

Original article

Morphometric Study of Height of Medial Malleolus of Fully Ossified Dry Human Left Tibia

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Abstract

Tibia is the larger and stronger of the two bones in the leg below the knee in vertebrates. The objective of this study was to determine the morphometry of the height of medial malleolus of fully ossified dry human left tibia and this morphometric parameter also clinically important in imaging diagnosis of fractures of the medial malleolus. This analytical type of study was done on two hundred (200) fully ossified dry human left tibia conducted in the Department of Anatomy at Sir Salimullah Medical College, Dhaka, Bangladesh from July 2014 to June 2015 for a period of one year. From the result of the present study it can be concluded that the mean (\pm SD) value of height of medial malleolus of tibia was greater in male than that of female which was statistically significant ($p < 0.01$). The results of this study will be useful for Orthopedic surgeons while making implants for the lower end of tibia.

Key words: Morphometric, medial malleolus, fully Ossified.

Introduction

The tibia known as shin bone or shank bone is commonly recognized as the strongest weight bearing bone of the body. Tibia is an ideal long bone of the lower limb which is used for sex determination, as it resists erosive forces which act upon it and it remains unaffected even after burial of body. The lower end of tibia is prolonged downward on its medial side as a strong flattened pyramidal process, the medial malleolus. The medial malleolus is one of the most commonly injured site of the Ankle joint⁸.

Medial malleolus is the medial process of the distal tibia. It is short and thick and has a smooth lateral surface with a crescentic facet articulating with the medial talar surface¹⁰. The medial surface is convex and subcutaneous. It has a wide base proximally. Its posterior border presents a broad groove the malleolar sulcus directed obliquely downward and medialward and occasionally double⁶.

The lower extremity of tibia with its medial malleolus and lateral malleolus of fibula together with talus forms the ankle joint⁹. Ankle fractures are the second most common orthopedic trauma presentation, accounting for approximately 10% of all fractures presenting at hospital¹. At the ankle, the medial malleolus can be fractured. Stress fractures of the ankle account for

approximately 10% of injuries seen in recreational and competitive athletes². So, for its reconstruction surgeries and in the manufacture of its implants various dimensions of lower articulating end of tibia are needed⁵. The tibia has been modelled as taking an axial force during walking that is up to 4.7 times bodyweight⁷. There is very limited amount of literature available on morphometry of the distal articular surfaces of tibia and fibula which will help in the reconstruction surgeries and in the construction of implants. So, this study was clinically important in imaging diagnosis of fractures of the medial malleolus¹¹.

No citable published research works on calcaneus in our country has been found. So, further work on tibia is needed. So, we need our own standard baseline data. Morphometric measurements of height of medial malleolus of tibia that form the ankle joint will be helpful data for comparing with male and female tibia that will make a guideline for anatomists, anthropologists, forensic scientists, sports medicine physicians, orthopaedic, plastic surgeons and radiologists.

Materials and methods: Two hundred (200) dry left sided adult human tibia were collected from the department of Anatomy and also from the students of Sir Salimullah Medical College (SSMC) Dhaka, Ibrahim Medical College (IMC) Dhaka, Dhaka National Medical College (DNMC) Dhaka and Bangladesh Medical College (BMC) Dhaka.

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Though tibia is an irregular bone, height of medial malleolus of tibia bone was measured with the help of flexible metallic wire and then the straight measurements of that values were considered.

For the measurement of height of medial malleolus (HMM) of tibia a red dot was given on the articular surface and a blue dot was given on the maximum superoinferior projection of medial malleolus. The distance between two dots which represents HMM was measured by a flexible metallic wire. Then the wire was measured with a digital slide caliper and recorded. (Fig-1)



Fig-1: Photograph showing the height of medial malleolus measured by flexible metallic wire. HMM represents the height of medial malleolus.

Ethical clearance : This study was carried out after approval of research protocol by Institutional Ethics Committee (IEC) of Sir Salimullah Medical College, Dhaka.

Results: The mean (\pm SD) height of medial malleolus was 1.70 (\pm 0.169) cm in male and 1.62 (\pm 0.221) cm in female. There was significant difference between height of medial malleolus ($p < 0.01$). (Fig : 2 and Table :1)

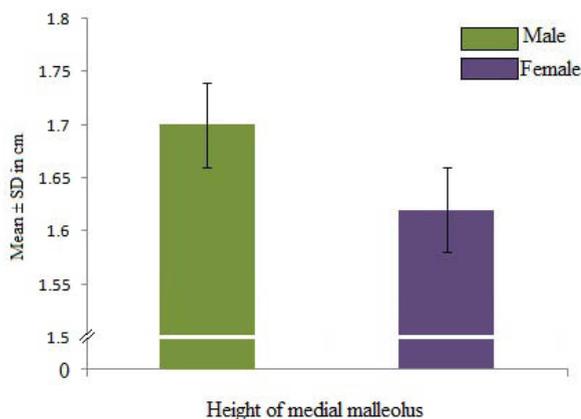


Fig 2: Bar diagram showing height of medial malleolus of left tibia in male(n=102) and female (n=98).

Table 1: Height of medial malleolus of left tibia in male and female

Sex	Height of medial malleolus Mean \pm SD in cm
Male (n=102)	1.70 \pm 0.169 (1.31- 2.30)
Female (n=98)	1.62 \pm 0.221 (1.23- 2.60)
P value	0.006**

Discussion

In the present study the mean (\pm SD) of height of medial malleolus was found greater in male than female which was statistically significant ($p < 0.01$). The measured values of present study was found significantly dissimilar ($p < 0.01$) to the findings reported by Gulec et al⁴ (2014) who carried out study on Turkish population. The dissimilarities might be due to same regional and geographical orientation.

Gichambira et al³ (2013) also worked on Turkish people. But they worked on whole population and did not differentiate sex. So the results of the present study could not be compared with that of their study.

Conclusion

From the result of the present study it can be concluded that the mean (\pm SD) value of height of medial malleolus were greater in male than that of female. The present study was an attempt to construct data on height of medial malleolus fully ossified dry human left tibia which will serve as a reference value in the field of anatomy, planning treatment and diagnostic procedures of orthopaedic surgery.

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