

To Find Out Measurement of Femur: An Institutional Based Study

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ABSTRACT

Background: Human skeletal structure differs between populations. The femur, which is the longest and most powerful bone of the human skeleton. Morphometric values of the femur are important for the determination of inter-racial features and differences. The present study was conducted to find out the measurement of femur.

Materials and Methods: In the present study 40 (20 right and 20 left) intact human adult femurs were obtained. The following measurements were conducted Neck shaft angle, Femoral Length and Neck Length of femur. The number of nutrient foramina and their location in respect to the proximal end of femur on both sides were studied. The recorded data was compiled, and data analysis was done.

Results: The results of present study are the Physiological length of left femur was 42.12 ± 1.21 cm and right was 45.23 ± 2.11 cm, the Rubusticity index of left femur was 13.12 ± 1.13 and right was 14.32 ± 2.34 , the Platymetric index of left femur was 84.43 ± 5.45 and right was 83.67 ± 5.56 , the Foraminal index of left femur was between 34-61% and right was 39-67%.

Conclusion: The present study concluded that there were significant different in between right and left femurs measurements. Knowledge from this study will be useful in forensics, prosthetics and in orthopaedical surgical procedures and bone grafting.


Keywords: Femur, Morphometry, Index.

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INTRODUCTION

The femur is the longest and strongest bone of the human body. Morphologically it is a typical bone consisting of upper and lower end and shaft in between. In the shaft of femur there are nutrient foramina, which give passages to the nutrient arteries of the medullary cavity of the bone, for its nourishment and growth. It has been suggested that the direction of the nutrient foramina is determined by the growing end of the bone, which is supposed to grow at least twice as fast as the non-growing end and as a result of this nutrient foramina move away from the growing end of the bone.¹

Anatomical awareness of different femoral dimensions is important in anthropological and medico-legal practice for sex/racial determination and as well as to radiologist, rheumatologist and orthopedic surgeons for diagnosis and planning of treatment.²

It forms the skeleton of the thigh, bears body weight in erect posture, supports movement of legs, provides attachment to muscles, form blood cells and acts as store house for calcium and phosphate.³

The neck shaft angle of femur^{4,5}, also known as Cervicodiaphyseal angle⁶ (120° - 140°)⁷ along with the proximal femoral geometry is of utmost importance in pre-operative planning of osteotomy, arthroplasty or fracture fixation⁸ and for implants of femoral neck.⁹ The present study was conducted to find out the measurement of femur.

MATERIALS AND METHODS

In the present study 40 (20 right and 20 left) intact human adult femurs were obtained from Department of Anatomy, Narayan Medical College & Hospital, Rohtas, Sasaram, Bihar, India. The selected bones were normal with no appearance of pathological changes were included in the study. The following measurements were conducted Neck shaft angle, Femoral Length and Neck Length of femur. Instruments Used for this study are Sliding Caliper, Osteometric Board. The number of nutrient foramina and their location in respect to the proximal end of femur on both sides were studied. The recorded data was compiled, and data analysis was done.

Table 1: Femur Measurements

Indices	Right Femur (Cm)	Left femur (Cm)
Physiological length	42.12±1.21	45.23±2.11
Rubusticity index	13.12±1.13	14.32±2.34
Platymetric index	84.43±5.45	83.67±5.56
Foraminal index	34-61%	39-67%

RESULTS

The results of present study are the Physiological length of left femur was 42.12±1.21cm and right was 45.23±2.11cm, the Rubusticity index of left femur was 13.12±1.13 and right was 14.32±2.34, the Platymetric index of left femur was 84.43±5.45 and right was 83.67±5.56, the Foraminal index of left femur was between 34-61% and right was 39-67%.

DISCUSSION

Stature is an important anthropometric parameter to establish an individual's identity in medico-legal issues relating to skeletal remains examination. Stature is estimated using combined dimensions of bones responsible for height or using regression equations based on intact long bone length measurements. In some instances like a mass disaster, these methods cannot be applied as intact long bones are not available.¹⁰

The results of present study are the Physiological length of left femur was 42.12±1.21cm and right was 45.23±2.11cm, the Rubusticity index of left femur was 13.12±1.13 and right was 14.32±2.34, the Platymetric index of left femur was 84.43±5.45 and right was 83.67±5.56, the Foraminal index of left femur was between 34-61% and right was 39-67%.

Strecker W, Keppler P et al. stated that mean values of length of right and left femora were found to be similar, although the left femora showed larger values than right, they were not significantly greater.¹¹ Pearson K and Bell J also stated that there was no significant statistical bilateral difference found in bones.¹²

In a study done by RC Siwach et al¹¹ in 2003 among people of Rohtak using 150 dry bones, the neck shaft angle was 123.5°, as against 146.25°, which is again higher.¹³ In the study of Minakshi verma et al¹², NSA was not significant on the right side whereas on left side, the two tailed p value is less than 0.0001.¹⁴

The studies of Bokariya P. et al.,¹⁵ Khan and Hussain¹⁶ and Datta M. et al¹⁷ which did not report any significant difference in the robusticity index of the right and left femur in Central India, South India and West Bengal population respectively.

CONCLUSION

The present study concluded that there were significant difference in between right and left femurs measurements. Knowledge from this study will be useful in forensics, prosthetics and in orthopaedical surgical procedures and bone grafting.

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