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Evaluation of Sex in Humerus

Medical Science

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ABSTRACT

AIM: The aim of the present study is to determine the sex by evaluating morphometry in humerus. Determining sex is always been an important aspect in forensic and archaeological cases. METHODS: For this purpose, 60 humerus of unknown sex were taken from the department of anatomy, A.C.S medical college, Chennai. Each humerus was measured using various instruments like tape, Vernier calliper and digital weighing machine. The osteometric data of present study is statistically analysed. RESULTS: The statistical data confirmed that all the parameters i.e., length of humerus, biepicondylar width, vertical diameter of head and weight of humerus showed significant difference between male and female humerus. The results of present study showed the mean value for the length of humerus in male - 31.3cm, female -28.2cm, Mean value of biepicondylar width in Male -5.6cm, female -5.1cm. Mean value of vertical diameter of head in male - 4.4cm, female -3.8cm, Mean value of weight in male -116gms, female -68gms.CONCLUSION: The data generated in the study would be a useful reference to estimate the sex of the humerus.

INTRODUCTION

Sexual dimorphism in human body is evident from foetal life. Almost all bones of human skeleton show some degree of sexual dimorphism, usually it is confirmed that males are larger and heavier than female. Determining sex from bones play an important role in identifying unknown bodies. Of the human skeleton the humerus is a long bone, often remains in good condition and is especially favourable for metric study, which has been tapped as a site for sex determination.

Humerus is the long bone in upper arm. It is located between elbow and shoulder joint. It has an upper end, lower end & shaft. Upper end consist of head, neck, greater &lesser tubercle. Lower end has articular & non articular part. Capitulum & trochlea forms articular part. Non-articular part includes medial & lateral epicondyle. Humerus has demonstrated a greater accuracy than other long bones. Evaluation of sex still remains a challenge, which has an important role in medico legal investigations. Therefore present study is an attempt to determine sex based on humerus measurements.

Materials and methods

60 dried adult humeri (28 right side and 32 left side) of unknown sex were collected from department of anatomy A.C.S medical college, Chennai. Measurements were taken by using Vernier calliper, tape, digital weighing machine as described in text book of anthropology. The following method is simple, accessible and gives greater accuracy.

Metrical data of each humerus was collected using 4 parameters as described below.

1. Maximum length of humerus (ML)- the distance between most proximal point of head of humeri to most distal point of trochlea, using tape.

2. Vertical diameter of head (VDH)-the distance between most proximal point of head of humeri to anatomical neck using Vernier calliper

3. Biepicondylar width (BW)-the distance between the proximal point of medial epicondyle to lateral epicondyle, using tape.

4. Weight of humerus (WT)-using digital weighing machine [fig: 1]

Fig-1 Measuring weight

RESULTS

60 adult humeri were studied. Each humerus was measured for 4 parameters were already described. The measurements were tabulated and statistically analysed, which showed a marked difference. Based on which it was found that out of 60 humerus 35 humeri were male and 25 humeri were female.

Table 1: Measurements of Humerus

S.NO	PARA METERS	SEX	MEAN	SD	RANGE	't' value	DF	P VALUE
1.	Maximum Length	M	31.2	0.973	30-34	2.32	58	<0.001
		F	28.2	0.971	26-29			
2.	Biepicondylar Width	M	5.6	0.560	5.0-7.0	1.96	58	<0.025
		F	5.1	0.354	4.5-6.0			

3.	Vertical Diameter of Head	M	4.4	0.187	4.2-4.9	1.64	58	<0.05
		F	3.8	0.21	3.5-4.1			
4.	Weight	M	116	15.34	100-160	2.57	58	<0.005
		F	68	14.61	40-90			

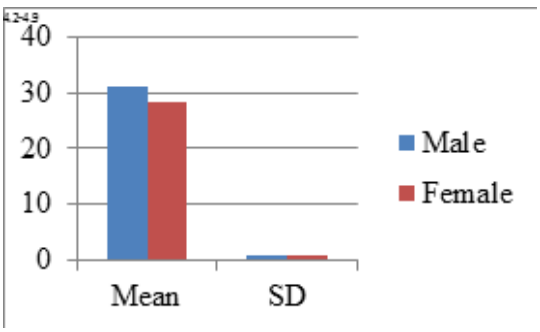

Fig: 2 Length of the Humerus

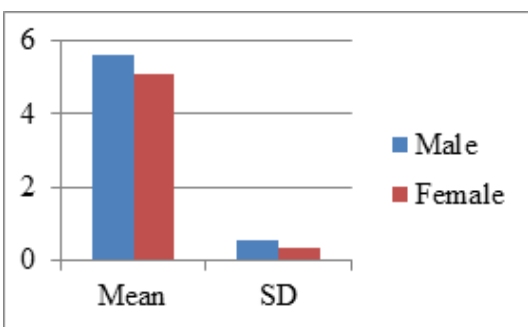

Fig: 3 Biepicondylar Width of humerus

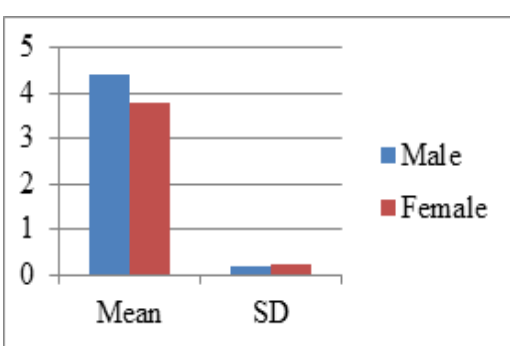

Fig: 4 Diameter of the Humerus

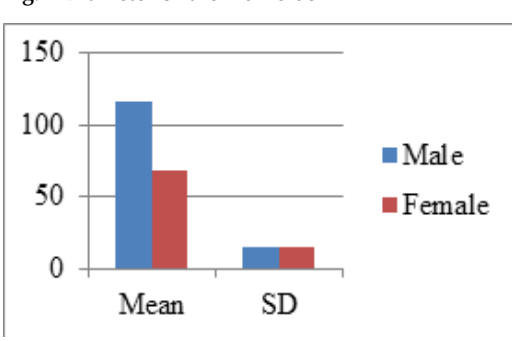

Fig: 5 Weight of the Humerus

DISCUSSION:

Morphometry refers to the quantitative analysis of form, a concept that encompasses size & shape. Morphometric analysis are commonly performed on organisms and are useful in analysing their fossil record.

It is essential to identify sex from different bones of the body, other than skull and pelvis (Girish Patil, 2011). Many studies have set osteometric standards for sexual dimorphism (Iscan.M.Y, 1986). This study aimed to determine the sex by using different measurement of humerus. Based on the range set by previous studies the sex of the bone was identified. The results have revealed that the mean values of the male measurements were significantly higher than those of females.

The length of humerus ranges between 30-34 cms in male, 26-29cms in female (Table-1). The mean value of maximum length of humerus in male is 31.2cms, female is 28.2 cms, which showed a significant difference (Fig: 2). Similar findings found in Girish patil 2011. There has been a wide difference found in biepicondylar width. It is statistically significant. It ranges in male from 5.0-7.0cms, in female 4.5-6.0cms (Table-1). Mean value of BW in male -5.6cms, female -5.1cms (Fig: 3). Results of the study are in comparison with the study by Singh et al 1972. Difference in vertical diameter of head has been found which showed a range of 4.2-4.9cms in male, 3.5-4.1cms in female (Table-1). Mean value of VDH in male -4.4cms, in female-3.8cms (Fig: 4).Anil et al .weight of humerus ranges in male -100-160gms, female - 40-90gms. Mean weight of humerus in male is 116gms and in female is 68gms, (Fig: 5) Niraj.P

CONCLUSION:

From the results it is clear that based on above parameters the sex of humerus can be decided. The length, vertical diameter of head, weight of humerus were a good predictor. The biepicondylar width is an accurate predictor of gender.

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