International Journal of Research in Medical Sciences
Lakshmi Kumari K et al. Int J Res Med Sci. 2015 Mar;3(3):656-658
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: 10.5455/2320-6012.ijrms20150324

Research Article

A study of cephalic index and facial index in Visakhapatnam, Andhra Pradesh, India

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Received: 16 January 2015
Accepted: 8 February 2015

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ABSTRACT

Background: The description of the human body has been a major concern since ancient times. The use of medical terminology enhances reliability of comparison made between studies from different areas thereby contributing higher level of scientific evidence. Cephalic index is an important parameter in forensic medicine, anthropology and genetics to know the sex and racial differences between individuals. Facial index is useful index for forensic scientists, plastic surgeons and anatomist. The parameters are useful for plastic surgeons during treatment of congenital and traumatic deformities, identification of individuals in medicolegal cases by forensic scientists and identifying craniofacial deformities of genetic syndromes by geneticist.
Methods: 170 males and 110 female adults from Visakhapatnam, Andhra Pradesh, India region are included in this study. Anthropometric points for cephalic index were measured by using spreading calipers. Facial index measurements were taken by measuring tape. All measurements were taken in subjects sitting in relaxed condition and subjects head is in anatomical position. Cranial index and facial index were calculated as per the formula.
Results: Maximum number of males with mean cephalic index values of 80.21 were observed as mesocephalic and female with mean value of 79.25 observed as brachycephalic. Regarding facial index males were leptoprosopic and females were mesoprosopic.
Conclusion: Cephalic index and facial index were terms used by anthropologists, anatomists, plastic surgeons and forensic scientists to identify individual's race and sex for treatment of craniofacial deformities.

Keywords: Cephalic Index, Length of the head, Width of head, Length of face, Bizygomatic width

INTRODUCTION

Cephalic index is very useful to find out racial differences. It can also be used to identify the gender of individuals. The first classification based on cranial morphology is attributed to professor of anatomy Retzius (1840). The measures used by Retzius when applied to living individuals are known as cephalic index, when applied to dry skulls are known as cranial index.[1,2]

Cephalic index is calculated by determining the ratio between maximum width and maximum length of the head. Retzius described as genets dolichocephalae those who had an elongated skull type, and genets brachycephalae when those who had short skull type. However he assigned no numerical values to set the boundaries between individual types in both groups and neither did he use the intermediate term mesocephalae, which was introduced at later time.[3]

This mesocephalae term provided a classification system. Cephalic index is calculated by determining the ratio between maximum width and maximum length of the head.

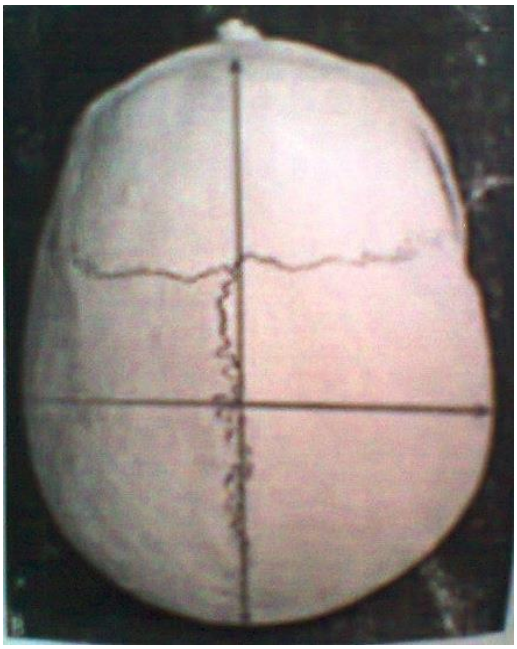

Figure 1: Cephalic index.

Table 1: Classification of head according to cephalic system.

Classification	
Hyperdolichocephalic	65.5-69.9
Dolichocephalic	70.0-74.9
Mesocephalic	75.0-79.9
Brachycephalic	80.0-84.9
Hyperbrachycephalic	85.0-89.9
Ultabrachycephalic	90.0->90

$$\text{Cephalic index} = \frac{\text{Maximum skull width}}{\text{Maximum skull length}} \times 100$$

Facial index is used in anthropometry to describe the facial proportion. Facial type assessment is crucial for the planning and prognosis of orthodontic treatments. Facial pattern indicates the direction of growth of craniofacial complex.[4,5]

It must be taken in to consideration when selecting the orthodontic biomechanics.[6] The facial index is measured by morphological facial height multiplied by 100,which is divided by bizygomatic width. The term used in facial index are derived from Greek, where the word for face is prosopon.[3]

According this classification face is classified as euryprosopic, mesoprosopic and leptoprosopic.[2,7]

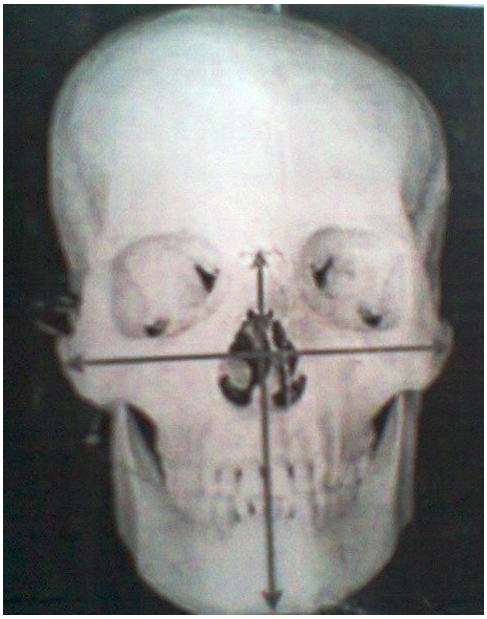

Figure 2: Facial index.

Table 2: Face classification according to facial index.

Type of face	Facial index
Hypereuryprosopic	<79.9
Euryprosopic	80.0-84.9
Mesoprosopic	85.0-89.9
Leptoprosopic	90.0-94.9
Hyperleptoprosopic	95.0- >95

$$\text{Facial index} = \frac{\text{Nasimental length}}{\text{Bizygomatic width}} \times 100$$

Relation of the length of the face to its maximal width between the zygomatic prominence. To get superior facial index the length of the face is measured from nasion to the alveolar point. For total facial index length is measured from the nasion to the mental tubercle. In the medical field most studies make use of a nomenclature to describe facial index in accordance with anthropometry.[8,9]

METHODS

For the present study 280 adults from Visakhapatnam origin were selected as subjects. The age of individuals are ranged from 26-49 years. The head length was measured with the help of spreading calipers, from glabella to mid-point of external occipital protuberance. The head breadth was measured as the maximum transverse diameter between two fixed points, above the mastoid prominence. For facial index subjects were measured from the nasion to mental tubercle and bizygomatic width as facial width. All the measurements were taken with the subject sitting in relaxed condition and head in anatomical position.

RESULTS

From the collected data, statistics were analyzed. Results and observations of both genders for cephalic index and facial index are shown in the tabular form. Results are expressed in numbers and percentages in both sexes, Mean cephalic index in males is 80.21 and mean cephalic index in females is 79.25.

Table 3: Range of cephalic index - male and female.

Cephalic index	No. of persons observed	
	Males	Females
72.01-73	2	0
73.01-74	-	-
74.01-75	8	2
75.01-76	7	3
76.01-77	21	4
77.01-78	26	9
78.01-79	14	6
79.01-80	20	6
80.01-81	27	4
81.01-82	12	22
82.01-83	12	19
83.01-84	13	14
84.01-85	2	15
85.01-86	-	1
86.01-87	2	1
87.01-88	2	1
88.01-89	2	3
Total	170	110
	Mean-80.21	**Mean-79.25**

Table 4: Cephalic index - percentage in male and female.

	Cephalic index	Males	%	Females	%
Dolicocephalic	<74.9	10	3.57	2	0.71
Mesocephalic	75-79.9	88	31.42	28	10.00
Brachycephalic	80-84.9	66	23.57	74	26.40
Hyperbrachycephalic	>85	6	2.14	6	2.14
Total		170		110	

Table 5: Facial index - percentage in male and female.

	Facial index	Males	%	Females	%
Hypereuryprospic	<79.9	3	1.07	5	1.79
Euryprospic	80-84.9	59	21.07	76	27.14
Mesoprospic	85-89.9	74	26.43	21	7.50
Leptoprospic	90.0-94.9	29	10.36	8	2.86
Hyperleptoprospic	>95	5	1.79	-	-
Total		170		110	

DISCUSSION

In the present study, subjects are from Visakhapatnam region of Andhra Pradesh, South India. 170 male and 110 female adults were studied. In male 3.5% are dolichocephalic, 31.42% are mesocephalic, 23.57% are brachycephalic and 6% are hyperbrachycephalic. In female cephalic index brachycephalic heads shows highest percentage as 26.4%, mesocephalic heads are 10%, hyperbrachycephalic heads are 2.1% and lowest percentage is dolichocephalic. With the cephalic index sex as well as race of an individual can be determined. Comparison of cephalic index between parents and offsprings can give a clue to genetic inheritance.

Facial index in male shows mesoprosopic with 20.4%, euryprosopic with 21%, leptoprosopic 10% and hyperleptoprosopic and hypereuryprosopic with less percentage. In females most of them are euryprosopic and 7% leptoprosopics. Facial index is crucial for orthodontic treatment. Both indices are important in anthropometry, forensic medicine and genetics.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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DOI: 10.5455/2320-6012.ijrms20150324
Cite this article as: Lakshmi Kumari K, Vijaya Babu PVSS, Kusuma Kumari P, Nagamani M. A study of cephalic index and facial index in Visakhapatnam, Andhra Pradesh, India. Int J Res Med Sci 2015;3:656-8.