

Research Article

Morphometric Study of Proximal End of Femur in Central Indian Population

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ABSTRACT:

Introduction: Femur bone is used for anthropometric analysis in the cases of unidentified parts if available. So that very difficult to identify sex by an individual bone. My present study is aimed to calculate a range of anthropometric parameters of the proximal end of dried femora for sex determination.

Material and Methods: The study was carried out on undamaged, dried, non-pathological 50 dried femora of both sexes at L N Medical College and Research Centre, Bhopal. Total length of femur, vertical diameter of Neck, vertical diameter of Head measured through osteometric board and vernier caliper.

Result : The outcome was statistically significant. All bones were found to be symmetrical.

Conclusion: P value of present study point towards symmetrical femora. Femoral length were next best sex discriminatory parameter after Vertical diameter of Head.

Key Words: Femoral Length, Vertical Diameter of Neck, Vertical Diameter of Head, Central Indian

INTRODUCTION:

The structural function of femur requires that it endures the mechanical loads, by changing its shape, size and mass¹. The architecture of each of the femur parts (proximal portion, shaft, distal end) changes to meet the functional demands placed on it during daily activities².

Several adult cadaver based studies have revealed differences in morphology of proximal femur varying with race². According to Siwatch R C³ and Noble P C⁴, in case of Total Hip Arthroplasty, it is mandatory that the design and dimensions of femoral component should match the anatomy of proximal femur. In clinical practice, if the implant happens to be ill-fitting, hip dislocation and implant fractures are quite common⁵.

Most commonly femur bone used for anthropometric analysis in the cases of unidentified parts if available. Generally male femur bone are longer, thicker, and heavier than female bone. So that very difficult to identify sex by a individual bones.

Several studies did not report that uniform values for all the races studied because racial variations necessitated by diet, heredity, weather, and other landscape factors⁶. Few studies have been reported in blacks in Africa on the determination of sex from measurements of femoral heads, and these were mainly from Nigeria^{7,8}.

So that I know no such type of work previously done in central Indians to differentiate the sex of the femora. The aim of our study is calculate a range of anthropometric parameters of the proximal end of dried femora for sex determination. The objective of present study are Total length of femur, vertical diameter of Neck, vertical diameter of Head.

MATERIALS AND METHODS: The study comprised of undamaged, dried, non-pathological 50 dried femora of both sexes and sides available in the Department of Anatomy. Fractured deformed bones, and those with unclear bony landmarks were skipped.

Femur length : The length of femora was determined by using osteometric board. The distance from the most superior point on the head of the femur to the most inferior point on the distal- medical condyle.

Vertical diameter of the head: The vertical diameter of the head measures the straight distance between the highest and deepest points of the femoral head. Use vernier calipers.

Vertical diameter of the neck: Minimum diameter of the neck of the femur at superior- inferior direction. Use vernier calipers

RESULTS:

PARAMETERS	RIGHT SIDE (23 Femur bones)					
	Female			Male		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum
TOTAL LENGTH	43.04	37.60	48.20	44.81	41.10	48.60
VERTICAL LENGTH OF NECK	2.81	2.40	3.40	3.06	2.70	3.80
VERTICAL LENGTH OF HEAD	4.17	3.50	4.80	4.26	4.10	4.70

Table No:1 Shows Mean , Minimum and Maximum Values of Right Sided Male and Female Femora

Table no 1 shows that parameters in females fall short off counterparts in males. Minimum value of all parameters in females is lesser than in males.

PARAMETERS	LEFT SIDE (27 Femur bones)					
	Female			Male		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum
TOTAL LENGTH	43.94	39.20	48.10	44.24	40.10	47.00
VERTICAL LENGTH OF NECK	2.96	2.40	3.80	3.00	2.60	3.40
VERTICAL LENGTH OF HEAD	4.17	3.60	5.00	4.20	3.80	4.60

Table No:2 Shows Mean , Minimum and Maximum Values of Left Sided Male and Female Femora.

Table no 2 shows that parameters in females fall short off counterparts in males. Minimum value of all parameters in females is lesser than in males.

Parameters	Male Femur (32)	Female Femur (18)	P Value
	Mean ±Sd	Mean ±Sd	
TOTAL LENGTH	43.6±3.09	42.1± 2.47	.527
VERTICAL LENGTH OF NECK	2.89±.31	2.98 ±.30	.319
VERTICAL LENGTH OF HEAD	4.20 ±.28	4.17±.31	.758

Table No:3 Indicating differences in male and female femoral.

We applied independent ‘t’ test , including all the parameters. On the basis of ‘t’ test symmetry or asymmetry was

concluded. The outcome was statistically significant. All bones were found to be symmetrical.

DISCUSSION:

This study conducted in the department of Anatomy at L N medical college and research centre. In the present study sex determination of these proximal end femur bone was done using different measurement and indices. Vertical length of head was statistically significant in our study. Anuj et al⁹ reported that vertical diameter of head in male femora was on right side 45.21mm and left side was 46.18 mm and in females it was found that on right side 40.79 mm and left side 41.55mm respectively. In our study it be noted that on males was 4.20cm and females was 4.17 respectively.

Akhtari et al¹⁰ results shows that males people of northern area of Rajshahi have vertical diameter of head was significantly greater than females. P.S. IGBIGBI et al¹¹ concluded that the differences between male and female value were statistically significant. Similar to our results. Singh and Singh¹² reported figures of above 45.50 mm for male bones and less than 41.50mm for female bones.

Above observation indicate its value in regional differentiation. Urvik C et al¹³ concluded that vertical diameter of head in male femur is more than female femur in the Gujarati population.

Vertical diameter of head of Central Indian population is less than the vertical diameter of Black Malawian and chines, Gujarati population, while more than the vertical diameter of Rajasthan population.

Mean value of femur length was higher in male as compared to female. Our results similar to Pandya Am et al¹⁴. while mean maximum female femoral length in present study was similar to the value in American whites and Californian sample. According to development of the general features of long bone size and shape depends on genetic factors while the manifestation of its characteristics depends on the mechanical environment¹⁵. Meera Jacob et al¹⁶ calculated p value, the difference in mean maximum length in males and females was highly statistically significant (p<0.0001).

In the present study shows that vertical diameter of neck is statistically significant (P< .319). Hema Nidugala et al¹⁷ reported that vertical diameter of neck is significant (P< 0.005). The result of our study when compared to North Indian population show lower value which may be due to the differences existing between population. We observed that femoral length were next best sex discriminatory parameter after Vertical diameter of Head.

CONCLUSION :

Mean of the sample suggest that it is towards the higher side in Central Indian males. P value of present study point towards symmetrical femora. Apart from Anatomy, the knowledge about different diameters of head and neck of femur is prudent in : Orthopedic surgery for implant application. Radiological practice for diagnosis of different

pathologies of this part, Jurisprudence, in order to determine age, sex and race. So ever population have their own metric standards.

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