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A Study of Cephalic Index and Head Shape Among Undergraduate Students.

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ABSTRACT

The cephalic index and shape of the head vary with race and sex. This cross-sectional study was carried out to determine the cephalic index and head shape in undergraduate medical students of SEGi University, Kota Damansara with a total of 160 normal students 18-24 years-old (20 males and 20 females each from Malays, Chinese, Indians and Middle East). The statistical analysis was conducted using statistical package for the social sciences software (version 22.0). Our data showed for all the races, the males were dolicocephalic and females were mesocephalic. The mean cephalic index was statistically significant based on sex and races with p value of 0.03. Our result also showed that the mean cephalic index was statistically significant based on races with p value of 0.01 in case of male and female participants separately. Based on the results of the present study along with other findings, it can be concluded that head dimension varies with ethnic and sex. This may eventually be used to help in determining race and sex by forensic medical experts, anatomist, anthropologist and archeologist.

Keywords: Cephalometry, Cephalic index, Head shape

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INTRODUCTION

Cephalometric measurement includes cephalic index which is useful in determination of race and sex. Anthropometry, photography, cephalometry, ultrasound, magnetic resonance imaging (MRI) and computerized tomographic scan are used in measurement of skull. The simplest way is to use spreading caliper [1-11]. Cephalometry is the most valid technique in investigation of craniofacial skeleton. It can determine race and sex from decomposed body and from skeletal remains [2, 3, 4, 5, 6, 7, 10, 12, 13, 14, 15]. It can be calculated from skull as well as cadaver [11, 14, 16]. According to cephalic index, head is classified into bradycephaly (80-84.9), mesocephaly (75-79.9) and dolicocephaly (70-74.9) [1, 2, 3, 4, 5, 8, 9, 12, 13].

Therefore this study was carried out to determine the cephalic index and head shape in undergraduate medical students. This may eventually be used to help in determining race and sex by forensic medical experts, anatomist, anthropologist and archeologist.

MATERIALS AND METHODS

The ethical approval to perform our research was obtained from the ethical committee of SEGi University. Our target participants were the undergraduate medical students of SEGi University, Kota Damansara with a total of 160 normal students 18-24 years-old (20 males and 20 females each from Malays, Chinese, Indians and Middle East). We briefly explained to them the purpose of our research and the methods in which we would obtain the necessary data from them. Finally, we obtained the measurements from the participants for our study in the Physiology Lab at the Faculty of Medicine of SEGi University.

Spreading caliper and ruler were used for measurements of cranial length and width. The cranial length was the measurement from the glabella to the opisthocranium (external occipital protuberance). The cranial width was the distance from euryon to euryon. Euryon is the most laterally prominent point on the parietal bone. Cephalic index was calculated and expressed in percentage form [Cephalic Index = (Cranial width x 100%) ÷ Cranial length] [17-18].

After we obtained all the necessary measurements, we performed a statistical analysis of the data collected by using the statistical package for the social sciences software version 22.0 [19].

RESULTS

Mean Cephalic Index of the Male and Female Participants Based on Sex and Races

Table 1 shows the mean cephalic index in male and female participants based on sex and races. For all the races, the males were dolicocephalic and females were mesocephalic. The result was statistically significant based on sex and races with p value of 0.03.

Mean Cephalic Index of the Male Participants Based on Races

Table 2 shows the mean cephalic index of the male participants based on races. The result was statistically significant with p value of 0.01.

Mean Cephalic Index of the Female Participants Based on Races

Table 3 shows the mean cephalic index of the female participants based on races. The result was statistically significant with p value of 0.01.

Table 1: Showing the mean cephalic index of the male and female participants based on sex and races

	Mean cephalic index of Male participants (n= 80)	Mean cephalic index of Female participants (n= 80)
Malays (n= 20 Males, n=20 Females)	74.45	78.03

Chinese(n= 20 Males, n=20 Females)	73.68	79.23
Indians (n= 20 Males, n=20 Females)	71.59	75.13
Middle East(n= 20 Males, n=20 Females)	72.31	76.32
p value	0.03	
n denotes number of participants		

Table 2: Showing the mean cephalic index of the male participants based on races

Male participants (n= 80)	Mean cephalic index
Malays (n= 20)	74.45
Chinese(n= 20)	73.68
Indians (n= 20)	71.59
Middle East(n= 20)	72.31
p value	0.01
n denotes number of participants	

Table 3: Showing the mean cephalic index of the female participants based on races

Female participants (n= 80)	Mean cephalic index
Malays (n= 20)	78.03
Chinese(n= 20)	79.23
Indians (n= 20)	75.13
Middle East(n= 20)	76.32
p value	0.01
n denotes number of participants	

DISCUSSION

For all races, our results showed that the males and females were dolicocephalic and mesocephalic respectively. The result was statistically significant based on sex and races with p value of 0.03. Our finding can be supported by previous reports that had classified head according to cephalic index into bradycephaly (80-84.9), mesocephaly (75-79.9) and dolicocephaly (70-74.9) [1, 2, 3, 4, 5, 8, 9, 12, 13]. Similar finding was also reported by other scientists who collected data on 600 north Indian adults. The males and females were dolicocephalic and mesocephalic respectively [17].

Our research also showed that the mean cephalic index was statistically significant based on races with p value of 0.01 in case of male and female participants separately. Other scientists in Malaysia had reported that the cephalic index was not statistically significant in case of sex but was statistically significant in case of races [8].

CONCLUSION

In conclusion, for all the races, the males were dolicocephalic and females were mesocephalic. The mean cephalic index was statistically significant based on sex and races. Therefore based on the results of the present study along with other findings, it can be concluded that head dimension varies with ethnic and sex. This may eventually be used to help in determining race and sex by forensic medical experts, anatomist, anthropologist and archeologist.

AUTHOR CONTRIBUTIONS

Conceived and designed the experiments: SAY NSS MNH SRD. Performed the experiments: ASZ HMH NFA PM. Analyzed the data: ASZ HMH NFA PM HTD MB. Wrote the paper: SAY NSS MNH SRD. Revised the paper: SAY NSS MNH SRD HTD KTZ ASZ HMH NFA PM KAJ MAE MES VA SYAK JZ RM WAC AY RSYW NMHM ATK MB KTO SWWL. All authors read and approved the final manuscript to be published.

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