



ESTIMATION OF SEX WITH THE HELP OF HUMERUS

Anatomy

Dr. Dashrath H. Pimple

Associate Professor, Department of Anatomy, Rajmata Vijaya Rajwade Scindia Medical College (Government Medical College) Bhilwara

ABSTRACT

INTRODUCTION:- Skeletal remains can be used to infer the subject's sex via two methods, morphological and anthropometric. Morphological methods are based on the examination of bones and are very important for a preliminary sex assessment. The second approach is based on anthropometric analysis which relies on the bone measurements. Many bones have been previously used for the identification of sex, and such studies emphasize that sexual dimorphism starts to appear after puberty. The humerus has rarely been tapped as a site for sex determination, though it has often demonstrated an even greater accuracy than other long bones such as the femur.

Therefore, the purpose of this study was to establish osteometric standards for the determination of sex from the humerus.

Material and Methods: 200 humeri of known sex (100 male and 100 female). Dry adult bones were included in the study whereas deformed, damaged or broken bones were excluded from this study. Measurements were taken using an osteometric board.

RESULTS AND DISCUSSION:- In our study, the mean maximum length in male was 32.7cm \pm 0.155, female it was 28.20cm \pm 0.153 and the mean total length of humerus in male was 31.532 cm \pm 0.154, in female it was 28.35cm \pm 0.153. The parameters in our study are significant (<0.0001) to consider as major discriminative variables in sexual dimorphism of humerus.

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- It was clear that certain parameters of the humerus could help in sex determination also. The sexual dimorphism in the humerus 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 humerus for the identification of the female humerus.

KEYWORDS

Humerus, sex, length

INTRODUCTION:-

Determination of sex is a very important component of any human skeletal analysis. Sex estimation in complete human skeletons is usually easy by observation of morphological traits¹.

Sex discriminatory functions obtained for each bone are very useful in mass disasters and criminal cases of multiple human burials, where charred bodies, scattered, mixed or incomplete remains are recovered. Since osteometric methods for the determination of sex from the skeleton are population specific, researchers from around the world have conducted studies to establish group-specific standards of assessment².

Skeletal remains can be used to interpret the subject's sex via two methods, morphological and anthropometric. Morphological methods are based on the examination of bones and are very important for a preliminary sex assessment. The second approach is based on anthropometric analysis which relies on the bone measurements³.

The analysis of DNA is the most reliable method for sex determination but it is also the most expensive and time consuming method, which can also be hindered by local conditions⁴.

Determination of sex from the skeleton is vital to medico-legal investigations. Since the osteometric methods for the determination of sex are population specific, researchers from around the world have conducted studies to establish group specific standards of assessment. The determination of sex is a very important component of any human skeletal analysis. Sex estimation in a complete human skeleton is usually easy by the observation of morphological traits.

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Many bones have been previously used for the identification of sex, and such studies emphasize that sexual dimorphism starts to appear after puberty. The humerus has rarely been tapped as a site for sex determination, though it has often demonstrated an even greater accuracy than other long bones such as the femur^{5,6}.

Therefore, the purpose of this study was to establish osteometric standards for the determination of sex from the humerus.

MATERIALS AND METHODS:-

The present study was carried out on 200 humeri of known sex (100 male and 100 female). Dry adult bones were included in the study whereas deformed, damaged or broken bones were excluded from this study. Measurements were taken using an osteometric board. Following parameter was measured for each bone.

All parameters were measured in centimeters (cms), noted, tabulated and analyzed statistically. Maximum Length measured from straight distance between the highest point of the head of the humerus to deepest point on trochlea by using Osteometric board.

RESULTS:-

The mean maximum length in male was 32.7cm \pm 0.155, female it was 28.20cm \pm 0.153 and the mean total length of humerus in male was 31.532 cm \pm 0.154, in female it was 28.35cm \pm 0.153. Statistical analyses of the parameters showing t - value for maximum length 11.206, for total length of humerus 11.168 was observed. The parameters in our study are significant (<0.0001) to consider as major discriminative variables in sexual dimorphism of humerus.

Differences in the value between right & left male and right & left female humerus were not statistically significant, so were not evaluated further.

Table 1.

measurements	Right side humerus		Left side humerus	
	Male	female	Male	female
sex				
Length of humerus in cm.(range)	29.6- 35.8	27.2-29.2	29.4-35.2	27.4- 29.6
mean	32.7	28.2	32.3	28.5
S.D.	1.60	1.82	1.74	1.92

DISCUSSION:-

The mean value of total humerus length gives an important evidence to indicate the characteristic features of a population as a whole. Munoz et al stated the total humerus length by a remains of humerus segment, for estimating of sex from whole skeletal or remains⁷. The maximum length was the measurement with the greatest sex difference. The reliability of sex determination from each variable was tested and the maximum length was found to be the most sensitive one (88.9%) with

the highest rate of accuracy (90%). Maximum length was present as a factor only in the Chinese. They found that the highest rate of accuracy was 86.8% in the Chinese, 92.4% in the Japanese and 97.1% in the Thais⁸. The mean maximum length in male was 32.7cm \pm 0.155, female it was 28.20cm \pm 0.153 these values are mere with previous studies.

The mean values of the male measurements were significantly higher than those of the females. In our study the mean maximum length of the humerus values are higher in males than those of females (Table -1) 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. 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 humerus could help in sex determination also. The sexual dimorphism in the humerus 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 humerus for the identification of the female humerus in the Rajasthan region.

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