

Anthropometric study of cephalic index among medical students in Nepal

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Abstract

Background: Cephalic index is the ratio of the maximum breadth of head to its maximum length that is expressed as a percentage. Anthropometric measurements, especially craniofacial measurements, are important for determining various head and face shapes. These anthropometric studies are conducted on the age, sex and racial/ethnic groups in certain geographical zones.

Objectives: The objectives of this study were to find out racial classification and their differences in Nepalese medical students anthropologically and to compare these with the data from other ethnic caste for use in anthropometric and forensic studies.

Method: This is a descriptive and cross sectional study on 940 undergraduate medical students of age 17 to 27 years, with 455 males and 485 females from the three different medical colleges of Nepal. The head length (cm) and breadth (cm) were measured by spreading calliper. The height (cm) and weight of the participants were recorded. All the collected data were summarized using statistical package for social sciences (SPSS) 16.0 versions and their significance was tested by student t- test.

Results: The mean cephalic index of 455 males and 485 females were 80.99% and 83.34% respectively. The cephalic index varied from the range of 71.20 to 97.40 in female and 72.08 to 96.77 in male. The dominant type of head shape in our study was mesocephalic (50.76%) followed by brachycephalic (32.74%).

Conclusion: This study showed the head type of Nepalese was brachycephalic predominant but with the tendency to mesocephalic and hyperbrachycephalic.

Key words: Anthropometry, Cephalic index, Head breadth. Head length

INTRODUCTION

Anthropometry is the systematic technique for measuring and taking observations on man, his skeleton, the skull, the limbs, trunk etc as well as the organs by the most reliable means and scientific methods¹. The anthropometrics studies are conducted on the age, sex and to find out racial and sexual differences in certain geographical zones. Cephalic index and head shape are greatly affected by geographical, sex, age and racial factors.

Anthropometry deals with the techniques for measuring different parts of the human body as well

as the human skeleton. Accordingly, anthropometry includes somatometry and osteometry. Somatometry deals with the measurement of the living body or the cadaver including their head and face. But osteometry is concerned with the measurement on the skeletal bones other than skull. However, cephalometry is concerned with the measurement on the head and face. Cephalic index is the ratio of the breadth of the head to its length that is expressed as percentage. The index is obtained by dividing the maximum width of the cranium by its maximum length and multiplying by 100.

METHODS

Nine hundred and forty (455 males and 485 females) undergraduate Nepalese medical students with age range from 17 years to 27 years were taken as a participants from the three different medical colleges of Nepal from March 2010 to March 2012 after approval from the ethical committee. The major caste Brahmin, Kshetry, Newar and Mangoloid with other scheduled

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caste data were calculated. Rai, Limbu, Magar, Gurung, Sherpa and Tamang communities were placed in mongoloid groups and Tharu, Shah, Singh; Biswokarma etc. were mentioned as unspecified schedule caste. The informed consent from the participants was taken.

The participants were asked to sit comfortably on a stool in relaxed condition with head in anatomical position. The maximum head length (MHL) was measured as greatest anteroposterior diameter with the help of spreading calliper from glabella to inion. The maximum head-breadth (MHB) was measured as the maximum transverse diameter between two fixed parietal eminences points. The participants were advised to stand straight against the vertical scale of height machine without shoes or slippers and measurement for total stature was taken. Those having any craniofacial deformity were excluded.

Cephalic Index= (Head breadth /Head length) ×100

The result of the cephalic index was presented in four groups on the basis of international anatomical descriptions by William et al (1995)¹.

Table 1: Classification of head shape based on cephalic index¹.

Head shape	Range of cephalic index (%)
Dolicocephalic	<75
Mesocephalic	75-79.9
Brachycephalic	80-84.9
Hyperbrachycephalic	>85

All the collected data were summarized using statistical package for social sciences (SPSS) 16.0 versions and their significance was tested by student t- test.

RESULTS

The summary of the results of the various parameters are presented in table 2 to 3 and comparisons of cephalic indices between various ethnic groups are presented in table 4-6.

Among the participants, mean stature was 160.61 cm, mean weight 55.60 kg, mean head length 17.54 cm, mean head breadth 14.39, mean head height 15.01 cm and mean cephalic index 82.04. Gender-wise, mean cephalic index of 455 male students was 80.99 while that of 485 female students was 83.38 (p value <0.001). The cephalic index varied from the range of 71.20 to 97.40 in females and 72.08 to 96.77 in males.

Table 2: Age wise distribution of participants.

Categorized age	Frequency	Percentage
17-21 yrs	717	76.3
22-27 yrs	223	23.7
Total	940	100

Table 3: Frequency of community wise mean height and CI

Community	Frequency		Mean height (cm)		Mean CI	
	Male	Female	Male	Female	Male	Female
Brahmin	123	141	167.10	155.80	80.46	83.25
Kshetri	119	126	164.30	156.57	81.85	83.48
Newar	83	115	164.31	156.37	80.81	83.72
Mangoloid	53	48	165.49	154.14	81.29	84.43
Others	77	55	165.59	155.30	80.52	81.83

Table 4: Caste-wise distribution of various head shapes

Head type	Brahmin	Kshetri	Newar	Mongoloid	Others	Total
Dolicocephalic	6	6	5	1	8	26
Mesocephalic	92	72	61	36	52	313
Brachycephalic	109	93	76	36	42	356
Hyperbrachycephalic	57	74	56	28	30	245
Total	264	245	198	101	132	940

Table 5: Results of head shape and gender wise classification

Head type	Gender		Total	P value
	Male	Female		
Dolicocephalic	5	21	26	0.015
Mesocephalic	231	82	313	
Brachycephalic	149	207	356	
Hyperbrachycephalic	70	175	245	
Total	455	485	940	

Table 6: The cephalic index in different student groups

Study group	Workers	Number		Cephalic Index	
		Male	Female	Male	Female
Kasturba Medical College, Manipal, India.	Vaishali KY(2012) ²	66	34	77.92	80.85
Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Dr. Sudha & Nageswara Institute of Dental Sciences India.	Salve VM (2011) ³	160	160	75.68	78.20
Ogbia students of Baysela state, Nigeria	Erije MA(2010) ⁴	219	221	73.68	72.24
B.J Medical College, Gujarat, India.	Shah GV and Jadhav HR (2004) ⁵	302	198	80.42	81.20
Kaa, Bori and Okwale	Oladipo GS (2009) ⁶	400	400	111.18	75.09
Nepalese students	Present study	455	485	80.99	83.38

DISCUSSION

In the present study, the mean Cephalic index (CI) of males was 80.99 which is slightly higher than that of Indian Barelis 79.80 and Bhils 76.98⁷ and similar to finding in Gujarati males 80.42⁵. This finding is lower than the CI in population in south of Iran⁸ (82.4) and Chile⁹ (81.51).

The dominant type of head shape in our study was mesocephalic (50.76%) followed by brachycephalic (32.74%) and hyperbrachycephalic (15.38%).

The brachycephalic head types of Indian males (33%) and Turkmen (42.4%) in north Iran¹⁰ was similar to finding with this study. The dolicocephalic (1.09%) was a rare head type of our study but it was found in seven percent of Indian Gujarati and in nine percent in Tehran^{5,10}.

The cephalic index of Nepalese female in this study was 83.38. This was higher than in the study by Shah and Jadhav⁵ in Indian females (81.20) and Ognis female of Nigeria⁴ (75.09).

In females, the dominant types of head was brachicephalic (42.68%) followed by hyperbrachycephalic (36.08%) and mesocephalic (16.9%). The study done by Vaishali¹ showed dominant type of head was brachycephalic in 33% of female while it was 49% in females of Gujarat⁵. The rarely present head type in this study was dolicocephalic (4.32%).

The dominant head type of ethnic groups like Brahmin, Kshetri and Newar in present study was brachycephalic while in Mongoloid and other groups dominant head type was mesocephalic. The cephalic index in present study of mongoloid group was 81.29 in males and females 84.43 in females. This is similar to the study done by Lobo et al.¹¹ on Gurung community of Nepal where CI of male was 83.1 and for female was 84.6.

Our study showed cephalic index of Kshetri was 82.65 which fall in the brachycephalic. The different studies of people of North India showed the mean value of all population less than 76.0 which fall in the dolicocephaly category. It showed Kshetri were brachycephalic and Tharus were in mesocephalic. The old Nepalese and Gurkha were having meso to brachycephalic index (78.09)¹².

The study carried by M K Bhasin¹³ observed brachicephalic elements among the Indian population groups with Mangoloids, Tibetans, Bhotia, Burman, Lepcha, Limbus, Khambus and Gurung. The mean values of CI among them were 76.06 which were facing to mesocephaly category. But our study of Mongoloids showed brachicephalic and mesocephalic head type with 35.64% each.

CONCLUSION

The present study showed the anthropometrical

variations in cephalic index. The magnitude of the cephalic index varies significantly in different ethnic groups. The findings of the study can be utilized as evidence based scientific data on the era of cephalic index diagnosis and in establishing racial burden of the society. This research work provides valuable diagnostic and prognostic information that can be used for further studies in Nepalese community.

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