

SEXUAL DIMORPHISM USING CEPHALIC INDEX

Running Title - Gender determination using cephalic index

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ABSTRACT:

INTRODUCTION

Cephalometry is used for classification of sex and race of a person whose identity is not known. Skull is most important reliable bone for sex differentiation Cranial index also referred to as cephalic index is measured to categorize head shapes. The cephalic index is ratio of the maximum width divided by its maximum length multiplied by 100.

AIM

To verify if cephalic index can be used for sexual dimorphism.

MATERIALS AND METHOD

A group of 60 individuals were selected: 30 males and 30 females. After getting informed consent measurements were taken with the help of spreading calipers. All measurements were taken by a single observer to avoid error, three values were recorded and the average value were taken as the main value. SPSS software was used to analyze the data and related samples Wilcoxon signed rank test was done

RESULT

Wilcoxon signed rank test was done, the p value was 0.192 ($p > 0.05$). So, it is statistically not significant, hence sexual dimorphism cannot be determined using head circumference

CONCLUSION

Cephalic index is a very useful parameter for various anthropometric studies, from the present study we conclude that the Cephalic index is not reliable parameter for sexual dimorphism.

KEYWORDS Cephalic index; innovative Sexual dimorphism; Spreading calliper; anthropometry.

INTRODUCTION:

Cephalometry is used for classification of sex and race of a person whose identity is not known. Cephalic index is used to identify a gender of the person. Skull is most preferred bone for sexual dimorphism since, it resists mutilation, decomposition and even fire. Skull is most important reliable bone for sex differentiation. The reliability of sex determination of the skull depends based on the degree of sexual dimorphism and prevalence among population group. The cephalic index was measured using spreading caliper. The most commonly used indices for identification of sexual dimorphism are cranial index, nasal index and orbital index (1). Cephalic index can also be used to determine differences in race and gender. According to cephalic index, the head shapes are of four types, which are dolichocephaly, brachycephalic, mesocephalic, hyper brachiocephalic (2).

The measurements of cephalo facials play a major role in identification of an individual in forensics. Its measurement also related to the skull shape. The technique of cephalometry summarizes, anatomical complexities of human head and face living in same geographical region (3). Cranial dimensions and cranial index are the important tools for sexual and racial dimorphism. Cephalometry is a reliable technique for identification of craniofacial skeleton because of its practicality and its validity (4). Various factors like age, sex, race, ecology and geography may influence human body dimensions (5). Almost all crania of humans are longer than broad. Hence, the cranial index is nearly always less than 1.(6).

Sexual dimorphism is the variances in measurements seen between gender of the same kind, such as differences in size and shape that may be caused by genetic factor (7). Although some of these features occurs due to natural

selection, few may have evolved by sexual selection(8). Body mass dimorphism varies dramatically in primate species, both during present and past(9). The extensive knowledge and experience of our research team has been translated into high quality publications (10–17),(18),(19),(20),(21,22),(23),(24),(25–29). Aim of the current study was to verify if cephalic index can be used for sexual dimorphism.

MATERIALS AND METHODS

A group of 60 individuals were selected: 30 males and 30 females. Cranial index also referred to as cephalic index is measured to categorize head shapes. The cephalic index is ratio of the maximum width (Figure1) divided by its maximum length (Figure 2) multiplied by 100. After getting informed consent measurements were taken with the help of spreading calipers. All measurements were taken by a single observer to avoid error, three values were recorded and the average value were taken as the main value. SPSS software was used to analyze the data and related samples Wilcoxon signed rank test was done



Figure 1: Measurement of cephalic breadth using a spreading caliper



Figure 2 : Measurement of cephalic length using a spreading caliper

RESULTS

Table 1- Range, mean and standard deviation of Cephalic index in males and females

	N	Minimum in cms	Maximum in cms	Mean in cms	Standard Deviation
Male Cephalic index	30	76.13	91.95	82.66	3.54
Female Cephalic index	30	77.71	95.06	84.50	4.23

* p value was 0.192(p>0.05)

The average measurement of male cephalic index is 82.6±3.54

The average measurement of female cephalic index is 84.5±4.23

Related samples Wilcoxon signed rank test was done. The p value was 0.192($p > 0.05$). So, it is statistically not significant, hence sexual dimorphism cannot be determined using head circumference.

DISCUSSION:

The result of the present study on estimation of sexual dimorphism using cephalic index showed that cephalic index is not a reliable source of stature estimation. Whereas, in other study it is showed that the average cephalic index of male was 80.54 ± 7.20 , while in the group of females it was 82.22 ± 6.87 . no statistical differences were noted between sexes (30). In the study done by Pindrick et al the normative value of cephalic index was made possible using CT scans of normal subjects (31). In the study by Rachmavathi it is said that cephalic index is an important craniofacial parameter to assess the head shape which may help to determine the dental arch shape (32). A study Constantine et al concludes that large differences occur in Cephalic index in the normal fetuses and during delivery complications (33).

Compared to other species humans exhibits lower levels of sexually dimorphic characters. Most of studies are done on adults, as sexual dimorphism is not characteristic before puberty, this was concluded by many studies (7,33). Gender determination among the human skull was generally based on differences in size and robustiaty. Cephalic index measurements are very useful for planning surgical procedures to treat cranial deformities. It's a very reliable tool to assess developmental craniofacial skeletal deformities (34).

LIMITATIONS:

The sample size taken for the study was considerably small and the results of the study can not be generalized.

FUTURE SCOPE:

To increase the sample size and also to include people with various age group and race,

CONCLUSION

Cephalic index is a very useful parameter for various anthropometric studies, from the present study we conclude that the Cephalic index is not reliable parameter for sexual dimorphism.

AUTHOR CONTRIBUTIONS

Rupa Devi R: Study Design, Data collection, Data Analysis, manuscript writing

Yuvaraj Babu K: Study Concept, Data verification, Data Analysis, manuscript drafting and correction

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CONFLICT OF INTEREST

The authors reported the conflict of interest while performing this study to be nil

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