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Original Article

CRANIAL ANTHROPOMETRY IN 600 NORTH INDIAN ADULTS

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ABSTRACT

The present study was conducted on 600 adults, comprising of equal number of males and females, within the age group of 18 year and above and of North Indian origin. The purpose of study was to access the head length, head width and to find out the relationship of these parameters with each other. Cephalic Index was calculated. The data so obtained was compiled and analysed statistically to observe baseline data and then compared with previous available data. This data can be useful for experts in forensic and allied surgical branches. The average head breadth and head length found in study were 139.51 mm, 186.88 mm respectively in males and 136.19 mm, 177.74 mm respectively in females. On the basis this study it was concluded that North Indian males have dolichocephalic type of head and females have mesocephalic type of head.

KEY WORDS: Craniometry; Cephalic index; Dolichocephalic; Mesocephalic.

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INTRODUCTION

In the past, various methods have been determining the racial traits by studying cranial capacity, cranial index and observations like Craniometry [1]. Craniometry is the technique of measuring the bones of skull [2]. Cephalic index was defined and first used in physical anthropology to classify ancient human remains found in Europe. The theory became closely associated with the development of racial anthropology in the 19th and early 20th century. When prehistorians attempted to use ancient remains to model population movements in terms of racial categories. Human population were characterized as either Dolichocephalic (long headed), Mesocephalic (moderate headed) or Brachycephalic (broad headed) [3].

Aims of this study was to establish data on craniometry on North Indian adults and to recognize applied significance of present study to forensic, plastic and cosmetic surgery. The data was compared with previous published data and attempted to find out correlation in the observations if any.

MATERIALS AND METHODS

The study was conducted on normal male and female of North Indian origin. This study was carried out on 600 adult subjects (300 males and 300 females) with their age 18 yrs. and above. Subjects showing cranial abnormality and those who are below 18 yrs, were excluded from the study. The measurements were taken thrice and mean was calculated to ensure accuracy.

Parameters: The subjects were asked to sit on a chair in relaxed condition with their heads in anatomical position and the measurements taken using a spreading calliper using stretched anatomical landmarks.

Figure 1: Measuring Head Breadth.

Figure 2: Measuring Head Length.

Following parameters were measured

1. Head lengths: It was measured from glabella to the inon.
2. Head width: It was measured below the nasion to the gnathion.
3. From above parameters cephalic index was calculated as per following formula.
4. Cephalic Index = Head length x 100 / Head breadth

Based on the cephalic index head shape were determined according to method used by Willium Et al; 1995 [4] as given bellow On the basis of cephalic index head shapes were categorized in four categories.

OBSERVATIONS & RESULTS

A total of 600 subjects were studied out of which 300 were males and 300 were females, the mean and standard deviations of head length, head width and cephalic index obtained from the subjects are present in table 1.

The percentage means of cephalic index in males and females were 74.74% and 76.83% respectively.

Results obtained based on the cephalic indices showed that the male population is predominantly dolicocepholic with 55% and female population is mesocephalic with 47.33% while the rarest type of head shape observed in this study is the hyperbrachycephalic type. Thus present study provides an important tool to the Forensic Experts for establishment of identity in case even if only head is retrieved in north India.

DISCUSSION

The present study has been compared with the previous studies of head length and head breadth. It has been seen that population of Latvia and various studies conducted for population of Nigeria show that head length in both the males and females of these regions is higher than the population of North Indian adults. This population when compared for head breadth shows that the population of Latvia and Nigeria Ibibios has broader heads but North Eastern Nigerian have almost similar dimensions to North Indian population.

The mean breadth in present study of North Indian adults is 139.5 mm in males and 136.19 mm in females. The head breadth of present study when compared with populations of Malaysians, Japanese and Sri Lankans, it was found that they have broader heads as seen in table 4. Present study when compared with Indian studies conducted on Gujarati males (Sindhi, Patel, Rabari and Bheels) and the students conducted on Punjabi students in Punjab shows that they have broader heads.

S. No.	Parameter	Males (mean ±SD)	Females (mean ±SD)	P Value
1	Head Length	186.88 ± 6.33	177.74 ± 8.44	<0.001
2	Head Breadth	139.51 ± 6.33	136.19 ± 6.13	<0.001
3	Cephalic Index	74.74 ± 4.31	76.83 ± 5.58	<0.001

Table 1: Showing parameters of 300 males and 300 females.

S. No.	Type	Range	Male %	Female%
1.	Dolichocephalic	<74.19	165(55%)	104(34.67%)
2.	Mesocephalic	75-79.9	98(32.67%)	142(47.33%)
3.	Brachyphalic	80-84.9	35(11.67%)	42(14%)
4.	Hyperbrachycephalic	85-89.9	2(0.67%)	12(4%)

Table 2: Showing types of heads on the basis of cephalic index.

S. No.	STUDY	REGION	SEX	HEAD LENGTH (mm)	HEAD BREADTH (mm)
1.	Present Study	North India	M	186.88	139.51
			F	177.74	136.19
2.	Nagle E[5]	Lativa	M	193.1	154.2
			F	183.3	145.8
3.	Raji J M[6]	Nigeria (North-Eastern)	M	190.8	137.0
			F	183.9	135.7
4.	Oladipo G S[7]	Nigeria (Ibibos)	M	190.6	152.0
			F	188	147.0
5.	Maina M B[8]	Nigeria	M	191.11	135.9
			F	183.53	135.47

Table No. 3: Mean head length and head breadth of various studies greater than the mean of present study.

STUDY	REGION	SEX	HEAD LENGTH	HEAD BREADTH
Present Study	North Indian	M	186.88	139.51
		F	177.74	136.19
Ngeow WC[9]	Malasian Malays	M	184.1	155.0
		F	173.4	149.4
Mahajan A[10]	Punjabi Students	M	185.8	156.8
		F	179	147.2
Jadhav HR[11]	Guajarati Males	Sindhi	185.6	153.4
		Patel	185.6	150.1
		Rabari	182.2	146.4
		Bheel	179.6	136.7
Hossain MG[12]	Japanese adult females during 1975-79	M	179.07	155.0
	1998-2001	F	180.12	147.8
Iiperuma I[13]	Sri Lanka	M	180.5	147.8
		F	175	141.11
Akhtar Z[14]	Bangladeshi Garo	M	174.9	-
Shreshtha O[15]	Nepal (Rai)	M	179.6	-
		F	171.32	-
	Nepal (Limbu)	M	180.01	-
		F	171.94	-

Table No. 4: Studies showing more head breadth and less head length as compared to present study.

The mean head length in present study was found to be more when compared with studies done by Ngeow WC[9], Mahajan A [10], Jhadav HR [11], liayperuma I [13] , Akhtar Z [14] and Shrestha O [15]. Differences in these parameters can be attributed to genetic, geographical with Malaysian, Japanese and Sri Lankans. Genetic factors could be responsible for the increased head breadth in Punjabi students. Whereas, in certain populations the heads are broader than the present study but the lengths being smaller than the present study. It shows that it is not necessary that if head is longer in certain populations it will be broader also. Head length of Rai and Limbu communities in Nepal and Bangladeshi Garo is smaller but there is no head breadth available for them.

Forensic experts have to determine identity of such bodies which are beyond recognition. Cephalic index is an important tool for identification in forensic medicine and to examine differences between different races.

For example if some decomposed and mutilated dead body is found at some place far from its native place, with the knowledge cephalic index and with the help of various data banks the race and place of body can be determined.

CONCLUSION

The study observed that both the parameters that is Head length and head breadth were more in males than females which shows sexual dimorphism. On being compared with other populations it was found that our region falls in concordance with Punjabi students males as well as females, Gujarati males of siddi, Sindhi and Patel communities for head length and North Eastern Nigerian females for head breadth.

COMPETING INTERESTS: None

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