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SEXUAL DIMORPHISM USING CEPHALIC INDEX

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ABSTRACT:
INTRODUCTION: Cephalometry is useful in the classification of sex and race of individuals of unknown identity.This study contains an synoptic capture of cephalic and cephalic dimensions among dental students.Cephalic index is an most important parameters in identification of both sexes.Skull is an most preferred bone for sexual dimorphism since, it resists mutilation,decomposition and even fire.Skull is an most important reliable bone for sex differentiation.Sexual dimorphism means that two sexes of species that differ in external appearance. **AIM:** To verify if cephalic index can be used for sexual dimorphism. **MATERIALS AND METHOD:** Cephalic index=width/length x 100. The cephalic index or cranial index is the ratio of the maximum width multiplied by 100 divided by its maximum length. After getting informed consent measurements were taken for 60 individuals (30 male and 30 female) with the help of spreading calipers Three values were recorded and the average value were taken as the main value.SPSS software (23) were used to analyse the data. **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 highly useful method for planning surgical procedures as well as assessing their effectiveness in correcting cranial deformations in children. From the present study we conclude that cephalic index is not a reliable parameter for sexual dimorphism.
KEYWORDS Cephalic index; innovative Sexual dimorphism; Spreading calliper; anthropometry.

INTRODUCTION:

Cephalometry is useful in the classification of sex and race of individuals of unknown identity.This study contains an synoptic capture of cephalic and cephalic dimensions among dental students.Cephalic index is an most important parameters in identification of both sexes.Skull is an most preferred bone for sexual dimorphism since, it resists mutilation,decomposition and even fire.Skull is an 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 popolation group.The absolute measurement of 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 is usually an anthropometric parameter utilized in determination of racial variation. It is even used to determine sexual individuals among individuals whose identities are not known. According to cephalic index, the head shapes are of four types, which are dolichocephaly (having a relatively long skull, typically with the breadth less than 80 or 75 percent of the length), brachycephalic (having a relatively broad, short skull typically with the Breadth at least 80 percent of the length), mesocephalic (having a head of medium proportions, not markedly brachycephalic or dolichocephalic), hyper brachiocephalic (having a very round or broad head with cephalic index of over 85) (2).

The measurements of cephalo facials play an important role in personal identification in forensic application.Its measurement also related to the shape of the skull.The technique of cephalometry summarises, anatomical complexes of head and face of human being living within a similar geography (3).Cranial dimensions and cranial index are the invaluable tools sexual and racial dimorphism.Cephalometry continues as one of the most versatile technique in investigation of craniofacial skeleton because of its practicality and the validity(4). The human body dimensions are affected by biological, ecological, geographical, sex, racial and age factors. Regarding the effect of ethnic, racial, geographical factors on head dimensions, the present was done to determine the measurements of cephalic index.(5). In craniometric terms, the maximum breadth of human skull is measured across broadest points if its parietal bones.The cranial index is otherwise called as cephalic index.Almost all crania of humans are longer than broad.Hence, the cranial index is nearly always less than 1.(6).

Sexual dimorphism is the differences in the males and females of the same species,such as size,color,shape and structure that are caused by inheritance of the one or other sexual pattern in genetic material(7). Sexual dimorphism means that two sexes of species differ in external appearance. Although some sexual dimorphism is the result of natural selection,most thought to have evolved through sexual selection(8). Body mass dimorphism varies dramatically in primate species,both during present and past(9). Our team has extensive knowledge and research experience that has 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 ,cranial ratio or cephalic ratio a measurement to categorise head shapes among dental students. Cephalic index=width/length x 100.The cephalic index or cranial index is the ratio of the maximum width(biparietal diameter or BPD side to side of the head of an organisms(human or animal) (Figure1) multiplied by 100 divided by its maximum length (occipitofrontal diameter or FOD, front to back)(Figure 2). All measurements were taken by a single observer to avoid error.vThree values were recorded and the average value were taken as the main value.SPSS software were used to analyse 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

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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**

*Related samples Wilcoxon signed rank test, 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 is 80.54±7.20,while in the group of boys of the same age,82.22±6.87.Hence, there is no statistically differences were noted between sesxes (30). In the study done by Pindrick et al the normative value of new indices as well as established measures like the cephalic index can be drawn from the evaluation of CT scans of normal individuals (31). In the study by Rachmavathi it is said that cephalic index is a craniofacial parameter that is often used as a tool to measure the length and breadth of the head.It is important to determine the shape of the head because it can provide information related to the shape of the dental arch (32). On the other hand, knowledge of cranial cephalometry is also an important in the study and differentiation of cranial shape from different races,geographical background and diets.In,the clinical practice,specific data of the cephalic index give an indication of individual growth and development and also abnormalities in the size and shape of the skull. Whereas, the study Constantine et al concludes that there is a wide variation in the change in Cephalic index in the normal fetuses and delivery complications (33). A value below the range in the third trimester or a progressive reduction in Cephalic index during the latter half of pregnancy should provoke detailed scanning of the fetal cranial sutures to check for craniosynostosis. Although humans exhibit low levels of sexual dimorphism compared to other animals, differences between males and females were numerous. Generally,the majority of studies tend to focus on adults,because sexual dimorphism is not well pronounced before puberty, this was concluded by many studies (7,33). Cephalic index is a highly useful method for planning surgical procedures as well as assessing their effectiveness in correcting cranial deformations in children.There are relatively only very few studies measuring cephalic index in healthy caucasian young children. Cephalic index was one of the clinical anthropometric parameters recognised in the investigation of craniofacial skeletal deformities and brain development because of its validity (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 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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