



DETERMINATION OF THE SEX OF THE TIBIA BY ITS MAXIMUM LENGTH.

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ABSTRACT

INTRODUCTION:- The sex determination of the skeletons is of most importance to the physical and the forensic anthropologist's. Sex determination is an important issue of anthropological and forensic sciences. Determination of sex is a priority issue for further analysis of unidentified ancient human remains, because all techniques of identification are markedly different for males and females. The tibia is an ideal long bone of the limb which is used for sex determination, as it resists the erosive forces which act and it remains unaffected even after the burial of the body. The present study provides sex determination using discriminant analysis from tibia measurements in Mumbai region.

Material and Methods: 100 human tibia of known sex (50 males and 50 females) were procured from the Department of Anatomy from various medical colleges of Mumbai.

RESULTS AND DISCUSSION:- In our study, the length of the right and the left tibia of the males and females were measured. The length of the right male tibia ranged from 34.2 -46.8 cm with a mean of 40.5 cm whereas the length of the right female tibia ranged from 32.6-44.2 cm with a mean of 38.4 cm. Calculated t-value and P value Showed that the difference in the mean maximum length in male and female was highly statistically significant with $P < 0.001$.

CONCLUSIONS- From the present study, it was clear that certain parameters of the tibia could help in sex determination from fragments of the tibia also. The sexual dimorphism in the tibia is not only due to the general growth and the musculoskeletal activity, but also due to the genetic structure of the population.

KEYWORDS : Tibia, sex, length**Introduction:-**

Determination of sex is a priority issue for further analysis of unidentified human skeletal remains, because all identification techniques based on the sexes and for males and females different formulas are needed. The determinants of sexual dimorphism from osteological material are related greatly in body size and muscularity, and the childbearing capability in females¹. In general, the pelvis and skull are the part of the skeleton that exhibits prominent sexually dimorphic characteristics to predict sex with high accuracy. Some of the powerful methods of sex determination from skeleton are based upon the application of statistical analysis to osteological material. Discriminant function analysis is one of the most sophisticated mathematical approaches. Sex determination by discriminant function analysis provides information from each bone, which is very useful in disasters and forensic cases. Methods of sex determination by discriminant analysis from skeletons have been described in several populations by many authors². The long bones are often better preserved than the other shorter bones. The sex determination of the skeletons is of most importance to the physical and the forensic anthropologists. Sex determination is an important issue of anthropological and forensic sciences. Determination of sex is a priority issue for further analysis of unidentified ancient human remains, because all techniques of identification are markedly different for males and females.

The anthropometric study of bones is important to determine the race and also in medico-legal cases for the determination of stature, age and sex. The tibia is an ideal bone as it resists the erosive forces and keeps its anatomical shape for a long time even after the body is buried³. The tibia is an ideal long bone of the limb which is used for sex determination, as it resists the erosive forces which act and it remains unaffected even after the burial of the body.

The present study provides sex determination from tibia measurements in Mumbai region. Osteometric measurements included were the maximum length of the tibia. It is the second largest bone in the body. Although, it is comparatively vertical along its length, the proximal and distal ends extend outwardly.

Material and Methods:-

100 human tibia of known sex (50 males and 50 females) were procured from the Department of Anatomy from various medical colleges of Mumbai. The bones which showed fractures or any other pathologies were discarded. Length was measured on an Osteometric board.

Results:-

The length of the right and the left tibia of the males and females were measured. The length of the right male tibia ranged from 34.2 -46.8 cm with a mean of 40.5 cm whereas the length of the right female tibia ranged from 32.6-44.2 cm with a mean of 38.4 cm.

The length of the right and the left tibia of the males and females were measured. The length of the right male tibia ranged from 34.2 -46.8 cm with a mean of 40.5 cm whereas the length of the right female tibia ranged from 32.6-44.2 cm with a mean of 38.4 cm. The length of the left male tibia ranged from 34.6 -46.4 cm with a mean of 40.5 cm whereas the length of the right female tibia ranged from 32.4-46.2 cm with a mean of 39.3 cm. Mean value of maximum length of the tibia was higher in male as compared to female. Calculated t-value and P value Showed that the difference in the mean maximum length in male and female was highly statistically significant with $P < 0.001$. Differences in the value between right & left male and right & left female tibia were not statistically significant, so were not evaluated further.

measurements	Right side tibia		Left side tibia	
	Male	female	Male	female
Length of tibia in cm. (range)	34.2- 46.8	32.6- 44.2	34.6-46.4	32.4- 46.2
mean	40.5	38.4	40.5	39.3
S.D.	1.8	1.92	1.88	1.96

DISCUSSTION:-

Sex determination from the long bones or their fragments is often the

most important step for the identification of a person. Usually, the poorly preserved or the fragmentary bones are recovered from the crime site. The long bones are often better preserved than the other shorter bones. The sex determination of the skeletons is of utmost importance to the physical and the forensic anthropologists. A lot of studies have been done for sexing the long bones of the body.

In the study of Slaus et al So far numerous studies focus on the limitations of discriminant function formulae using more robust, skeletal elements including the femur, tibia and calcareous and talus, and generally accuracies fall within the 80-90% range⁴. Gonzales-Reimers et al. investigated sex determination by discrimination by discriminant function analysis of the right tibia in the prehistoric population of the Canary Island and highlighted the high average accuracy (94.9 to 98.3%). Tibia breadth parameters showed better discriminant power than length measurements and authors explained on the basis of greater male muscular development⁵.

This study which involved some measurable characteristics of the tibia can help in identifying the sex of the tibia. Identification of sex from the long bones has been studied in various populations. The average predictive accuracy is different for all. In one study on tibia, it was found to be 82.8% (87.5% for males and 72.2% for females). Comparison with the other races is not possible as different methods are used in different studies.

CONCLUSION:

From the present study, it was clear that certain parameters of the tibia could help in sex determination from fragments of the tibia also. The sexual dimorphism in the tibia is not only due to the general growth and the musculoskeletal activity, but also due to the genetic structure of the population. The present study considered length as the best discriminant factor for the identification of the male tibia for the identification of the female tibia in the Mumbai region.

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