Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Morphological study on variation in patterns of talar articular facets of human calcanei in population of Bihar

Nirmaja Kumari Jha[1], Anant Kumar Pandit[2], Aloka Sharma[3]

[1]Assistant professor, Department of Anatomy, Jawaharlal Nehru Medical College, Bhagalpur;
[2]Assistant professor, Department of Anatomy, Jawaharlal Nehru Medical College, Bhagalpur;
[3]Professor and head, Department of Anatomy, Jawaharlal Nehru Medical College, Bhagalpur

***ABSTRACT*:**
Background: The calcaneum is the largest and strongest of all the tarsal bones. Of the seven tarsal bones Talus and calcaneum belong to the proximal row. The present morphological study conducted to evaluate the variation in patterns of talar articular facets of human calcanei in population of bihar and its clinical aspects. **Material and methods:** The study was conducted on 60 dried adult human calcaneal articular facets in the Department of Anatomy, Jawaharlal Nehru Medical College, Bhagalpur from May 2015 to April 2018. The patterns of articular facets on superior surface of calcaneum were observed with naked eye and using hand lens. Data obtained from bones were analysed for patterns of Talar articulating facets. **Results:** this study showed that Type B (71.7%) was the most common pattern of Talar facets of Calcanei. Type B1 with fused anterior and middle facets with constriction was the most common pattern of articular facet , followed by B2 type, making type B the most common type. Type A pattern (28.3%) was next common type and Type C was a very rare pattern of Talar articular facet of Calcanei. **Conclusion:** This study concluded that Type B was the most common pattern of Talar facets of Calcanei. Type A pattern was next common type and Type C was a very rare pattern of Talar articular facet of Calcanei.
Keywords: Talar articular facet of Calcanei, facets with constriction.

Received: 02/05/2020 **Modified:** 12/06/2020 **Accepted:** 15/06/2020

Corresponding Author: Dr. Anant Kumar Pandit, Assistant professor, Department of Anatomy, Jawaharlal Nehru Medical college, Bhagalpur.

This article may be cited as: Jha NK, Pandit AK, Sharma A. Morphological study on variation in patterns of talar articular facets of human calcanei in population of Bihar. J Adv Med Dent Scie Res 2020;8(7):149-152.

INTRODUCTION:

The calcaneum is the largest and strongest of all the tarsal bones. It is the most proximal of all the tarsal bones and situated below the talus and extends behind it. It is directed upwards, forwards and laterally. It is somewhat irregular cuboid in shape. It is the weight bearing bone. The superior surface of calcaneum has two parts- non-articular and articular. The non-articular part extends posteriorly and is about one third of total superior surface. Anterior to this nonarticular part is articular which articulates with talus bone to form talocalcaneal joint, where inversion and eversion of foot occurs.[1] Calcaneum is also a useful tool in determination of sex and its length being considered useful in stature estimation.[2-4] There is considerable variation in the number and arrangement of these facets. They are functionally important because they influence the subtalar stability. Calcaneum is the most frequently fractured tarsal bone with calcaneal fracture accounting for about 60% of all major tarsal injuries. The majority of fractures involve subtalar joint. Certain morphological variations of calcaneal facets for tali may predispose to the development of arthritic changes in subtalar joint.[5] Although a talocalcaneal coalition may occur at any of the three facets, the majority of osseous fusion involves the middle facet. Tarsal coalition is a frequent cause of painful flat foot.[6] Classification given by Arora et al[7], Kaur et al[8], Garg et al[9]; Chandra Philip[10] about various types of calcaneal articular facets. Variations in the talar facets of calcanei are important. Therefore, the present morphological study conducted to evaluate the variation in patterns of talar

articular facets of human calcanei in population of bihar and its clinical aspects.

MATERIAL AND METHODS:

The study was conducted on human calcaneal articular facets in the Department of Anatomy, Jawaharlal Nehru Medical College, Bhagalpur from May 2015 to April 2018. Before the commencement of the study ethical approval was taken from the Ethical Committee of the institute. Sixty dried adult human calcaneum bones obtained from Dept. Of Anatomy and Forensic Medicine of Jawaharlal Nehru Medical College, Bhagalpur as well as from undergraduate students from JLNMC, Bhagalpur were included in this study. The patterns of articular facets on superior surface of calcaneum were observed with naked eye and using hand lens. A sliding Vernier Calliper of 0.1 mm accuracy was used for measuring distance between articular facets. Data obtained from bones were analysed for patterns of Talar articulating facets.

RESULTS:

In this study, we found three major types based on the separation of articular facets on superior surface i.e type A , B , and C.

Table 1: Three major types based on the separation of articular facets on superior surface

Types	Description
Type A	Anterior , Middle and Posterior articular facets separate with four subtypes
A1	Distance between anterior and middle articular facet < 2mm.
A2	Distance between anterior and middle articular facets 2-5 mm
A3	Distance between anterior and middle articular facets > 5mm.
A4	There is only one joint facet named anterior talar facet.
Type B	Anterior and Middle facets fused two subtypes
B1	There was a constriction between anterior and middle facets
B2	There was no constriction between anterior and middle facet
Type C	Anterior , Middle and Posterior facets fused

Type A Cancaneal Facets

B1 TYPE CALCANEAL FACET

B2 TYPE CALCANEAL FACET

Type C Cancaneal Facets

Table 2: Prevalence of three major types

Types	N(%)	Left	Right
A	17(28.3%)	9	8
A1	13(21.7%)	6	7
A2	2(3.3%)	1	1
A3	2(3.3%)	2	0
A4	0(0%)	0	0
B	43(71.7%)	23	20
B1	26(43.4%)	16	10
B2	17(28.3%)	7	10
C	0(0%)	0	0
total	60(100%)	32	28

In this study it was found that Type B (71.7%) was the most common pattern of Talar facets of Calcanei. Type B1 with fused anterior and middle facets with constriction was the most common pattern of articular facet , followed by B2 type, making type B the most common type. Type A pattern (28.3%) was next common type and Type C was a very rare pattern of Talar articular facet of Calcanei.

DISCUSSION:

The racial and sexual variations in the morphology of talar articular facets of calcaneum is well documented by earlier researchers. Four different pattern types as described by Jha and Singh[11], Gupta et al[12], Saadeh et al[13] and Kullar J S et al[14].

In this study it was found that Type B (71.7%) was the most common pattern of Talar facets of Calcanei. Type B1 with fused anterior and middle facets with constriction was the most common pattern of articular facet , followed by B2 type, making type B the most common type. Type A pattern (28.3%) was next common type and Type C was a very rare pattern of Talar articular facet of Calcanei.

Among the type B pattern, B2 subtype (32%) is commonest. High incidence of type A was found in one study in Africans.[15] Type A is more common than type B in American population.[3]

Studies done in various parts of India by Muthukumaravel et al. (2011)[16] in South Indians (Tamilnadu) and Patel et al. (2013)[17] in Western Indians (Gujarat) also found predominance of Type I calcanei i.e. 65.82% and 64.88% respectively followed by Type II i.e. 33.33% and 28.78% respectively but in both the studies separation between anterior and middle facets in Type II was less than 5mm while we noted maximum bones with 5-10 mm separation.

The interval between anterior and middle facets are important in osteotomy and interposition bone grafting to correct the deformities of pes planus. In this procedure, the identification of the interval between the anterior and middle facets is important for the exact placement of retractor because the line of osteotomy passes through this interval. [18,19]

CONCLUSION:

This study concluded that Type B was the most common pattern of Talar facets of Calcanei. Type A pattern was next common type and Type C was a very rare pattern of Talar articular facet of Calcanei.

REFERENCES:

1. Moore KL. Clinically oriented Anatomy. 3rd edn. Williams and Wilkins Baltimore 1992:490-1
2. Steele DG. The estimation of sex on the basis of the talus and calcaneus. Am J Phys Anthropol 1976;45:581-588.
3. Bidmos MA, Asala SA. Sexual dimorphism of the calcaneus of South African blacks.J Forensic Sci 2004;49:446–450.
4. Bidmos MA, Asala SA. Discriminant function sexing of the calcaneus of the South African whites. J Forensic Sci 2003;48:1213-1218.
5. Verhagen FD. Arthritis of the subtalar joint associated with sustentaculum tali facet configuration. J Anat 1993;183:631-634.
6. Ayoob A, Maeseneer MD, Shahabpour M, Van Roy P, Barbaix E and Qlng S. The talocalcaneal unit: Pictorial review of anatomy and pathologic conditions on multi detector CT. JBR-BTR 2010;93:20-27.
7. Arora A.K. Gupta.S.C, Gupta C.D. Jeysing.P Variations in Calcaneal articular Facets in Indian Tali- Anat Anz, (1979) ,46-377-380.
8. Kaur M, Kalsey G, Laxmi V:Morphological classification of tali on the basis of calcanean articular facets. PB Journal of Orthopedics; 2011; 12(1):57- 60.
9. R. Garg, S. Babuta, K. Mogra, R. Parashar, S. Shekhawat, Study of Variations in Pattern of Calcaneal Articular Facets in Human Tali in the Population of Rajasthan (India). People's Journal of Scientific Research, July 2013, Vol. 6(2), 18 -23.
10. Chandra Philip, G Prabavathy,Study of Anatomical Variations of Human Tali Based on Their Calcaneal Articular Facets, Research Journal of Pharmaceutical, Biological and Chemical Sciences, September - October 2014, vol: 5(5), 1484-1490.
11. Jha M R, Singh, D R. Variations in the talar articular facets on the superior surface of calcaneus. Journal of Anatomy, India. 1972. 21(1); 40-4.
12. Gupta S C, Gupta C D, Arora A K. Pattern of the talar articular facets in Indian calcanei. Journal of Anatomy 1977; 124(3): 651-5.
13. Saadeh FA, Fund AH, Mahmoud SMI, Marwan EE. Patterns of talar articular facets of Egyptian calcanei. J AnatSoc Indian. 2000;49(1):6-8.
14. Kullar J S, Arora A K, Kapoor N S, Randhawa G K and Kullar K K et al. Morphology of Talar Articular Facets of calcaneus and its clinical implications, Kashmir Journal of Medical Science. 2015. 1(1) : 10-4.
15. Bidmos M. Metrical and non-metrical assessment of population affinity from the calcaneus. Forensic Sci Int 2006;159(1):6-13.
16. Muthukumaravel N, Ravichandran D, Melani Rajendran S. Human Calcaneal Facets for the Talus: Patterns and Clinical Implications. Journal of Clinical and Diagnostic Research 2011;5(4):791-794.
17. Patel SJ, Patel RK, Chauhan KR, Bansal M. Patterns of talar articular facets on calcaneum and its clinical implication. International Journal of Anatomy and Physiology 2013; 2 (4):23-26.
18. Hyer CF, Lee T, Block AJ, et al. Evaluation of the anterior and middle talocalcaneal articular facets and the Evans osteology. J Foot and Ankle Surg 2002;41(6):389-92.
19. Richardson GE. Pes planus. In: Terrycanale S. Campbell's operative orthopaedics. 9th edn. St Louis Mosby-Year Book, Inc 1998:1720-5.