

## ORIGINAL RESEARCH

### **Evaluation of age-related modification on morphometric dimensions of Proximal Femoral of males: A cross-sectional study**

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#### **ABSTRACT**

**Background:** Assessment of age-related variation on morphometric dimensions of Proximal Femoral of males in a known population.

**Materials & methods:** 25 male femur bones were obtained from department of human anatomy. Two study groups were formed- Less than 50 years of age and more than 50 years of age. Complete demographic and clinical data of all the bones was collected from the data record files. Measurements were done and different morphometric parameters were assessed. All the parameters were compared on the basis of age group.

**Results:** Mean anteroposterior physeal angle in subjects of less than 50 years and more than 50 years of age was  $75.16^\circ$  and  $75.26^\circ$  respectively. Mean lateral physeal angle among subjects of less than 50 years and more than 50 years of age was  $82.28^\circ$  and  $82.01^\circ$  respectively. Mean neck version among subjects of less than 50 years and more than 50 years was  $9.77^\circ$  and  $9.59^\circ$  respectively. Non-significant results were obtained while comparing the morphometric dimension of male's femur among different age group.

**Conclusion:** No significant age-related changes in structural components of proximal femur was observed after fourth to fifth decade of life.

**Key words:** Skeletal, Deformities, Males

#### **INTRODUCTION**

The kinematical chain of the low extremity can be designated as a crank mechanism, thus reciprocating the foot motion into rotary motion through the hip that in turn is being transformed into the ascending variable directive torsion movements of the flexed sloping spiral of the spine.<sup>1,2</sup>

While the human femur is an element of the non-linear system of the locomotor's apparatus (as the super system for the femur), functionally dependent upon the other elements of the super system, being some time a subsystem, the elements of which are epiphysis and diaphysis, the investigation of its system and anatomical organization has not only theoretical, but also, perhaps, direct practical and clinical significance.<sup>3,4</sup>

Despite the epidemic of childhood obesity, the influence of body weight on bone strength during growth is poorly understood. Overweight adults have high areal bone mineral density (BMD,  $g/cm^2$ ) and reduced risk of osteoporotic fracture. During growth, increased body weight is associated with increased bone mineral content (BMC, g) and bone geometric

strength, and several authors report greater bone mass in overweight and obese children. Yet, recent work suggests that obese children have low bone mass for their weight and are at increased risk for fracture.<sup>5-7</sup> Hence; the present study was undertaken for assessing the age-related variation on morphometric dimensions of Proximal Femoral of males in a known population.

## MATERIALS & METHODS

The current research was undertaken for evaluating the age-related variation on morphometric dimensions of Proximal Femoral of males in a known population. 25 male femur bones were obtained from department of human anatomy. Two study groups were formed- Less than 50 years of age and more than 50 years of age. Complete demographic and clinical data of all the bones was collected from the data record files. Measurements were done and different morphometric parameters were assessed. All the parameters were compared on the basis of age group. All the parameters were compared on the basis of age group. All the results were recorded and analyzed by SPSS software. Mann-Whitney U test was used for evaluation of level of significance.

## RESULTS

The mean anteroposterior physeal angle was 75.21° while mean lateral physeal angle was 82.13°. Mean neck version was 9.68° while mean angle of inclination was 130.02°. Mean anteroposterior physeal angle in subjects of less than 50 years and more than 50 years of age was 75.16° and 75.26° respectively. Mean lateral physeal angle among subjects of less than 50 years and more than 50 years of age was 82.28° and 82.01° respectively. Mean neck version among subjects of less than 50 years and more than 50 years was 9.77° and 9.59° respectively. Non-significant results were obtained while comparing the morphometric dimension of male's femur among different age group.

**Table 1: Morphometric measurements**

Measurements	Mean	SD
Anteroposterior physeal angle	75.21°	6.11°
Lateral physeal angle	82.13°	6.36°
Neck version	9.68°	8.12°
Angle of inclination	130.02	6.39°

**Table 2: Comparison of Morphometric measurements among subjects divided on the basis of age group**

Measurements	Age group (years)		p- value
	Less than 45 years	More than 45 years	
Anteroposterior physeal angle	75.16°	75.26°	0.12
Lateral physeal angle	82.28°	82.01°	0.25
Neck version	9.77°	9.59°	0.78
Angle of inclination	129.96°	130.10°	0.65

## DISCUSSION

The mechanical competence of bone is determined by its size and shape, and by the spatial distribution, organization and intrinsic properties of the bone tissue. Areal bone mineral density (aBMD) measured by dual-energy x-ray absorptiometry (DXA) explains 50% to 80% of the mechanical strength of bone in vitro and is strongly associated with clinical fractures (7,8), but it does not reflect the three-dimensional distribution of bone mass, cortical and trabecular microarchitecture and intrinsic properties of the bone matrix. Quantitative computed tomography (QCT), on the other hand, measures cortical volumetric BMD

(vBMD), trabecular vBMD, bone volume, cross-sectional area and cortical thickness.<sup>6-10</sup> Hence; the present study was undertaken for assessing the age-related variation on morphometric dimensions of Proximal Femoral of males in a known population.

The mean anteroposterior physeal angle was 75.21° while mean lateral physeal angle was 82.13°. Mean neck version was 9.68° while mean angle of inclination was 130.02°. Mean anteroposterior physeal angle in subjects of less than 50 years and more than 50 years of age was 75.16° and 75.26° respectively. Mean lateral physeal angle among subjects of less than 50 years and more than 50 years of age was 82.28° and 82.01° respectively. Carballido-Gamio *et al* used quantitative computed tomography and tensor-based morphometry (TBM) to identify three-dimensional internal structural patterns of the proximal femur associated with age and with incident hip fracture. A population-based cohort of 349 women representing a broad age range (21–97 years) were included in this study, along with a cohort of 222 older women (mean age 79±7 years) with (n=74) and without (n=148) incident hip fracture. Images were spatially normalized to a standardized space, and age- and fracture-specific morphometric features were identified based on statistical maps of shape features described as local changes of bone volume. Morphometric features were visualized as maps of local contractions and expansions, and significance was displayed as Student's t-test statistical maps. Significant age-related changes included local expansions of regions low in volumetric bone mineral density (vBMD) and local contractions of regions high in vBMD. Some significant fracture-related features resembled an accentuated aging process, including local expansion of the superior aspect of the trabecular bone compartment in the femoral neck, with contraction of the adjoining cortical bone. However, other features were observed only in the comparison of hip fracture subjects with age-matched controls including focal contractions of the cortical bone at the superior aspect of the femoral neck, the lateral cortical bone just inferior to the greater trochanter, and the anterior intertrochanteric region. Results of their study support the idea that the spatial distribution of morphometric features is relevant to age-related changes in bone and independently to fracture risk.<sup>10</sup>

In the present study, mean neck version among subjects of less than 50 years and more than 50 years was 9.77° and 9.59° respectively. Non-significant results were obtained while comparing the morphometric dimension of male's femur among different age group. Gupta *et al* assessed the age related variation on morphometric dimensions of Proximal Femoral of males in a known population. A total of 20 male femur bones were obtained from department of human anatomy. All the bones were categorized into two groups; Less than 45 years of age and More than 45 years of age. The mean anteroposterior physeal angle was 74.12° while mean lateral physeal angle was 81.99°. Mean neck version was 9.46° while mean angle of inclination was 129.41°. Non-significant results were obtained while comparing the morphometric dimension of male's femur among different age group. We couldn't appreciate any significant age related changes in few structural components of proximal femur after fourth to fifth decade of life.<sup>11</sup>

## CONCLUSION

No significant age-related changes in structural components of proximal femur was observed after fourth to fifth decade of life.

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