

ORIGINAL ARTICLE

Incidence of Patterns of Bony Modification of Neck of the Talus

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ABSTRACT

Background and Aim: Talus is the important tarsal bone that connects the leg two long bones with the human foot through the ankle joint. The current study aims to determine the incidence of neck bone modification of the talus.

Methodology: This cross-sectional study was carried out on 82 Tali of either gender in the Department of Anatomy, Saidu Medical College, Swat and Women Medical and Dental College Hospital, Abbottabad during the period from February 2021 to July 2021.

Careful examination of the talar neck dorsal surface was carried out for the presence of facets either squatting or medial, gutter-shaped facets, combined facets, and trochlear surface extension. All the data gathered were tabulated and SPSS version 23 was used for data analysis.

Results: Of the total 82 human dry tali, the prevalence of lateral squatting facets, medial and bones squatting facets, gutter-shaped facets, and combined facets were 34 (41.5%), 13 (15.9%), 14 (17.1%), and 12 (14.6%) respectively. About 11 (13.4%) tali had no facets. Trochlear surface lateral extension and medial trochlear extension were observed in 70 (85.4%) and 9 (11%) respectively. Gutter, medial and combined facets were more common on the left side compared to the right side whereas on the right side, lateral squatting facets were more common. Lateral extensions were common in medial extensions.

Conclusion: The occurrence of various types of squatting facets is caused by cultural habits, squatting position, and genetic inheritance. The dorsal surfaces modifications occurrence of the talus's neck serves as a critical anthropological factor in determining regional origin of unclaimed skeletons.

Keywords: Talus, Squatting Facets, Bony modification

INTRODUCTION

Talus is the important tarsal bone that connects the leg two long bones with the human foot through the ankle joint [1]. Because of the erect posture, the human foot plays a significant part in weight-bearing and locomotion. Different populations had different bone modifications as a reflection of individual behavior and lifestyle. Human body positions such as squatting position, bipedal gait, and erect posture place various hassles on the human foot, resulting in morphological disparities [2, 3]. Hip hyperflexion and ankle hyper dorsiflexion involve different postures in squatting positions [4]. Talar neck squatting facets pose ankle modification caused by habitual squatting posture and trochlear lateral surface extensions as a lateral and medial trochlear in humans. Talus is subjected to a specific load or force indicated by squatting facets [4, 5]. Bones' skeleton anatomy is significantly affected by strenuous practices like scraping, hunting, and kneeling [6]. The incidence of squatting facets mainly depends on various life activities whereas squatting facets had been drastically modified in the modern era as compared to previous era studies [7, 8].

The presence of talar neck dorsal surface smoothness can distinguish the squatting facets from trochlear surface curvature. In certain cases, the bone transverse rim without separation of articular cartilage from trochlear surface indicates squatting facets. The trochlear surface and squatting facets concave shape continuation changes from concave to convex shape [9, 10]. Talus neck dorsal surface medial side has squatting facets that come

in contact with the tibia, however, during full dorsiflexion tibia comes in contact with lateral squatting facets that have smooth lateral side cartilage [11]. Trochlear extensions are surface extensions that lie anterior to a line that runs perpendicular to the medial and malleolar surface of the foot-long axis [12, 13]. The current study aims to determine the incidence of neck bone modification of the talus.

METHODOLOGY

This cross-sectional study was carried out on 82 Tali of either gender in the Department of Anatomy, Saidu Medical College, Swat and Women Medical and Dental College Hospital, Abbottabad during the period from February 2021 to July 2021. Careful examination of the talar neck dorsal surface was carried out for the presence of facets either squatting or medial, gutter-shaped facets, combined facets, and trochlear surface extension. The study included human tali who were free of any physical or pathological changes or deformities. Ethical approval was taken from the institutional ethical committee. Individual's lateral and medial squatting facets of neck dorsum were carefully examined for the presence of gutter shaped, medial, lateral, and combined facets. The extension of trochlear surface were also investigated. All the gathered data were tabulated and prevalence of each facet and trochlear extension was determined.

RESULTS

Of the total 82 human dry tali, the prevalence of lateral squatting facets, medial and bones squatting facets, gutter-

shaped facets, and combined facets were 34 (41.5%), 13 (15.9%), 14 (17.1%), and 12 (14.6%) respectively as shown in Table-1. About 11 (13.4%) tali had no facets. Figure-1 and 2 illustrate the prevalence of surface modification of right and left dry tali among 73 human tali. Trochlear surface lateral extension and medial trochlear extension were observed in 70 (85.4%) and 9 (11%) respectively as shown in Figure-3. Gutter, medial and combined facets were more common on the left side compared to the right side whereas lateral squatting facets were more prevalent on the right side. Lateral extensions were common in medial extensions. The present study revealed the presence of neck dorsum surface modification of the talus and trochlear surface. Also, squatting facets four different categories such as medial, lateral, combined, and gutter shaped were calculated. There were 38 (52.1%) right-sided dry tali and 35 (47.9%) left-sided dry tali among the 82 dry tali.

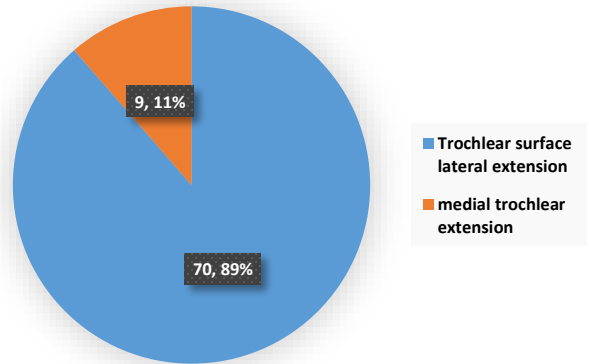


Figure 3: Trochlear surface lateral extension and medial trochlear extension

Table 1: Prevalence of various types of facets among 82 dry human talis

Facets Types	Frequency N	Percentage %
Lateral squatting facets	34	41.5
Medial and bones squatting facets	13	15.9
Gutter-shaped facets	14	13
Combined facets	12	17.1

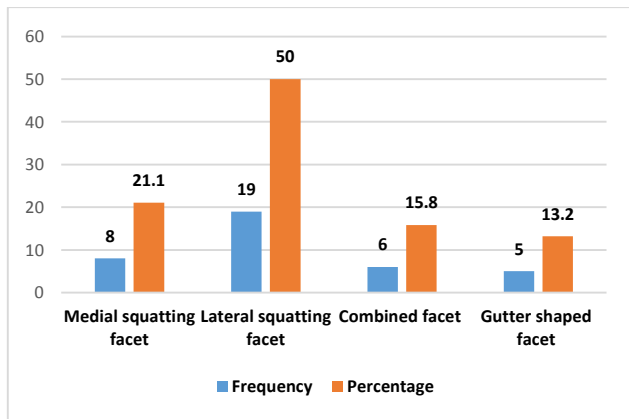


Figure 1: surface modification of right dry tali (N=38)

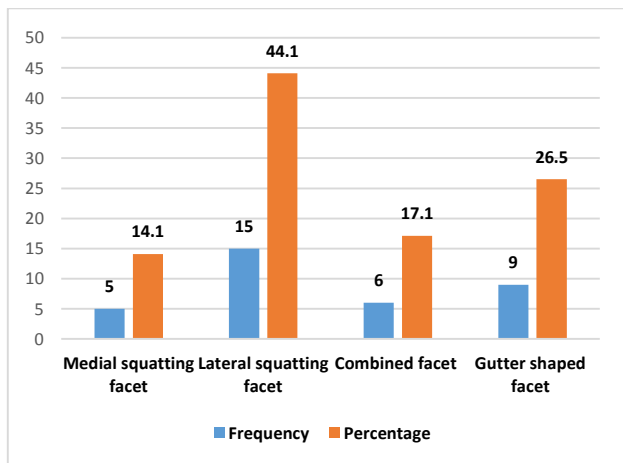


Figure 2: surface modification of left dry tali (N=35)

DISCUSSION

The occurrence of various types of squatting facets is caused by cultural habits, squatting position, and genetic inheritance. The dorsal surfaces modifications occurrence of the talus's neck serves as a critical anthropological factor in determining the regional origin of unclaimed skeletons. Human articular surfaces morphology changes with the application of continuous stress on bones. The habit of squatting, which is observed in the majority of the Pakistani population due to variations in the nature of work causes changes in the human skeleton, particularly in the limb lower side. The presence of squatting facets on the dorsal surface of the talus's neck and lateral and medial trochlear extension is among one such modification [14].

Numerous researches have been carried out on various sprints but fewer focused on squatting facets among the Pakistani population. One previous study detected squatting facets on talar neck dorsal surface and tibia distal extremity anterior margin among 11 tali. About 64% Australian population had lateral squatting facets [15, 16].

Yilmaz et al found lateral squatting facets in 37.7 percent of 175 dry tali of Byzantine origin, and 0.6% gutter shaped and medial squatting facets [17]. Another study reported that Asian population had significantly higher squatting facets in 221 dry tali compared to European countries. About 2.72% population had medial squatting facets which was significantly lower than other countries. The prevalence of combined and no facets were 16% and 31% respectively [18, 19].

Cherubino et al discovered lateral squatting facets in 50.81 percent of 616 tali and medial squatting facets in 1.79 percent [20]. Grasset al discovered lateral squatting facets in 41% of the dry tali, medial facets in 4%, and 3% in combined facets of the dry tali in a study of 200 dry tali from the North Indian population [21]. Suthar et al discovered 83.2% lateral and 17.6% medial squatting facet, 11.8% combined, and 10.7% gutter shaped facet in a study of 262 dry tali [22]. All the previous studies findings indicates that squatting facets prevalence varies by race whereas significantly higher facets reported among Pakistani populations. Earlier research reported higher prevalence of squatting facets due to unequal distribution

of body weight to the foot lateral side during different posture [23-25].

Dhillon's et al study revealed that prevalence of extension in the medial and lateral trochlear surface was 11% and 17% respectively, and demonstrate the distinction in extensions from squatting facets because of the continued anteroposterior curve of the trochlea and came into contact with the inferior surface of the tibia during dorsiflexion [26].

27. Sundararajan et al conducted her study on 300 dry tali and found that medial and lateral extension was 34% and 58% respectively. These are caused by talar facets variations in terms of shape and orientation [27]. Another study reported prevalence of medial and lateral extension of 11% and 8% respectively [28]. Medial extension was seen in 61% cases as reported by Al-Jabri et al.[29].

CONCLUSION

The occurrence of various types of squatting facets is caused by cultural habits, squatting position, and genetic inheritance. The dorsal surfaces modifications occurrence of the talus's neck serves as a critical anthropological factor in determining regional origin of unclaimed skeletons.

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