Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

SEX DETERMINATION OF FEMUR:A MORPHOMETRIC ANALYSIS OF MAXIMUM LENGTH OF FEMUR AND FEMORAL HEAD DIAMETER

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INTRODUCTION

The thigh bone or femur, is the body's longest and strongest bone. It supports the thigh's skeletal structure. It is made up of three parts: a proximal end, a shaft and a distal end. The proximal end of the femur has a head, a neck and two massive projections known as the greater trochanter and lesser trochanter on the upper part of the shaft.

Its length corresponds to striding gait, while its strength corresponds to weight and muscular forces[1]. Since it shows considerable variation between individuals, it is widely studied to establish stature and locomotion pattern in skeletal remains for sex recognition[2]. It is most likely to withstand environmental effects and animal movements due to its robustness and strength[3].

Bones are an integral part of determining a person's biological profile. The determination of sex is the first step in constructing a profile and defining an individual's identity, as subsequent methods of determining age and stature are highly sex dependent[3]. The most sexually dimorphic bones are the skull and pelvis but, in their absence, sex must be determined from available bones[4]. Long bones are often found in good condition. The femur is the most sexually dimorphic of the three. The causes for this may be numerous, including variations in pelvic morphology caused by greater pelvic width in females, which is affected by reproductive function[1].Body size and proportions are influenced by genetic variations, as are differences in musculature[5,6]. Female femora are normally shorter and have more obliquity than male femora. The typical male long bones are larger, longer, rougher and more massive than the typical female long bones. The study of sexual dimorphism is based on the idea that the male's axial skeleton weight is comparatively and completely heavier than the female's and that the femur bears the brunt of this weight in the transmission of body weight[1,7].As a result, in today's world of rising crime, fatalities and mass disasters, witnessing human skeletal remains is becoming more common; the femur can play a key role in deciding sex.

The acetabulum of the pelvic bone articulates with the spherical head of the femur. It has a non-articular pit called the fovea on its medial surface that attaches to the round ligament of the femur head.

The aim of this study was to sex determination of femur: a morphometric analysis of maximum length of femur and femoral head diameter.

MATERIAL AND METHODS

The present study sex determination of femur: a morphometric analysis of maximum length of femur and femoral head diameter in the north Indian populationwas conducted on 300 femora of unknown sexof which 195 male bones and 105 female bones were found in the current study. The bones were already present in the Department and had been collected from dissected cadavers.

Following Parameters were Measured for each Bone[3]

1. **Maximum Length of Femur (MLF):** The straight distance between the head's highest point and the medial condyle's lowest point.

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

2. **Femoral Head Diameter (FHD):** In the cranio caudal axis, it is the distance in a straight line between the top and lower ends of the femoral head.

RESULTS:

This was observed that the average (Mean ± SD) of maximum length of femur was found in male 45.72 ± 1.79 and in female 41.65 ± 2.52 andthe Mean ± SD of femoral head diameter was found in male 4.55 ± 0.27 and in female 3.98 ± 0.26. The maximum length of femur andfemoral head diameter was found significantly higher in male comparison to that in the female, with a p value of < 0.001.

Variable	Male	Female	p – Value
	Mean ± SD (cm)	Mean ± SD (cm)	
Maximum length of femur	45.72 ± 1.79	41.65 ± 2.52	0.001
Femoral head diameter	4.55 ± 0.27	3.98 ± 0.26	0.001

Table-1 Comparison ofMaximum length of femur andfemoral head diameter. All the values are mean ± SD.

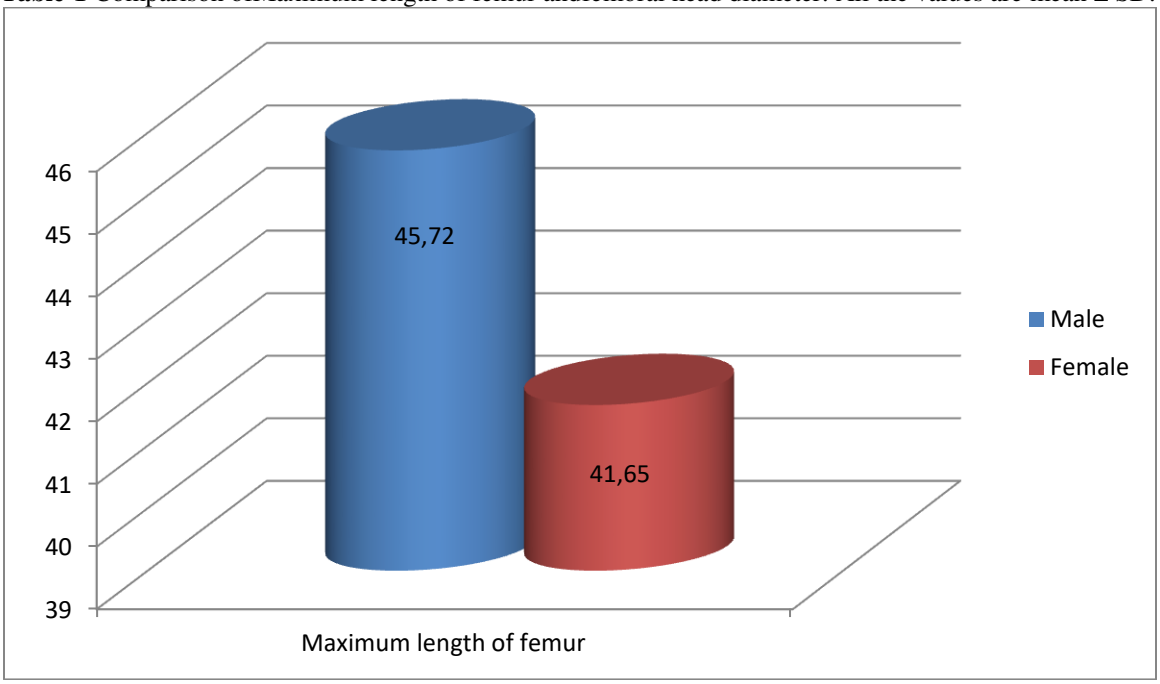

Figure: 1Comparison ofmaximum length of femur

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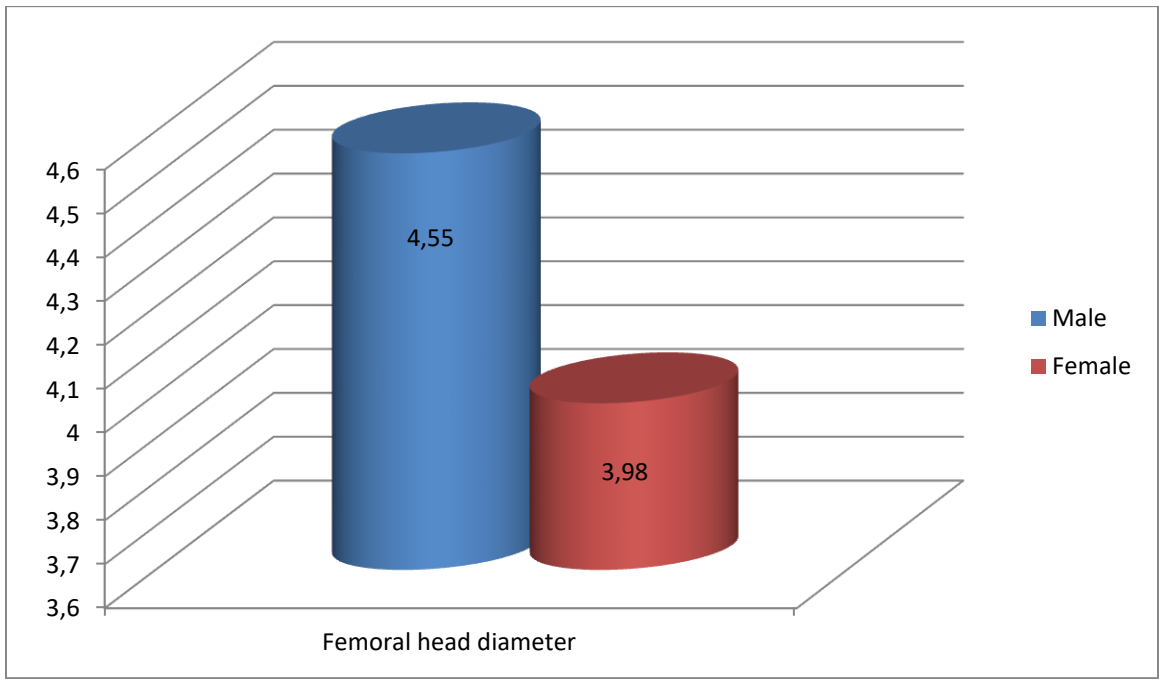

Figure: 2 Comparison ofFemoral head diameter

DISCUSSION

The mean ± SD concentration of maximum length of femur and femoral head diameter was found significantly higher in male comparison to that in the female, with a p value of < 0.001.These findings were concordant with the results of the studies, which were previously done bySikka et al., (2016)[8], Gargi et al., (2010)[9], Timonov et al., (2014)[10] and Singh et al., (2017)[11]determined the sex of femora and established baseline parameters for the North Indian population. In contrast to males and females, all of the parameters were highly singnificant. In comparison to females had lower value of maximum length of femur and femoral head diameter and males had higher standards of maximum length of femur and femoral head diameter.

CONCLUSION

The present study sex determination of femur: a morphometric analysis of maximum length of femur and femoral head diameter in the north Indian populationclearly shows that males have significantly higher statistical values for all parameters when compared to females. These characteristics are valuable not just in medico-legal practice, but also to anatomists and orthopaedic surgeons.

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