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Analysis of Some Morphometric Parameters of Tibia

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Abstract

Introduction: Degenerative arthritis of knee joint is common, but treatment is a difficult problem. Especially with increasing age, it leads to serious dysfunction and affects the quality of life of the person negatively. In this study, it was aimed to measure some morphological values of tibia proximal in healthy individuals and to establish normal reference intervals.

Method: The study was carried out on 100 individuals (50 females-50 males) who were referred to the Department of Radiology, Konya Education and Research Hospital, Health Sciences University and Multidector Computed Tomography (MDCT). Individuals aged between 20 and 80 were included in the study.

Results: Three different parameters of tibia were measured and their mean values were determined. We investigated whether statistically significant differences exist between men and women.

Conclusion: When literature information was considered, anatomic details belonging to tibia are used for orthopedic surgary. As a result, knowing the anatomical details of the knee joint, which is one of the most commonly used joints in daily life, will be useful during surgery and in the construction of orthosis and prosthesis.

Keywords: Anatomy; Morphometry; Tibia.

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Introduction

The knee joint is a hinge-type joint that allows flexion and extension movements. Stability of the joint is provided by static and dynamic structures. Static structures are composed of capsules and ligaments, and dynamic structures are composed of muscles and tendons [1]. The knee joint is a joint formed between the femur, tibia and patella. Fibula is not included in this joint [2].

Degenerative arthritis of knee joint is common but treatment is a difficult problem. Especially with increasing age, it leads to serious dysfunction and affects the quality of life of the person negatively [3]. In adults, increased lateral tibial torsion is associated with patellar femoral joint problems, and increased medial tibial torsion may be associated with knee osteoarthritis [4-8].

Tibial torsion is defined as the physiological displacement of the transverse plane according to the distal joint line around the longitudinal axis of the tibia. Most of the complaints of inward and outward pressure in children are related to tibial torsional problems. Proximal tibia deformities can be frontal and sagittal planar from the deformities originating from the proximal epiphysis and metaphyseal region of the tibia [9].

In this study, it was aimed to measure some morphological values of proximal zone of tibia in healthy individuals and to establish normal reference intervals.

Materials and Methods

The study was carried out on 100 individuals (50 females-50 males) who were referred to the Department of Radiology, Konya Education and Research Hospital, Health Sciences University. Study was done on multidector computed tomography (MDCT) images. Individuals aged between 20 and 80 were included in the study.

In the first step of working; patients who had previously visited to the hospital and who had knee views with 64-section MDCT were identified. Morphological evaluation was then performed by detecting images on the sagittal, coronal, and axial planes. Morphometric measurements were made by the same person to minimize the error margin. The parameters that are measured and recorded in our work are as follows; Bikondiler distance

(BD), the width of the medial tibia condyle (MTCW), and the width of the lateral tibia condyle (LTCW).

The averages of the data obtained were used to determine whether the difference between the means of both genders was statistically significant using the T test.

Results

Three different parameters of tibia were measured and their mean values were determined. We investigated whether statistically significant differences exist between men and women. BD, MTCW and LTCW values were significantly higher in males than in females ($p<0.05$). No significant difference was found between the other values obtained and the data details obtained by male and female sex are given in Table 1.

Table 1: *Comparison of the obtained data according to gender (mean ± SD)(mm). (BD: Bikondiler Distance; MTCW: The Width of the Medial Tibia Condyle; LTCW: The Width of the Lateral Tibia Condyle).*

Parameters	Female (n=50)	Male (n=50)	p
BD	67.95 ± 3.75	76.91 ± 5.50	<0.05
MTCW	45.76 ± 2.85	51.66 ± 3.80	<0.05
LTCW	41.29 ± 3.14	46.97 ± 3.85	<0.05

Discussion

The knee joint is one of the most commonly injured joints in the human body, and this rate of injury is increasing day by day due to the increase in sports injuries. Tibia's intercondylar protruding surfaces are deepened by cartilaginous structures called meniscus and the jointed femur becomes more suitable surfaces for the condenses. The esthetic depth provided by these meniscuses is of great importance, especially in terms of the fit of the lateral condyles of the femur and tibia [10]. Çakmak et al. reported that BD in women was 68.8 ± 4.6 mm, and 76.4 ± 2.8 mm in men. In another study these values were recorded as 69.0 ± 4.2 mm in women and 78.7 ± 5.4 mm in men [11]. In our study, BD was found to be 67.95 ± 3.75 mm in women and 76.91 ± 5.50 mm in men. The values we obtained are in line with the literature values.

When the tibia is a varus deformity, there is an aesthetic disturbance in the lower limbs in the form of a one-sided D-shaped and two-sided O-leg. In the early adulthood period, arthritis of the medial compartment, then lateral compartment, and associated pain and movement restriction develops before the knee [9]. In a previous study, MTCW was recorded as 39.2 ± 3.9 mm in women and 44.0 ± 3.2 mm in men [12]. Another similar study reported that these values were 43.4 ± 1.9 mm in women and 49.3 ± 3.1 mm in men [11]. In our study, MTCW was recorded as 45.76 ± 2.85 mm in women and 51.66 ± 3.80 mm in men.

The most common reason for walking with the help of walking stick is due to the inward turn of the tibia. Children with this deformity between the ages of 2 and 4, and at older ages can also be observed. It can be single or double sided. Often there are stumbling and falling complaints [13]. Shahi et al. found that LTCW values as 42.4 ± 2.3 mm for women and 47.7 ± 2.7 mm for men in their studies. Shah et al. reported the same parameters as 50.4 ± 4.4 mm for women and 56.2 ± 3.8 mm for men. In our study, these values were 41.29 ± 3.14 mm in women and 46.97 ± 3.85 mm in men. The values we found were in agreement with the values of Shahi et al. [14,15] and lower than those of Shah et al.

As a result, knowing the anatomical details of the knee joint, which is one of the most commonly used joints in daily life, will be useful during surgery and in the construction of orthosis and prosthesis.

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