International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2024: 7.101

Estimation of Sex in Human Remains - by Facial Length and Breadth - An Anthropometric Study

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Abstract: ***Present study was conducted in 250 medical students of Malwa region in which gender determination was done using Face length (FL) and Maximum Facial Breadth (FB). Among all 250 students included in our study, the mean age for males was 19.5±0.111 years (Mean±SEM) and for females it was 20.1±0.0895 years. The mean Face length for males was 12.4±0.0787 cm and for females it was 10.6±0.0384 cm. The mean Maximum Facial Breadth was 13±0.0649 cm for males while it was 12.2±0.0598 cm in females. Significant (p<0.0001) statistical difference between males and females for the facial parameters was observed. These results could help the forensic experts to estimate the gender of the deceased by using a part of skull with intact norma frontalis. The Facial length was a better parameter than Facial breadth.***

Keywords: Facial length, Facial Breadth & Gender determination

1. Introduction

Study of human skeleton for sex determination has been still a topic of interest among many researchers because bones of the body are last to perish after death, next to enamel of teeth which is found to be not so important.

WE all know that there exists some degree foSexual dimorphism in almost all bones of the human skeleton. though we know that sex determination can be done in 80% of the individuals by taking measurements of the skull but if we get pelvis also, then maybe we can go up to 98% accuracy but very difficult to get both. So we have to depend on availability of the specimens.

In the present study we have tried to determine the sex of the individuals from the available materials. The bones like zygomatic bone, maxiila frontal, mandible are recovered specific populations and. Facial dimension were for evaluation of variations in craniofacial morphology, standards of anthropometric measurements needs to be established for a particular population.

Growth and development of a human being depend not only on hereditary factors but also on environmental factors by influencing the mental factors may influence hormonal and metabolic activities during growth. it is well established that Men usually have less fat tissue but more muscular mass strong and wider bones. In comparison to women.

Taking into account the importance of anthropometric measurements the present study was undertaken. In the Malwa region of Central India.

2. Material and Methods

Medical students between 18 to 25 years of age group were selected from index Medical College, Indore, MP, India.

For the study which included 125 males and 125 females each (total = 250).

Students with facial deformity were excluded from the study.

Maximum Facial length and maximum Facial breadth were measured using vernier caliper. The anthropometric measurements which were measured were defined as Facial length (FL): It is the maximum vertical distance of the face measuring between nasion (intersection of naso frontal suture with the mid sagittal plane) to gnathion (most anterior and lowest median point on lower jaw passing in front of the nose anteriorly as shown in Figure 1

Maximum Facial Breadth (FB): It is maximum transverse distance of the face between the most prominent parts of the zygomatic bones with the help of vernier caliper. (Figure 1).

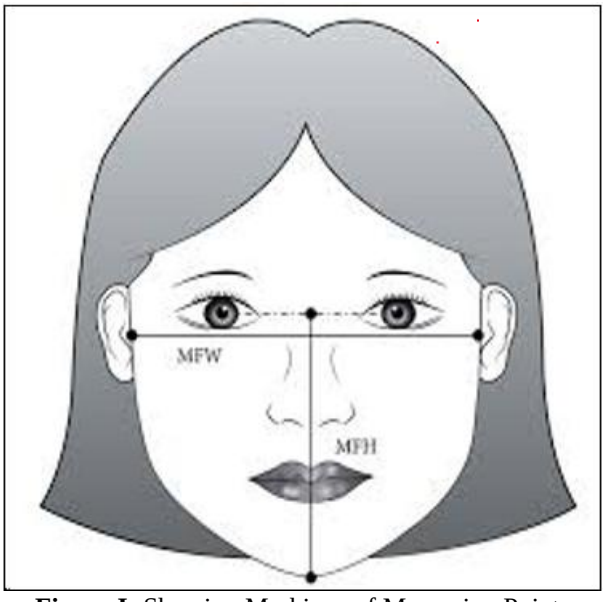

Figure I: Showing Markings of Measuring Points

MFW - Maximum Facial Width/Breadth

MFH- Maximum Facial Height/Length.

The Age, Facial length (FL) and Maximum Facial Breadth (FB) were calculated as range, mean, standard deviation and standard error of mean.

Student - t - test was applied for Age, FL and FB to assess the Statistical significance of the obtained data with the help of Graph prism statistical software.

3. Observation and Results

A descriptive statistics was calculated among 250 students enrolled as shown in Table - 1 for male and Table - 2 for females which shows that the mean age for males was 19.5±0.111 years (Mean±SEM) and for females it was 20.1±0.0895 years.

The mean Facial length for males was 12.4±0.0787cm and for females it was 10.6±0.0384 cm.

The mean Maximum Facial Breadth was 13±0.0649 cm for males while it was 12.2±0.0598 cm in females. FL and FB measured gives results which reveals that measurements were on the higher side in males when compared with females which represents its sexual dimorphism.

Table 1: Showing Comparative statistics in males

Statistics	Age	FL (Cm)	FB (cm)
Minimum	18	10.8	11.7
Median	19.8	12.7	13.1
Maximum	25	14.7	14.2
Mean	19.5	12.4	13
Std. Deviation	1.11	0.787	0.6491
Std. Error (SEM)	0.111	0.0787	0.0649
Lower 95%CIof mean	19.5	11.9	12.5
Upper 95%CI of mean	20.1	12.3	13.1
Cofficient of Variation (CV)	5.71%	6.55%	5.05%

Table 2: Showing Comparative statistics in females

Statistic	Age	FL (CM)	FB (CM)
Minimum	18	10	10.9
Median	19.9	10.5	12.1
Maximum	25	11.1	13.2
Mean	20.1	10.6	12.2
Std. Deviation	0.895	0.384	0.598
Std. Error (SEM)	0.0895	0.0384	0.0598
Lower 95% CI of mean	19.5	10.5	12.1
Upper 95% C Iof mean	20.3	11.9	12.2
Coefficient of variation (cv)	4.74%	3.54%	4.76%

Table 3: Representing STUDENT t - Test between Male and Female

Student t - test	Age	FL (CM)	FB (CM)
t - value	t=1.714	t=13.98	t=6.28
p - value	0.0709	<0.0001	<0.0001
Difference between means	0.23+ - 0.1384	- 1.149+ - 0.08514	- 0.558+ - 0.08853
Are means signif. different? (p - <0.05)	No	Yes	Yes
95% confidence interval	- 0.02314 to 0.5535 -	- 1.324 to - 1.034	- 0.7236 to 0.2924
R squared	0.01435	0.4	0.1605
Upper 95% CI of mean	19.8	12	12.9
Coefficient of variation (cv)	5.54%	6.44%	4.96%

4. Discussion

Present study was conducted in 250 medical students of Malwa region in which gender determination was done using maximum Face length and maximum Facial breadth.

In our study, the mean Facial length for males was 12.4±0.0787 cm and for females it was 10.6±0.0384 cm. this indicates the sexual dimorphism. These findings were in par with the findigs of Neeta Chhabra et al in 2015

Student t - test was found to be statistically significant between the means of two groups. Which indicates that the gender can be predicted significantly using the facial length.

In a similar type of study conducted by Vijeta Choudhary and A. K. Kapoor in Delhi in 2018, the mean facial breadth was 124.7 mm in males and 121.51 mm in females. In our study, the mean of maximum Facial breadth for males was 13±.0.0649 cm and it was 12.2±0.0598 cm for females. our results are almost similar to the results of the study conducted by Vijeta et al with a bare minimum difference.

Testosterone may be the reason for sexual dimorphism as it brings about massive increase in the size and muscles mass and bones which results in changes in the shape of the face between the sexes.12

Since our findings go hand in glove with other researchers as far as the facial measurements are concerned based on which we can predict that the gender of the available remains of the deceased could be identified by using these parameters.

5. Conclusion

There was significant statistical difference between males and females for the facial parameters used in this study i e. Face length and maximum Facial breadth.

The Facial length was a better parameter with t - value of 13.98 than Maximum Facial Breadth (t=6.28) to assess gender more accurately.

This shows that these parameters can significantly be used for estimation of gender using the part of skull with intact norma frontalis which allows to measure these parameters during forensic investigations or during facial reconstructive surgeries in men or women of Malwa region.

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