Original Research Article

Squatting Facets Morphometry in population of South West Coast – A study that could help in Identification

Ullasa Shetty*

Associate Professor, Department of Forensic Medicine and Toxicology, A.J.Institute of Medical Sciences and Research Centre, Mangalore, India

Received: 15-02-2021 / Revised: 10-03-2021 / Accepted: 11-04-2021

Abstract

Squatting facets have long been observed in the Indian population but has been seldom used in identification.These happen due to life style modifications. The extreme dorsiflexion of the feet in squatting makes the impression on these bones in the lower end of the tibia and also the superior articulating surfaces of the talus. These important aspects may be helpful in identification. There is a gap in the knowledge of how reliable it is to be used in identification of the individual in the present knowledge. This study puts in a sincere effort to describe the incidences and morphometry of squatting facets in South West Coast Population of India.

Keywords: Squatting, facets, incidence, morphometry, identification.

Introduction

Identification is a core area of forensic medicine. This deals with the application of the knowledge and methodology in identifying a human being or any other area of interest. There are many incidences in where a partial or degraded parts of a human being are encountered, say it an accident or intentional homicide. Understanding some key features that distinguish the human beings is very important. There are racial differences and also there are geographical differences. There are many studies which are conducted to understand the racial differences. There are some differences that are very subtle and can be incorpo-rated into the anatomy due to local geographical influences or in some cases the practices.Such lifestyles that may influence in the changes in the anatomy are very important and in fact can be one of the most important distinguished features that may be very helpful in identification. The distal articulates with the superior articulating surface of the talus. The extension of the medial surface is contributed by the medial malleolus and this surface also contributes in the articulation with the lateral surface of the talus[1-3].The capsule is tightly adherent to the anterior groove and at the same time a bit loosly attached to the posterior end[4,5].Habitual squatting has long been recognized to change the skeletal morphology of the lower limb. Squatting may be a resting postural complex that involves hyperflexion at the hip and knee and hyperdorsiflexion at the ankle and subtalar joints.During locomotion, the foot is never dorsiflexed sufficiently to bring the anterior border of the inferior extremity of the tibia into contact with the dorsum of the neck of the talus.Thus modifications of the neck of the talus and therefore the distal tibia indicating their habitual contact are taken as evidence of the acute dorsiflexion of the ankle that occurs in squatting[6].This study puts in a sincere effort to describe the incidences and morphometry of squatting facets in South West Coast Population of India.

*Correspondence

Dr Ullasa Shetty

Associate Professor, Department of Forensic Medicine and Toxicology, A.J.Institute of Medical Sciences and Research Centre, Mangalore, India

E-mail: ullasashetty01@gmail.com

Aims and Objectives

To study the incidences and morphometry of squatting facets in South West Coast Population of India.

Materials and Methods

This study was done in the Department of Forensic Medicine, A.J.Institute of Medical Sciences, Mangalore.

This study was done from Jan 2017 to Dec 2019.

The study was done using 400 tibias and 400 talus dry human bones.

The bones were available in the Department of Forensic Medicine, Department of Anatomy and also the students who had were asked.

The presence of the facets was noted. Then the maximum length, breadth of the facets was noted.

Exclusion criteria

The bones which were damaged and the articulating surfaces if not clearly distinguishable was not taken.

Statistical Analysis

All statistical analysis was done using the latest R software. Pearson Chi-Square was used to determine the significance.

Result

Squatting facets on dry talus bones

Table 1: Squatting facets in dry talus

		Absent	Present
Side	Left % within SIDE	40.0%	60.0%
	Right % within SIDE	20.0%	80.0%

Table 2:Chi square test

Chi-square Test		
	Value	Exact Sig. (2-sided)
Pearson Chi-Square	1.521	0.51

SQUATTING FACETS IN DRY TIBIA BONES

Table 3 : Squatting facets in dry tibia

Side	Absent	Present
Left	25.0%	75.0%
Right	50%	50%
CHI-SQUARE TEST.		
	Value	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.48	.103

Table 4: Morphometry of squatting facets on tibia

	Mean maximum height	Mean maximum width
Right	3.21 mm ± 0.6 mm	5.43 mm ± 1.12 mm
Left	3.41 mm ± 0.32 mm	5.52 mm ± 1.05 mm

Table 5: Morphometry of squatting facets on talus

	Mean maximum height	Mean maximum width
Right	2.86 mm ± 0.18 mm	4.91 mm ± 0.25 mm
Left	2.97 mm ± 0.29 mm	5.11 mm ± 0.62 mm

Discussion

SQUATTING FACETS ON DRY TALUS BONES

Fig 1: Squatting facet in dry talus

Irrespective of the side to which the bone belongs, the squatting facets is present in 70% percent.
On the right side, it is present in 80 percent.
On the left side, it is present in 60 percent.
It is present more on the right side.
It might be because of the natural dominance to use more of right leg and invariably the pressure would be put more on the right side.

SQUATTING FACETS ON DRY TIBIA

Fig 2: Squatting facet in dry tibia

Irrespective of the side to which the bone belongs, squatting facets is found in 62.5 percent.On the right side, it is present in 75 percent.On the left side, is present in 50 percent.The squatting facets are present more on the Right side.According to a study conducted by Baykara et al[7]they quote that in order to learn the daily activities of the medieval societies in the Van region by studying of squatting facets.They studied the Adult skeletons from Dilkaya and Van Kalesi-Eski Vanehri societies dating to the Medieval Age in 65 tibia and 82 tali from Dilkaya, 61 tibia and 52 tali from Van Kalesi-Eski Vanehri. The tibial squatting facet found was 97.2% and 96.9%, respectively in females and males,and in Van kalesi Eski Vanehri was 87.5% and 89.2 %, respectively in females and males. The talus squatting facet found was 72.1% and 51.3%, respectively in females and males, and of Vankalesi Eski Vanehri was found to be 91.2% and 83.7%,respectively in females and males.According to Ari et al

[8] different demographic and racial factors can play a role in the modifications of the distal tibia surface, articulating with the talus. Inderbir Singh[6] in conducted a study of Squatting facets on the talus and tibia in Indian population.Using 200 tibia and 200 tali(dry bones),92 tibia and 100 talus (wet cartilage covered bones).The author mentioned that, out of 292 tibia which were studied,231 tibia had squatting facets indicating an incidence of 79.1%. Of the 300 talus which were studied, 86 talus had squatting indicating an incidence of 28.6%.

Conclusion

Multiple factors may contribute for the formation of squatting facets. And this difference may be because of study in different population, or difference in life style. The study is intended to be very helpful in identification and is very valuable in the field of forensic medicine.

References

1. De Silva.J.M.Functional morphology of the ankle and the likelihood of climbing in early hominins.2009;106(16):6567-6572.
2. Darlene F,Murphy,Denise M,Alosa**.** Predictive Factors for Lateral Ankle Sprains. J Athl Train. 2002; 37(4): 376–380.
3. Andrew R. Fauth.Anatomically based investigations of total ankle arthroplasty.A thesis in kinesiology.2005;oai:etda. libraries.psu.edu/oai/6741.
4. Rosdi Daud, Mohammed Rafiq Abdul Kadir, Sudin Izman, Amir Putra Md Saad,Aminudin Che Ahmad.Three-dimensional morphometric study of the trapezium shape of the trochlea tali. The journal of foot & ankle surgery 2013; 1–6.
5. Andrea Hayes, Yuki Tochigi, Charles L. Saltzman. Ankle morphometry on 3d-ct images. Iowa Orthop J. 2006; 26: 1–4.
6. Inderbir Singh.Squatting facets on the talus and tibia in Indians.J Anat.1959; 93: 540.
7. Ismail Baykara,Hakan Yýlmaz,Timur Gültekin and Erksin Güleç. Squatting Facet: A Case Study Dilkaya and Van-Kalesi Populations in Eastern Turkey.Coll. Antropol.2010;34(4): 1257–1262.
8. Ari, I.H. Oygucu and E. Sendemir.The squatting facets on the tibia of Byzantine(13th)skeletons.Eur J Anat.2003;7(3):143-146.

Conflict of Interest: Nil
Source of support:Nil