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Sex Differences of Cephalic Index among Nepalese Medical Students

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ABSTRACT:

Introduction: Anthropometry is used to measure the morphological parameters. Among the anthropometric variables, cephalic index is one of the important tools which help to determine the geographical sex, age and racial variations. Cephalic index is calculated as maximum head breadth (MHB)/maximum head length (MHL)*100.

Objective: The aim of this study was to find out whether sex could be determined by using cephalic index.

Methods: The study included all the students of Madan Bhandari Academy of Health Sciences, among them 80 were male and 123 were female. The head length and head breadth were measured by using the instrument, spreading caliper, in the department of Anatomy, which included students without any visible craniofacial skeleton deformities and students with the age of 18 to 25 years. The exclusion criteria were students with previous history and existing history of craniofacial trauma.

Results: The mean head length of male was 18.036±1.02 while mean breadth was 14.161±0.869 Similarly, the mean length of female was 17.264±1.002 and mean breadth was 13.635±0.803. The mean cephalic index of male and female were 78.723±5.986 and 79.218±5.847 respectively. The male head length was 0.772cm more than female being statistically significant (p=0.045<0.05).

Conclusion: The result of the present study observed cephalic index was found to be greater in females.

Keywords: Anthropometry; cephalic index; head breadth; head length.

INTRODUCTION

The anthropometry means measurement of the human individual which is derived from Greek word (Anthropos – man, Metron – measurement). It can be used to measure morphological parameters.[1]

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Cephalic Index (CI) is one of the very important anthropometric variables used in anthropology to determine geographical gender, age and racial variations.[2] CI is also called as index of breadth or cranial index, which is useful parameter for determining the shape of skull. CI is calculated as maximum head breadth (MHB)/maximum head length (MHL)*100.[3]

In this study, we attempted to investigate the patterns of head distribution and differences in cephalic index between two sexes in the students of Allied Medical Sciences. CI observations and findings of this study will provide platform for similar extended cephalometric studies based on various communities/castes/races of particular geographic zones.

The objective of this study was to calculate difference in cephalic index between two sexes by measuring head length and head breadth and to find the sequence of most predominant to least common head type.

METHODS

An observational, cross sectional study was carried out from April 2024 to August 2024 among the students of Madan Bhandari Academy of Health Sciences (MBAHS). The ethical clearance was obtained from Institutional Review Committee (IRC-042-080), MBAHS, Hetauda, Nepal. Informed consent was taken from each student. The study was performed at department of Anatomy, MBAHS; as students were easily accessed during college practical time. Among 203 students, 80 were male students and 123 were female students. The students included were of age 18 years to 25 years with normal craniofacial skeleton. The students with previous history and existing history of craniofacial trauma were excluded.

The measurements were explained verbally to the participants. They were seated on a chair, in relaxed position; with their head held out in Frankfurt's plane.[4] The measurement was taken following the techniques of Martin and Saller.[5] The head length and head breadth were measured by using the instrument; spreading caliper (Figure 1) pointed G-107 which is manufactured by galaxy informatics (India) made up of brass. The head length (greatest antero-posterior diameter) was measured from glabella to inion. The head breadth was measured as the maximum transverse diameter between two fixed points over the parietal bones.[5]

Figure 1: Measurement of head length by using spreading caliper

The method used for assessing cephalic index is based on international description; Williams et al.[6] On the basis of CI, head types are of dolichocephalic (<74.9), mesocephalic (75-79.9), brachycephalic (80-84.9) and hyperbrachycephalic (>85).[6]

The accuracy was maintained by taking the measurements thrice by same observer and the

mean was considered for further analysis. After measurements, the data were entered in Statistical Package for Social Sciences (SPSS^{TM}) version 20 and calculated mean, standard deviation (SD). Significance difference between sexes was tested by using independent T test.

RESULTS

The cephalic index was found to be greater in females as shown in table 1. The mean head length of male was 18.036±1.02 and mean head breadth was 14.161±0.869. Similarly, the mean head length of female was 17.264±1.002 and mean head breadth was 13.635±0.803. The mean cephalic index of male and female were 78.723±5.986 and 79.218±5.847 respectively. The male head length was 0.772 cm more than female head length which was statistically significant (p=0.045<0.05).

The minimum length of head among both sexes was 14.0 ±1.078 and maximum was 20.1±1.078. The minimum and maximum breadths of head among of total participants were 11.8±0.867 and 16.5±0.867 respectively.

Table 1: Calculation of cephalic index.

Parameters	Minimum		Maximum		Mean		p- value
	Male	Female	Male	Female	Male	Female	
Head length(cm)	15.1	14.0	20.0	20.1	18.036±1.02	17.264±1.002	0.045
Head breadth(cm)	12.6	11.8	16.5	15.6	14.161±0.869	13.635±0.803	0.304
Cephalic index	68.42	65.69	90.0	100.0	78.723±5.986	79.218±5.847	0.461

The different head types on the basis of cephalic index are shown in figure 2. These findings illustrated most of female head type belongs to brachycephalic 46(37.4%) followed by dolichocephalic 35(28.5%). Predominant head type in male was dolichocephalic 26(32.5%) followed by mesocephalic 23(28.7%). In both male and female, hyperbrachycephalic head type is least common 14(17.5%) and 17(13.8%) respectively.

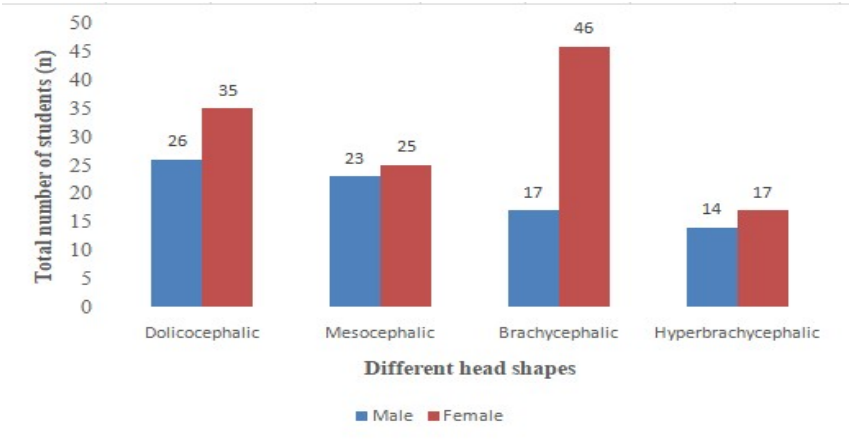

Figure 2: Bar diagram showing different types of head shapes.

DISCUSSION

Cephalic index is an important parameter in evaluating racial and sex differences. It was also shown that cephalic index is significant index for differentiation of population groups and cultures.[6]

In the present study, CI in female was higher than male with predominant head type brachycephalic 63(31.0%). Similarly, a study conducted by Manandhar B also revealed CI was higher in female (81.96±5.62) than male (80.51±5.26) and predominant head type was brachycephalic.[1] The similarity of result may be due to the fact that both studies were conducted among medical students, where the students were from different region and races of Nepal. Khatun S. observed least common type of head shape was hyperbrachycephalic in both male and female.[6] Similarly, in the present study also we found least common head type was hyperbrachycephalic.

The mean cephalic index in male and female was found to be 81.41±4.52 and 83.62±4.08 respectively in the study conducted by Chaudhary et al. [7] In comparison to their study, this study showed 78.723±5.986 and 79.218±5.847 respectively in male and female, which was less in both sexes. Pandey et al study observed cephalic index of the female students was approximately 3.35% higher than the male students. [8] In the present study, it was observed an average of 0.495 more in female than in male.

The mean cephalic index for male was 83.1 and for female 84.6 which was statistically significant in the study performed by Lobo et al whereas the mean cephalic index of male and female were 78.72 and 79.28 which were statistically not significant in this study.[9]

The limitation of this study is, it was conducted in a medical student who has come from different races and region of Nepal. Thus, the result of cephalic index between sexes can vary from other studies.

CONCLUSION

The cephalic index is helpful in different field of medicine like anthropology, forensic medicine, dentistry and corrective surgical procedures regarding skull. The present study could certainly be beneficial in above mention fields. It is recommended to perform similar study in specific races.

Conflict of Interest: None.

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