

A Morphological Study of Variations in Pattern of Calcaneal Articular Facets in Human Tali

Dr. G. C. Agarwal

Professor & HOD, Department of Anatomy
Pacific Medical College and Hospital
Bhillo Ka Bedla, Udaipur

Sami Ahmed

Assistant Professor, Department of Anatomy
Pacific Medical College and Hospital
Bhillo Ka Bedla, Udaipur

Isha Srivastava

Assistant Professor, Department of Anatomy
Pacific Medical College and Hospital
Bhillo Ka Bedla, Udaipur

Kavita Dhidharia

Assistant Professor, Department of Anatomy
Pacific Medical College and Hospital
Bhillo Ka Bedla, Udaipur

Dr. R. S. Jhala

Tutor, Department of Anatomy
Pacific Medical College and Hospital
Bhillo Ka Bedla, Udaipur

Address for Correspondence

Sami Ahmed

ahmedsami288@gmail.com

ABSTRACT

Aim: Aim of the present study is to know the presence and their percentages of incidences of various patterns of calcaneal articular facets in human tali.

Place of Study: Department of Anatomy of Pacific Medical College and Hospital Udaipur, Rajasthan, India

Methods and Materials: 80 unknown, dry human tali possessed from the bone sets. They were carefully examined for articular facets and classified into five groups.

Observations: The present study on human tali revealed five types articular facets. They are Type-1 were observed in 21.25% (in 17 tali), similarly Type-2 in 43.75% (35 tali), Type-3 in 10% (08 tali), Type-4 in 14% (06 tali), Type-5 in 17.5% (14 tali). Later they were well compared and correlated with available literatures.

Conclusion: This study on human tali has revealed the type of gait, and walking habits and weight bearing bone that has given rise to various articular facets. Hence it has been studied and reported.

Keywords: Talus, calcaneus, articular facets, weight bearing, sustentacular tali

INTRODUCTION

The skeleton of the foot, like that of the hand, consists of a closely articulated number of irregular bones, the tarsus, carrying five long bones, the metatarsus, which in their turn support the phalanges of the free digits¹. Talus is a main tarsal bone that connects bones of leg with that of bones of foot. It has neither muscular attachment nor the tendinous attachment². Consists of body, neck and head. The body carries a concavo-convex upper articular surface for tibia, continuous with inner and outer malleolar facets on the sides: the outer facet, for the fibula, is longer and more vertically directed. Lower aspect of body rests, through an oblique concave articular surface, on the os calcis: internal to this and in front of it is the interosseous groove which completes the sinus tarsi, separating the articular under surface of the body from the articular head. The depth of this groove causes the constriction of the neck to be more apparent below and externally: many vascular canals mark the bone in this sulcus¹. Talus is considered as the cornerstone of medial longitudinal arch of the foot³. Arora et al (1979)⁴, Bilodi & Agrawal (2003)⁵, Bilodi AK (2006)⁶, Kaur et al (2011)⁷ and R. Garg et al (2013)⁸, studied different patterns of articular facets of calcaneum in human tali. These authors divided talar articular facets into different types and described that differences in incidence of different types of articular facets could be due to differences in gait, built, structure of population or racial differences. Therefore, prior knowledge of articulation and various anatomical variations in articulation holds significance not only in delineating underlying pathologies but also in its treatment. Present study was conducted to

determine incidence of various types of calcaneal articulating facets in unknown human tali and correlate these findings to existing literature.

MATERIALS AND METHODS

80 dried human tali of unknown sex from the Department of Anatomy of Pacific Medical College and Hospital Udaipur, Rajasthan, India constituted the materials for the present study. Each talus was carefully examined for the pattern of calcaneal articulating facets. They were classified into 5 groups. From each group, a talus was selected to mark the outline of the articulating surface carefully with the white chalk. All the five tali were numbered and photographed. Incidence of various

patterns was observed and compared with available literature.

RESULTS

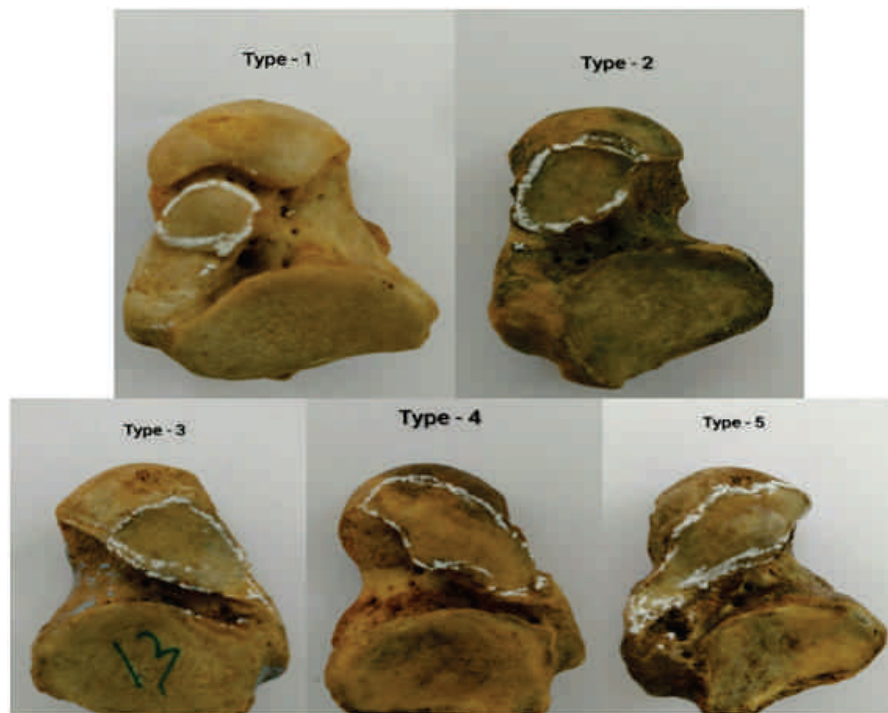
The present study showed five types of calcaneal articular facets on the plantar surfaces of heads of eighty unknown human tali according to given image. Later they were classified and tabulated in the given table below.

Various researchers have classified these facets into different types. In the present study incidence of various types of calcaneal articular facets were classified according to classification given by Arora et al (1979), Kaur et al (2011) and R. Garg et al (2013).

Table 1: Incidences and types of articulating facets-

S.No	Types of Calcaneal Articulating Facets	Number of tali which presents of this Facets	Percentages of Incidences
1	Type- 1	17	21.25%
2	Type- 2	35	43.75%
3	Type- 3	08	10%
4	Type- 4	06	7.5%
5	Type- 5	14	17.5%

Fig 1: Types of articulating facets-



From the above Table 1, it is observed that, Five types of calcaneal articular facets on the plantar surfaces in 80 human tali. 12.5% tali showed single small articular facets on their plantar surfaces (10 tali). In 33.75 % of tali showed a larger than type-1 articulating facet (27 tali). In 15% of tali showed facets partly separated by non-articular groove and ridge (12 tali). In 17% of tali showed two articular facets were separated by non-articular groove (12 tali). In 21.25% of tali showed

facets on the plantar surface being continuous with facet on the body of talus. (17 tali). Later they well compared and correlated with available literatures.

DISCUSSION

The present study is well correlated with earlier workers and compared with their available data Arora et al (1979), Kaur et al (2011) and R. Garg et al (2013).

Table 2: Comparison of incidences of various types of calcaneal articular facets in human tali.

S.No	Types of articular facets of calcaneum	Arora et al (1979) n= 500	Kaur et al(2011) n=100	R. Garg et al (2013) n=300	Present study n=80
1.	Type- 1	16%	45%	39%	21.25%
2.	Type- 2	78%	24%	43.7%	43.75%
3.	Type- 3	1%	9%	6%	10%
4.	Type- 4	3%	5%	5.3%	7.5%
5.	Type- 5	2%	17%	6%	17.5%

n=number of Tali

The present study was studied and observed to verify the incidence and variations in types of calcaneal facets on tali. The variations on plantar surface of the talus enable the tali to be classified according to the number and disposition of the articular facets. In the present study, the incidence of Type 1 tali was 21.25% in the present series which is in agreement with the observations of Arora et al (1979) as 16%. Other researchers have reported a higher incidence of this type of tali (Table 2). Type II showed the highest incidence of 43.75%. This observation was comparable with study of Arora et al (1979) who observed incidence of Type 2 to be 78%. Kaur et al (2011) reported incidence of this type of facet to be 24% and R. Garg et al (2013) observed 43.7%. Though, much higher incidence of 78% was reported by Arora et al (1979) and much lower by Kaur et al (2011). The incidence of Type 2 tali was 43.75% in the present series which is in agreement with the observations of R. Garg et al (2013) observed 43.7%. Incidence of Type 3 tali was found to be 10% in the present study which is close to Kaur et al (2011) observed 9% and R. Garg et al (2013) reported 6%. The least common type of talus found in the present study was of type 4 tali was found to be 7.5% which is close to Kaur et al (2011) observed 5% and R. Garg et al (2013) reported 5.3%. In the present study incidence of Type 5 tali was 17.5%, which is close to Kaur et al (2011) observed 17% whereas Arora et al (1979) found it to be 2% (Table 2).

Talar articular surface characteristics and sex difference was not taken in account during the present study.

Today with the aid of improvement of the technology there has been a great development of ankle prosthesis, implants, etc for the foot. Detailed anatomic information will act as a baseline for advanced treatment procedure⁸.

CONFLICTS OF INTEREST: None

ACKNOWLEDGMENT

Our sincere thanks go to Director of PMCH, Vice Chancellor,

Principal of Pacific Medical College and Hospital, Udaipur for their great support and permitting us to perform this study.

We also thank to supportive staff of department of Anatomy, PMCH, Udaipur.

REFERENCES

1. J. Ernest frazer (1920) - THE ANATOMY OF THE HUMAN SKELETON - edition -2 J. & A. CHURCHILL7, GREAT MARLBOROUGH STREET LONDON - 169-177p.
2. Sahana (1993)-Human Anatomy Description and applied -Vol-1 K.K.Publishers Pvt Ltd Howrah-427-30p.
3. Kulkarni NV: In: Clinical Anatomy (A problem solving approach; 2nd Edn.; Jaypee brothers medical publishers (P)Ltd; New Delhi, 2012; pp: 830
4. Arora AK, Gupta SC, Gupta CD, Jeyasing P: Variations in calcaneal articular facets in Indian tali. Anatomiseher Anzeiger, 1979; 146: 377-380.
5. Bilodi AK, Agrawal BK: Study of fifty human tali for calcaneal articular facets. Medical Journal of Kathmandu University, 2003;2(3): 213-215
6. Bilodi AK: Study of calcaneal Articular facets in human tali; Medical Journal of Kathmandu University, 2006; 4(1): 75-77.
7. Kaur M, Kalsey G, Laxmi V: Morphological classification of tali on the basis of calcaneal articular facets. PB Journal of Orthopaedics; 2011; 12(1):57-60.
8. R. Garg et al :Study of Variations in Pattern of Calcaneal Articular Facets in Human Tali in the Population of Rajasthan (India). People's Journal of Scientific Research; 2013; Vol. 6(2), July 2013:19-23