

Morphological and morphometrical analysis of talar articular facets in relation to talocalcaneal articulation

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ABSTRACT

Introduction: The morphology of the bone provides several anatomical inputs and its variation provides significant points during orthopedic surgeries and also in fabrication of tarsal bone prosthesis. The calcaneum is the biggest of tarsal bone unpredictably cuboidal with its long pivot slanted distally. The aim of the study is to assess the type of facet on the talus and calcaneum, as well as the overall morphology and morphometry of the talus and calcaneum. **Materials and Methods:** A total of 30 calcaneal bones are gathered from the Department of Anatomy, Saveetha Dental College, Chennai, and are utilized for this study. Digital Vernier caliper is utilized for morphometric investigation. The length, breadth, and width of talar articular facets in connection to talocalcaneal articulation are analyzed. **Results:** The bones were grown-up calcanei of both genders. The calcanei were finished in all viewpoints to give the right estimations. The calcanei were non-neurotic. **Conclusion:** From the study, it was observed that there is a high occurrence of the separate type of a talar articular facet which is common in all populations.

KEY WORDS: Calcaneum, Morphology, Morphometry, Sinus tarsi, Sulcus tali, Talus

INTRODUCTION

The calcaneum is the largest of tarsal bone irregularly cuboidal with long axis inclined distally.^[1,2] The posterior talar facet articulates with the middle third of the calcaneus and is oval and convex anteroposteriorly. The articulation between talus and calcaneus is by posterior and anterior compartments separated by sinus tarsi and canalis tarsi.^[3] The main reason of the present study is to assess the type of facet on the talus and calcaneus, as well as the overall morphology and morphometry of the talus and calcaneum.^[4] The middle third of the superior surface of the calcaneus carries the posterior talar facet for articulation with body of talus.^[5]

The calcaneum is the most frequently injured tarsal bone, with calcaneal fractures accounting for some 60% of all major tarsal injuries: Most fractures are intra-articular with subtalar joint involvement.^[6] Talocalcaneal coalition may occur at any of the three

facets; however, the majority involved that the middle facet tarsal coalition is frequently a cause of painful flatfoot. Anatomical variations in terms of ligamentous attachments, articulations, and bony morphology are common in the subtalar region.^[7]

The shape of the articular facets of the talus and calcaneum and their relationship to each other is important for joint function and surgical procedures.^[8] In this study, assessment of the morphology of the articular facets of the talus and calcaneum, in an Anatolian population, was undertaken.^[9] Racial differences are also present in developing fetuses, probably being genetically determined rather than resulting from other postnatal factors.^[10] Nevertheless, it is unlikely that the high occurrence of the separate type of a talar articular facet is common in all populations.^[11]

MATERIALS AND METHODS

A total of 30 calcaneal bones are collected from the Department of Anatomy, Saveetha Dental College, Chennai, and are used for this study. Digital Vernier caliper is used for morphometric analysis. The length,

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breadth, and width and total area of calcaneal bones are measured. The morphological appearances of calcaneal articular surfaces are photographed. The observed values are compared and represented graphically. The measurements are represented as average \pm standard deviation.

RESULTS

The bones are adult calcanei of both sexes. The calcanei are complete in all aspects so as to give the correct measurements. The calcanei are non-pathological. The length, breadth, and width of calcanei bone are calculated and the average was calculated. All the measurements were statistically analyzed. Talocalcaneal bone length, width, and breadth were calculated. Here, the types of talus and calcaneum were assessed using the following measurement. The anteroposterior length and width and sulcus of the talocalcaneal bone are 3.6 and 2.5 and the sulcus is 3.05. The length of the sulcus tali is marked between medial and lateral margins of the sulcus, while the length of the sulcus calcaneum is taken as the distance between anterior and posterior margins of the sulcus. In addition, the anteroposterior length and transverse width of the talus and calcaneum are measured, together with the width, length, and depth of the sulcus tali and sulcus calcanei which are determined using a digital caliper. The lengths of talus and calcaneum are taken as the distance between the most anterior point on the anterior surface and most posterior point on the posterior surface. The measurements are represented in Figures 1 and 2.

DISCUSSION

The talus articulates with the calcaneum inferiorly to make the subtalar joint. Morphology of the facet of the talar bone with calcaneum is a significant factor for the firmness of the subtalar joint.^[12,13] The “bony tripod” design, in which there are three articular features for talus on calcaneum, gives a rigid framework for the subtalar articulation.^[14] The reason for this investigation is to examine the frequencies of varieties of sorts of calcaneum in its morphology and morphometric variants.^[15]

The components of the talar bone and calcaneum decided in the present investigation are predictable with those declared by others.^[16,17] In the current examination, estimations of the bone are like those of Lee *et al.* (2012) and Jung *et al.*, on Korean population. The width and length of the sulcus tali contrasted from those revealed by Koshy *et al.* (2002) in Indian population. Estimations of the calcaneum were like Jung *et al.*, on Koreans, and Uygur *et al.*,^[18] on Turkish population. Still, the width of the sulcus calcanei in the present examination likewise contrasted from

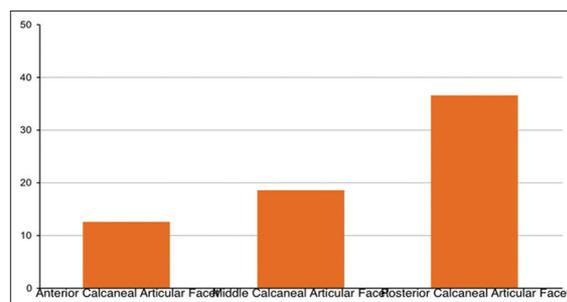


Figure 1: The measurement of anterior, middle, and posterior calcaneal articular facet

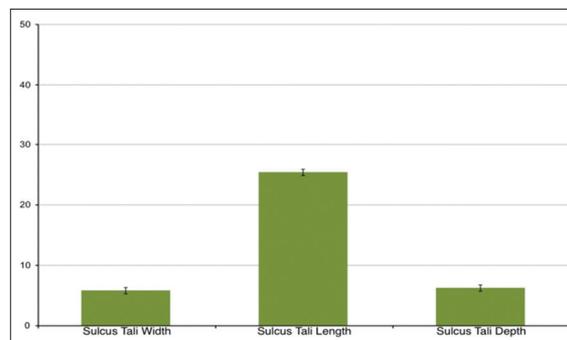


Figure 2: The measurement of width, length, and depth of sulcus tali

Koshy *et al.*, in Indian samples. Besides, the width and length of sulcus calcanei in the present investigation varied from those revealed by Sarvaiya *et al.*, in Indian populations. These distinctions might be due to various reference focuses being utilized for taking the estimations, just as racial distinctions.

CONCLUSION

From the study, it was observed that there is a high occurrence of the separate type of a talar articular facet which is common in all populations. It is reasoned that regardless of the similarities between populations, there are adequate contrasts that these ought to be considered for orthopedic, anthropological, and forensic purposes.

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