SEX DETERMINATION BY MASTOID PROCESS IN WESTERN U. P. POPULATIONS

Shobha Verma¹, C. S. Ramesh Babu²

¹Senior Resident, Department of Anatomy, HBT Medical College, Cooper Hospital.
²Professor and HOD, Department of Anatomy, Mujaaffarnagar Medical College, Uttar Pradesh.

ABSTRACT

Mastoid process is a conical prominence projecting from the undersurface of mastoid portion of temporal bone located just behind the external acoustic meatus and lateral to the styloid process. Its size varies, it is larger in males than in females. Advanced decomposition and mutilation or incineration of the body necessitates the examination of skeletal remains for sex determination. Studies on determination of sex by mastoid process morphometry in Indian skull are few, so the present study is proposed to determine the sex from morphometry of mastoid process in cadaveric skulls of western U.P. The present study was conducted in the Department of Anatomy, LLRM Medical College, Meerut on the 100 dried skulls of cadaveric origin with the help of vernier calliper.

The parameters which measured are
- Mastoid length.
- Mastoid breadth.
- AP diameter.
- Size of the mastoid process.

From the above study we observed that, the maximum length of female mastoid process (27.60) is less than the minimum value of length of male mastoid process (27.68). Length of the mastoid process shows sexual dimorphism.

KEYWORDS
- Mastoid Process, Mastoid Length, Mastoid Breadth and Sexual Diamorphism.


INTRODUCTION

- Mastoid process is a conical prominence projecting from the undersurface of mastoid portion of temporal bone located just behind the external acoustic meatus and lateral to the styloid process.
- Its size vary, it is larger in males than in females.
- Determination of sex through skeletal remains is an age old and time tested method.
- Such knowledge is applied in time of war, crimes, genocides, or mass disaster.
- Visual examination of entire skeletal segment may produce challenge.
- Various skeletal components give different degrees of accuracy in gender differentiation.
- Skull is considered next only to the pelvis in determining the sex.(1)
- Sex determination from the mastoid process is done metrically and nonmetrically.
- Various authors examined the skull and determined the sex by observing the mastoid process non-metrically.
- Mastoid region is one of the regions with most dimorphic traits. The tip of mastoid process is sexually dimorphic. It tend to be vertical in male and pointed inwards in females.(2)
- Some authors have already suggested that when the skull were placed on flat surface the male skull rest on mastoid process while female skull rest on occipital condyles or other portions of skull.(3)

AIMS AND OBJECTIVE

- The present study aims to assess the morphometry mastoid process measurement as it has maximum sex discriminatory power among all skull variables and to determine the sex from the cadaveric skulls in Indian population. The variables measured are
  1. Mastoid length.
  2. Mastoid breadth.
  4. Mastoid size.

MATERIAL AND METHOD

- The present study is conducted in the Department of Anatomy, LLRM Medical College Meerut, on 100 dried skulls of cadaveric origin. The skulls are studied to determine the accuracy of mastoid process in sex determination.
- The skulls of known sex in which spheno-occipital junction was synostosed and the mastoid part of temporal bone was intact were included for study. The skulls with physical damage, apparent deformity, defect and disease or on which spheno-occipital junction was not synostosed or in which spheno-occipital ectocranial sutures have completely disappeared were excluded from the study.
• The mastoid measurements were obtained with sliding calliper to the nearest millimetre as per standard anthropological convention and then the size of mastoid process calculated.

• The mastoid measurements were taken on both sides, that is right and left side and then the average of both were considered for statistical analysis. All the measurements were taken by a single observer to avoid inter observer error.

The parameters measured are
• Mastoid length.
• Mastoid breadth.
• Antero-posterior diameter.
• Size of mastoid process.
• With the skull lying on its right side and facing the observer, the fixed arm of the Vernier calipers was kept tangent to the upper border of the auditory meatus (Frankfurt plane) and the mastoid length was measured from this line to the tip of the mastoid process.

MATERIAL AND METHOD
• Size of mastoid process was obtained by multiplying the above said three variables and then dividing the product by 100.

• Statistical analysis was done for all mastoid measurements by calculating mean and standard deviation and, p value. Then student t test was used to distinguish between the male and female mean values for each variable. The data obtained was tabulated and analysed using SPSS-14 software.

• Review of literature.

• Determination of skull depends on the large size and robustness of male skull relative to those of female for example male cranial have better developed supraorbital ridges, broader palates, and thicker zygomatic and larger mastoid process than those of females. (4)

• Mastoid process is examined metrically by various authors.

• Sex is determined by taking a triangular area formed by the points porion, mastoidale and asterion with the help of statistical analysis and discriminant functional analysis. He studied on Brazilian skulls. (5)

• Some author’s used variables like mastoid length, breadth and width of mastoid process to determine the sex.

• Determination of the sex calculating the mastoid size( by mastoid height, breadth, radius) and supra mastoid crest size. (6)

• Determination of the sex in Japanese skull by using mastoid height, width and length. (7)

• Independent T-test revealed that there is a significant difference between males and females, with p value much less than 0.05. On applying the T test on the four variables(mastoid length, breadth, A-P diameter and size) of mastoid process we found that all the variables are statistically significant.
On comparing the mastoid length in between males and female we observed that, mean of mastoid length in males is 28.62 ± 00.64 and females is 23.92±01.54.

The measurement when compared was statistically significant with p- value <.000.
- Table also shows the minimum and maximum range of mastoid length among males and females.
- In males it ranges between 27.68 – 30.36mm.
- In females it ranges between 18.62 -27.60mm.
- One thing also noticed in this study that maximum length of female mastoid is less than the minimum length of male mastoid process, so we can determine the sex by visualising (Non metrically) the length of mastoid process.

On comparing the mastoid breadth of males and females we observed that mean of the mastoid breadth in males was 12.33 ± 0.86 and in females 12.38 ± 1.56.

These measurement when compared were statistically significant with p value=.000.
- The table also shows the minimum and maximum range of mastoid breadth among males and females.
- In males it ranges between 11.08–15.00.
- In females it ranges between 10.06–14.43.

On comparing the mastoid A-P diameter between males and female, we observed that mean of mastoid A-P diameter in males was 17.36 ± 01.03 and in females it was 15.393±01.81mm.

These measurement when compared were statistically significant with p value=.001.
- Table also shows minimum and maximum value of mastoid A-P diameter.
- In males it ranges between 16.60 – 20.54mm.
- In females it ranges between 11.50 – 18.60mm.
Size of mastoid process = Mastoid length x breadth x A-P diameter 

On comparing the mastoid size between males and females we observed that mean of the mastoid size in males was 61.46±0.71 and in females was 45.79±10.46mm.

**These measurement when compared**
- The table also shows the minimum and maximum range of size of mastoid process among males and females.
- In males it ranges between 53.91-85.57mm.
- In females it ranges between 30.74-71.99mm.

**DISCUSSION**
In our study we observed that all the parameters measured for the mastoid process of males are larger than that of females and all the parameters are statistically significant.

Studied the mastoid width and height on left and right sides in Thai populations. He has taken four parameters (left mastoid width-w, right mastoid width-W, left mastoid height-h, right mastoid height-H.\(^{(9)}\)

In the study, they find that mean of mastoid length 28.30±4.04 was, while breadth was 11.46±2.70m, A-P diameter was 17.52±4.69, and size was 60.18±31.33 among males.\(^{(9)}\)

In females length was 23.18±4.04, breadth was 8.68±2.70, mastoid A-P dia 13.69±4.69, mastoid size was 30.99±31.33.

In our study we found that mean of mastoid length was 28.62±0.63, breadth 12.33±0.86, A-P diameter 17.36±1.03, and size was 61.46±1.81 in males.

In females, mastoid length was 23.92±1.54, mastoid breadth was 12.38±1.56, mastoid A-P diameter 15.39±1.81and size was 10.46±0.01.

In this way by comparing the both study we see that the values of males' mastoid process are higher than females' values.

**CONCLUSION**
- Length of male mastoid process lies between 27.68±30.36.
- Length of female mastoid process lies between 18.62±27.60.
From the above values of mastoid length in males and females we observed that the maximum length of female mastoid process (27.60) is less than the minimum value of length of male mastoid process (27.68).

REFERENCES