	77.67
		West African Females	78.14
5.	Ilayperuma I, 2011 ¹³	Srilankan Males	78.04
		Srilankan Females	79.32
6.	Anitha et al, 2011 ¹⁹	North Indian Males	79.14
		North Indian Females	80.74
7.	Yogain V K et al, 2012 ¹⁷	Indian Students Males	77.92
		Indian Students Females	80.85
8.	Mahesh Kumar et al, 2012 ¹⁸	Haryanvi Males	66.72
		Haryanvi Females	72.25
9.	Ila Jitesh Gujarja et al, 2012 ²⁰	Marathi Males	77.08
		Marathi Females	79.02
10.	Ila Jitesh Gujarja et al, 2012 ²⁰	Andhra Males	76.28
		Andhra Females	78.16
11.	Ila Jitesh Gujarja et al, 2012 ²⁰	Gujarati Males	80.42
		Gujarati Females	81.20
12.	PPatro Sumitra, et al, 2014 ¹⁶	Southern Odisha Females	77.28
		Southern Odisha Females	78.38
13.	Present study, 2016	Eastern Odisha Male	77.16
		Eastern Odisha Female	78.79

Our data shows that the cephalic index in our study population is closest to that of Marathi males and females.

1. Male dominated types – Mesocephalic 67.32%.
2. Female dominant type – Mesocephalic 45.91%.

Followed by

- Male- Dolichocephalic, Brachycephalic and Hyperbrachycephalic.
- Female- Brachycephalic, Dolichocephalic and Hyperbrachycephalic in that order. Differences observed in different studies may be due to genetic, nutritional, and socio-economic factors.

CONCLUSIONS

The cephalic index in our study population is closest to that of Marathi males and females. Further study with larger sample is needed. Food habits and socio-economy need to be co-related. A genetic study is also needed.

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