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Proximal End of Femur: A Morphometric Study in a Tertiary Care Teaching Hospital

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ABSTRACT

Introduction: *Femur bone can be used for anthropometric analysis in the cases of unidentified parts if available. As it is very difficult to identify sex by an individual bone. Therefore this study was done to calculate a range of anthropometric parameters of the proximal end of dried femora for sex determination.*

Methods: *The study was carried out on undamaged, dried, non-pathological350 dried femora of both sexes at Anatomy at SMBT Institute of Medical Sciences and Research Centre, Nashik. 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*

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INTRODUCTION

The structural function of femur requires that it endures the mechanical loads, by changing its shape, size and mass.[1] The architecture of each of the femur parts (proximal portion, shaft, distal end) changes to meet the functional demands placed on it during daily activities.[2] Several adult cadaver based studies have revealed differences in morphology of proximal femur varying with race.[2] According to Siwatch R C[3] and Noble P C[4], 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 common.[5] 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 an individual bone. Several studies did not report that uniform values for all the races studied because racial variations necessitated by diet, heredity, weather, and other landscape factors.[6] 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.

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METHODS

This Prospective Study was conducted in the department of Forensic Medicine and Anatomy at SMBT Institute of Medical Sciences and Research Centre, Nashik. The study comprised of undamaged, dried, non-pathological 30 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 osteometric board. The distance from the most superior point on the head of the femur to the most inferior point on the distal- medical condoyle.

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. Vernier calipers used.

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

RESULTS

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

Table 1: Shows Mean , Minimum and Maximum Values of Right Sided Male and Female Femora

Parameters	Right side					
	Female			Male		
	Mean	Min.	Max.	Mean	Min.	Max.
Total Length	41.04	36.60	46.20	45.81	42.10	49.50
Vertical Length of Neck	2.91	2.50	3.50	3.56	2.80	3.90
Vertical Length of Head	4.27	3.60	4.96	4.36	4.20	4.90

Table 2: Shows Mean , Minimum and Maximum Values of Left Sided Male and Female Femora.

Parameters	Left side					
	Female			Male		
	Mean	Min.	Max.	Mean	Min.	Max.
Total Length	42.94	38.20	47.10	44.24	40.10	47.00
Vertical Length of Neck	3.96	2.50	3.96	2.90	2.60	3.70
Vertical Length of Head	4.17	3.60	5.00	4.20	3.80	4.60

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

DISCUSSION

In this 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 al[9] 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 al[10] results shows that males people of northern area of Rajshahi have vertical diameter of head was significantly greater than females. P.S. IGBIGBI et al[11] concluded that the differences between male and female value were statistically significant. Similar to our results. Singh and Singh[12] 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 al[13] 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 valve 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 environment.[15] 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 al[17] 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. Apart from Anatomy, the knowledge about different diameters of head and neck of femur is prudent in Orthopaedic 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.

REFERENCES

1. Daniel J Westcott. Effect of Mobility of Femur Midshaft External shape and robusticity. American Journal of Physical Anthropology 130:201-213 (2006).
2. Frost HM. Bone “mass” and the “mechanostat”: a proposal. Anat Rec.1987 sep;219(1):1-9.
3. Siwach RC, Dahiya S. Anthropometric study of proximal femur geometry and its clinical application. Indian Journal of Orthopaedics 2003;37(4): 247-251.
4. Noble PC, Jerry W, Alexander JW et al. The anatomical basis of femoral component design. Clinical Orhp 1998;235:148 165.
5. Gnudi, S; Ripamonti, C; Lisi L; Fini M. ; Giardino R. & Giavaresi G. Proximal femur geometry to detect and distinguish femoral neck fracture from trochanteric fractures in post-menopausal women. Osteoporos. Int., 13:69-73, 2002.
6. Luo, Y.C. Sex determination from the pubis by discriminant function analysis. *Forens. Sci. Int.* 1995; 74:89-98.

7. Asala, S.A., Mbajiorgu, F.E. and Papandro, B.A. A comparative study of femoral head diameter and sex differentiation in Nigerians. Acta Anatomica. 1998; 162:232-237.
8. Hsiao, T.H., Chang, H.P. and Liu, K.M. Sex determination by discriminant function analysis of lateral radiographic cephalometry. J. Forens. Sci. 1996; 41:792-795.
9. Anju KR. Deshwal, Apoorva Tripathi, Supriti Bhatnagar. Comparative measurement of diameter of femoral head in population of western Uttar Pradesh. International journal of scientific research. Vol :2, Issue -12, December 2013, 437-439.
10. Akhtari Afroze, M Durrul Huda. Femoral Head Diameters and Sex Differentiation in the Northern Zone (Rajshahi) of Bangladesh. TAJ 2005; 18(2): 84-88.
11. P.S. IGBIGBI and B.C. MSAMATI. Sex Determination from Femoral Head Diameters in Black Malawians. East African Medical Journal Vol. 77 No. 3 March 2000.
12. Singh, S.P. and Singh, S. The sexing of adult femora: demarking points for Varanasi zone. Indian Med. Gaz. 1972; 11: 45-49.
13. Urvik C. Kukadiya, Tulsibhai C. Singel, Pratik N. Trivedi, Jayesh K. Rathava, Vidya K. Satapara, Dilip V. Gohil, Mital M. Patel. Sex determination from vertical diameter of femoral head in Gujarati population. International Journal of Advanced Research (2014), Volume 2, Issue 6, 859-863.
14. Pandya A M, Singel T C, Akbari V J, Dangar K P, Tank K C4, Patel M P. Sexual dimorphism of maximum femoral Length. National journal of medical research. Vol 1 Issue 2 Oct – Dec 2011: ISSN 2249 4995.
15. Pavel Timonov, Antoaneta Fasova, Dobrinka Radoinova, Alexandar Alexandrov, and Delian Delev. A study of sexual dimorphism in the femur among contemporary Bulgarian population. Euras J Anthropol 5(1):46−53, 2014.
16. Meera Jacob R. Avadhani Bindhu. S. Maximum Femoral Length and Bicondylar Width as a Tool for Sexual Dimorphism. PARIPEX - INDIAN JOURNAL OF RESEARCH. Volume : 2 | Issue : 8 | Aug 2013.
17. Hema Nidugala, Bhagya Bhaskar, Sucharitha Suresh, Ramakrishna Avadhani. Metric Assessment of Femur Using Discriminant Function Analysis in South Indian Population. Int J Anat Res 2013, Vol 1(2):29-32. ISSN 2321- 4287.