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Anatomy

"A Study of Morphology and Pattern of Talar Articular Facets in Human Calcanei of Jodhpur Region of Western Rajasthan"

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Abstract **Original Research Article**

There are total three facets on upper side of talocalcaneal joint: anterior talar facet, middle and posterior. There are considerable variations in the number and arrangement of these articular facets. Present study was done to determine patterns of the talar facets of calcanei of Jodhpur Region of Western Rajasthan.

Keywords: Calcaneum, Articular facets, Patterns, Subtalar joint.

INTRODUCTION

Calcaneum is the longest, strongest and biggest of all the tarsal bones of the proximal row. It forms talocalcaneal joint with talus. This joint maintains eversion and inversion of foot and named as subtalar joint. There are three facets over upper side of talocalcaneal joint: anterior talar facet, middle and posterior [1]. It is also referred to as heel bone and forms a major component of theskeleton of the hindfoot and prominence of the heel. This bone is unique, since it is the first tarsal bone to ossify. The purpose of the calcaneus is to transmit the weight of the body to the ground and act as a strong lever for the calf muscles [2]. It is well designed to sustain high tensile, bending andcompressive forces. However, high instantaneous loads often result in fracture [3]. It is located poster inferior to the talus, providing support to the ankle joint. It measures about 3.5 inches in length and about 1.5 inch at its widest point [4]. The anterior and the posterior facets are situated on the body and the middle is situated on the sustentaculum tail. There are considerable variations in the number and arrangement of these facets. Using parameters such as degree of separation, fusion, and shape, several workers have described types and preponderance of articular facets on the anterior third of the calcaneus incertain population groups like African, Indian, British, Egyptian, and Spanish [5-7.

Bunning and Barnett have observed that there are three types of variations in the arrangement of facets. They have classified these variations as follows:

Type-A: There are three facets separated by variable intervals. Type-B: There are two facets, anterior and middle which are either continuous or have a notch between them.

Type-C: There is only one facet i.e. the three forms a continuum [8]. Few Indian workers have also worked on this subject. Jha *et al*. have reported that type-B calcanei are common amongst the population in Uttar Pradesh and also have classified type-B calcanei into four subgroups:

Group-1: Anterior and middle articular facets completely fused and form a single facet.

Group-2: Anterior and middle articular facets incompletely separated from each other by means of a notch.

Group-3: Anterior and middle articular facets separated from each other but with no non-particular area intervening.

Group-4: Absence of anterior articular facet. Only middle and posterior articular facets were being present [9].

MATERIAL& METHODS

Material of present study comprised of 90 (32 right and 58 left) Calcanei obtained from department of Anatomy, Dr S.N Medical College, Jodhpur.

Each Calcaneum was labelled with suffix L or R and was carefully examined for various types of articulating facets for talus and was categorised into five types- Type I: Middle & Anterior facet fused.

Subtype A-with narrow separation (<2mm)
Subtype B-with moderate separation (2-5mm)
Subtype C-with wide separation (>5)
Type II: Middle& Anterior facet separate.
Type III: Anterior facet absent.
Type IV: Anterior, Middle & Posterior facets fused.
Type V. Middle & Posterior facets fused

RESULTS

Type I: Middle & Anterior talar facet fused with separate posterior articular facet was found in 63.38%, 35.55% (Right) and 64.44% (left).

Type II: Middle& Anterior facet were separate in 36.61%, 63.46 %(Right) and 36.53 %(left) with separate posterior talar facet.

Type III: Anterior talar was facet absent in all cases.

Type IV: Anterior, Middle & Posterior talar facets fused were not found in any of case.

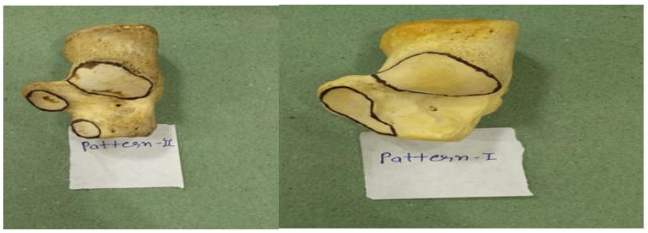
Type V. Middle & Posterior facets talar fused was not found in any case.

Table-1: Incidence of calcaneal articular facets in Present study

Type (pattern)	Right	Left	Total
Type -1	32	58	90
Type-2	33	19	52
Type-3	0	0	0
Type-4	0	0	0
Type-5	0	0	0

Table-2: Incidence of subtype of type-1

Total no. of bone	Subtype-A (<2mm)	Subtype-B (2-5mm)	Subtype-C (>5)
52	12	20	20



DISCUSSION

Incidence of facets was compared with other studies of different regions of India. Five different patterns of talar facets was used for grouping as it best categorizes the patterns of the talar facets observed in the present study.

Study	Region	Number of bone	type 1 %	type 2 %	type 3 %	type 4%	type 5%
Gupta *et al*.	India	401	67	26	5	2	0
Mini mol *et al.*	Mumbai	50	74	26	0	0	0
Nagar SK *et al.*	Gujarat	529	76.37	22.3	1.13	0	0.18
Rohin Garg *et al.*	Rajasthan	310	72.5	24.52	1.3	1.6	0.32
Jagdevsingh *et al.*	Punjab	200	72.5	25.5	1.5	0.5	0
Gindha *et al.*	Himachal Pardesh	325	69.5	29.8	0.31	0.6	0
Priyaety *et al.*	karnataka	71	67.6	25.35	7.04	0	0
Present study	Jodhpur	142	63.38	36.61	0	0	0

In the present study, the type I calcanei was the most common (63%) and the observation was in consonance with previous studies where mostly the figures ranged between 67.0-76.37%.

Study	Country	n	A	B	C
Gupta *et al*.	India	401	9	4	13
Mini Mol *et al.*	Mumbai	50	50	22	2
Nagar *et al.*	Gujarat	529	7.18	10.7	4.3
Rohin garg *et al.*	Rajasthan	310	4.8	7.7	8.1
K. Anjaneyulu, *et al.*	Sikkim	100	10	10	11
Present study	Jodhpur	142	12	20	20

Further, in type II, three subtypes were found i.e. Subtype A includes -with narrow separation (<2mm), Subtype B-with moderate separation (2-5mm), Subtype C-with wide separation (>5). Further, in Type II (A) was found to be present in 23.07% cases, Type II (B) in 38.46% cases and Type II (C) in 38.46% cases.

Type I was observed in 63.3% cases. However these figures described by other workers i.e Gupta *et al*. [7] in 67%, Priyaety *et al*. [15] in 67.6%, Gindha *et al*. [13] in 69.5%, Mini Mol *et al*. [10] in 74%, Jagdevsingh *et al*.[12] in 72.5% which was similar to Rohin Garg *et al*. [11]. Incidence of type I was highest in Nagar S K *et al*. which was in 76.37%. The incidence of type II calcanei was 36.61% in the present study and this figure is compared with Gupta *et al*. [7] in 26%, Priyaety *et al*. [15] in 25.35%, Gindha *et al*.[13] in 29.8.5%, Jagdevsingh *et al*. [12] in 25.5%, Nagar S K *et al*. [16] in 22.3%.

In the present study, the incidence of type III calcanei was not found in any of the case and this result is in close resemblance to the result of Mini Mol *et al*. [11]. It was highest 7.04% in studies of Priyaety *et al*. [15] followed by Gupta *et al*. (5%). In other studies it ranged between 1.3%-1.5%. The incidence of type IV calcanei in the present study was 0% which is in resemblance with study of Mini Mol *et al*. [10] and Nagar S K *et al*. [16]. Type V was observed by Nagar S K *et al*. [16] in 0.18% and Rohin Garg *et al*. [11] in 0.32% while it was not observed in any of case in present study.

CONCLUSION

The present study has showed wide range of variations in the incidences of various types of calcanei compared to previous workers in different regions of India. These variations may arise due to population differences, type of gait and built of an individual or the region to which they belong like whether it is a plane or a hilly area.

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