Int J Biol Med Res.2018;9(4):6479-6480

Contents lists available at BioMedSciDirect Publications

International Journal of Biological & Medical Research

Journal homepage: www.biomedscidirect.com

Original Article

MAXIMUM CRANIAL CIRCUMFERENCE: IMPORTANT PARAMETER IN SEXING OF CRANIA

Ruta Bapat *, B N Umarji, MS Nakhate

Assistant Professor, Department of Anatomy, Dr DY Patil Medical college, Nerul, Navi Mumbai
Prakash institute of medical sciences, Islampur Dist Sangli
Head and professor, , Department of Anatomy, Dr DY Patil Medical college, Nerul, Navi Mumbai

ARTICLE INFO

Keywords:
Crania
circumference
sexing
parameter

ABSTRACT

Determination of sex is one of the first and important factor in identifying decomposed bodies and skeletal remains. The correct sex determination is critical requirement in physical anthropology and medico- legal cases. The statistical sex difference is found in mean values of cranial circumference 1 and maximum cranial circumference 2 in male and female crania ($P < 0.01$). Maximum cranial circumference 1 is more effective parameter in sexing of crania.

1. Introduction

Anthropometry is a science of measurements and observations of significant features of human body, by the most reliable means and scientific methods and their arrangements under a classification system. It includes measurements taken on both skeleton and living body.[1]

To opinion on the sex of the individual, skull is one of the commonest parts of the skeleton. In the pre-pubertal age group although adult skulls show a few non-metrical and metrical differences, there is a paedomorphic tendancy in the human skull of either sex.[2]

Sexing of the skull is predominantly done using non metrical parameters, but they are best appropriate only in relative terms.[3]

Cranial measurements offer the simplest and fairly accurate way of judging the similarity or differences when comparing the skulls of different racial groups.[4]

AIMS AND OBJECTIVES

To study the sexual dimorphism in adult human crania by using maximum cranial circumference

2. MATERIAL AND METHODS

Total 310 adult human crania of known sex as male or female were studied for the present study. Only fully ossified adult crania were included in the present study. Crania showing wear and tear, any fracture or pathology were excluded. The thread and marker is used for the measurements of maximum cranial circumference.

1. Maximum cranial circumference- 1 [MCC1]- Photo 1

The maximum cranial circumference – 1 was taken with the help of thread. One point of the thread was placed on the glabella. Then by curving the thread around the cranium posteriorly it passed the opisthocranion point and again the second point reached up to the glabella. With the help of the thread maximum circumference was recorded.

2. Maximum cranial circumference- 2 [MCC2]- Photo 2

The maximum cranial circumference – 2 was taken with the help of thread. One point of the thread was placed on the nasion. Then by curving the thread around the cranium posteriorly it passed the inion point and again the second point reached up to the nasion. With the help of the thread maximum circumference was recorded.

RESULT AND DISCUSSION

Range, mean and standard deviation of the cranial capacity of adult crania was calculated. The identification point was calculated from the range of each parameter. From this percentage identified bones was calculated But when nearly 100% accuracy of sexing is required e.g. in medico-legal cases, it is advisable to calculate the maximum and minimum limits by adding ±3S.D to the mean value of each measurement. This gives the calculated range.[5] It covers 99.75% of the sample from this zone and will be useful also for any other sample from this zone. Demarking points were worked out from calculatd range[6]. To see the statistical significance in mean values of male and female P value is obtained by applying z test.

* Corresponding Author : **Dr Ruta Bapat**
Assistant Professor, Department of Anatomy, Dr DY Patil Medical college, Nerul, Navi Mumbai
E mail: ruta2262@gmail.com

TABLES: 1 Maximum cranial circumference (MCC1)

Details of measurements	Male	Female
No. of bones	155	155
Range	42.8 – 54.2	37.7- 50.5
Mean	49.8	47.75
Standard deviation	1.71	1.7
Statistical significance	P < 0.01	
Identification point	>50.5	<42.8
Percentage of identified bones	36.77	1.29
Calculated range	44.67 – 54.93	42.65-52.86
Demarking point	>52.86	<44.67
Percentage beyond demarking point	2.58	3.87

Z = 10.54

Table no 2 Maximum cranial circumference (MCC2)

Details of measurements	Male	Female
No. of bones	155	155
Range	38-52.80	36.7-49.3
Mean	47.81	46.27
Standard deviation	1.96	1.5
Statistical significance	P < 0.01	
Identification point	>49.3	<38
Percentage of identified bones	19.35	0.65
Calculated range	41.93-53.69	41.76-50.77
Demarking point	>50.77	<41.93
Percentage beyond demarking point	3.87	.65

Z = 7.78

In table no 1 the calculated range ranges from 44.67cm to 54.93cm in male crania and 42.65cm to 52.86cm in female crania. By applying demarking points, percentage of identified crania is 2.58% in male and 3.87% in female.

Sex difference in mean values of Maximum cranial circumference- 1 in males and in females is statistically significant. (p<0.01)

In table no 2 when demarking points are applied, the Maximum cranial circumference above 50.77cm is definitely of male cranium and if circumference less than 37.51mm then it is of female cranium. By this point percentage of identified male crania came down to 3.87 % and in females 0.65%.

The sex difference in the mean values of Maximum cranial circumference- 2 of crania is statistically highly significant (p<0.01).

The present study is compared with the study of Deshmukh AG [7]. In his study 40 male and 34 female crania were measured. The mean values of the maximum cranial circumference1 are 49.6 in males and 47.9 in females which are comparable with the mean values of the present study.

Both the studies are showing the statistical sex difference in the mean values of the maximum cranial circumference 1.

CONCLUSION

The maximum cranial circumference 1 is compared with the maximum cranial circumference 2. The mean values of the cranial circumference 1 are more than the values of maximum cranial circumference 2 in male and female crania.

More number of bones identified in the maximum cranial circumference 1 than the cranial circumference 2 because the glabella is more prominent and curved. Hence the maximum cranial circumference 1 is more useful in the sexing of the crania. The present study is having the medicolegal importance.

ACKNOWLEDGEMENT

I acknowledge Dr BN Umarji sir for his guidance in the present research. I also want to acknowledge Dr MS Nakhate for helping me in writing the paper.

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