

Study of calcaneal spur and its correlation with the talar articular facets of calcanei

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Abstract

Background & aims: A spur is bony outgrowth at the site of attachment of a ligament or tendon into bone. The aim of this study is to analyse the incidence of calcaneal spur in relation to morphological variations of talar articular facets of calcaneus. **Material & Method:** Study comprised of 350 dry adult calcanei of unknown age and sex from Department of Anatomy, B. J. Medical College, Ahmedabad. Calcanei were classified according to its talar articular facets and compare its relation with the calcaneal spur. **Result:** Out of the 350 calcanei 128 presented with spurs among them planter spur in 21.4%; dorsal spur in 10.2% and both spurs in 4.8%. Maximum incidence of calcaneal spurs were found in Type 1 calcanei 75% followed by 17.96% in Type 2, 7% in Type 3 and 0.7% in type 4. **Conclusion:** Calcaneal spurs are related to type of calcanei with the highest frequency in Type 1 and least in Type 4. Anatomical knowledge of the correlation between calcaneal spur and type of calcaneus may be of significant clinical interest to foot and ankle surgeons in clinical practice.

Keywords: Dorsal spur, plantar spur, talar articular facets.

Introduction

Calcaneus is the largest of tarsal bones, situated below the talus and extends behind the talus. It is directed forward and laterally with upward inclination.¹ It articulates with overlying talus to form local calcaneal joint which together with the talocalcaneo-navicular joint is referred to as subtalar joint.² Calcaneum has six surfaces i.e. dorsal, plantar, lateral, medial, anterior and posterior. There are three facets on the dorsal surface for synovial joints between calcaneum and talus i.e. anterior, middle and posterior. The anterior and posterior facets are situated on the body while middle is situated on sustentaculum tali. Anterior and middle facet articulates with the head of talus while posterior with the body of talus. There is considerable variation in the number and arrangement of these facets. They are functionally important because they influence the subtalar stability.³ certain morphological variations of calcaneal facets for tali may predispose to the development of arthritic changes in subtalar joint.⁴ At a local calcaneal 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.⁵ When foot bone is exposed to constant stress, calcium deposits built upon the pattern of heel bone. However, repeated damage can cause these deposits to pile up on each other, causing a purshaped deformity called calcaneal spur.⁶ Obese people, flat footed people and women who constantly wear high heeled shoes are more susceptible to heel spur. Calcaneal spur are of two types i.e. dorsal (posterior) spurs and plantar (inferior) spurs. The inferior spur is located on the inferior aspect of calcaneus and is typically associated with plantar fasciitis over a period, but may also be associated with ankylosing spondylitis.

Posterior spur develops on the back of the heel at the insertion of Achilles tendon. Clinically, it may remain asymptomatic or produce disabling pain in heel.⁷ Themorphology of articular facets of calcaneus and spurs has been as subject to finterest to anatomists and its anatomical information will be the baseline of advanced treatment procedure.The purpose of the present study is to analyse the incidence of calcaneal spurs and correlate it with the pattern of talar facets of calcanei.

Materials and Methods

The present study was conducted in 350 dry adult calcanei of unknown age and sex from the bone store of anatomy department of B. J. Medical College. Calcanei were labelled from 1 to 350 numerically. Morphological study of posterior (dorsal spurs) and inferior (plantar spurs) surface of the calcanei was done. The incidence of calcaneal spurs were studied in detail and photographs were taken.Each calcaneus was carefully examined for various types of articulating facets present on dorsal or superior surface for talus and were categorised into fourtypes.

- **Type 1:** Continuous anterior and middle facet.
- **Type 2:** Separate anterior and middle facet.
- **Type 3:** Single facet present limited to sustentaculumtali and no anterior facet.
- **Type 4:** posterior, middle and anterior facets confluent.⁸

Inclusion criteria: All the intact unbroken calcanei were taken for the above study.

Exclusioncriteria: Any calcaneus looking pathological on general examination was discarded from thestudy.

Statistical analysis: Incidence of variouspatterns of the talar articular facets of the calcaneum with plantar and dorsal spurs were calculated as percentage and compared with available literatures.

Results

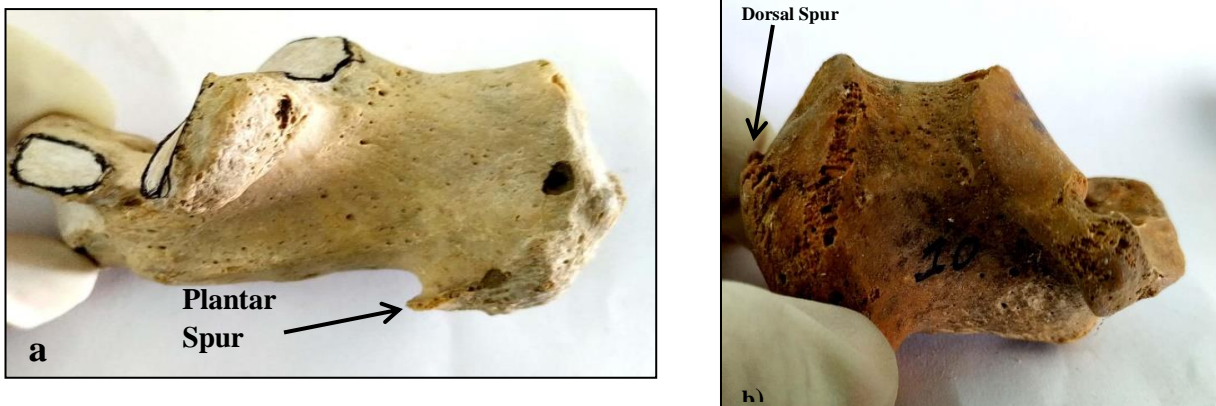
The presence and absence of calcaneal spurs on dorsal and plantar surface was studied in 350 calcanei. Out of 350 calcanei spurs were found in 36.57% (128 bones) calcanei.

Table 1: Incidence of calcaneal spurs

As per above mentioned data in table – 1, it has been observed that incidence of planter spur were more than other types.

Spur type	Total number	Incidence
Plantar spur	75	21.4%
Dorsal spur	36	10.2%
Both	17	4.8%
Total	128	36.57%

Figure 1 showing calcanei with spur a) Plantar spur b) Dorsal spur c) Both spur (Plantar & dorsal)



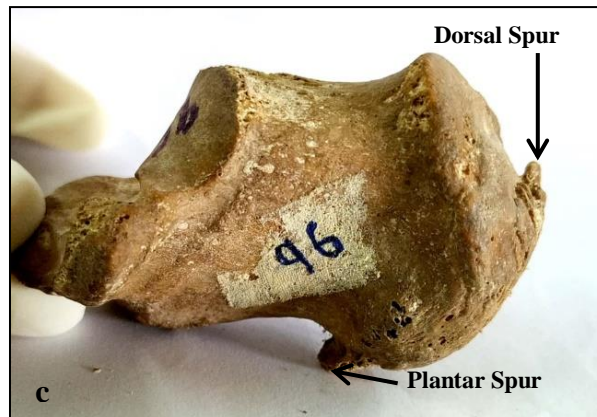
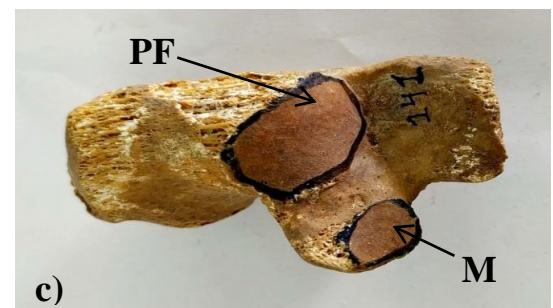
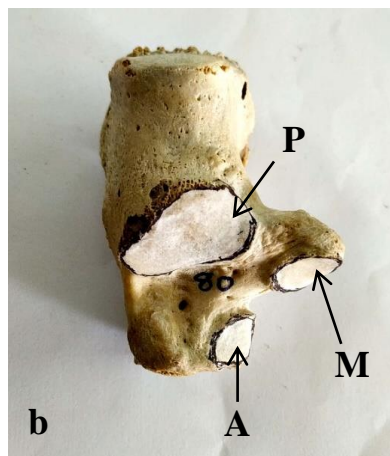
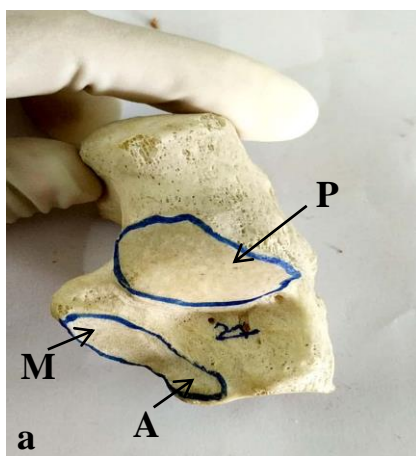


Table 2: Incidence of calcaneal spurs in relation with talar articular facets

Type of calcanei according to talar articular facets	Number of calcanei with spurs			Total number	Incidence
	Plantar	Dorsal	Both		
Type 1	59	27	10	96	75 %
Type 2	11	6	6	23	17.96 %
Type 3	5	3	1	9	7 %
Type 4	0	0	0	0	0 %

Table – 2 is showing that maximum incidence of calcaneal spurs was found i

Figure 2 showing different types calcanei according to talar articular facets a) Type -1 continuous anterior (AF) & middle facets (MF) b) Type – 2 separate anterior (AF) & middle facets (MF) c) Type – 3 Single facet limited to sustentaculumtali and no anterior facet (AF). Posterior facet – (PF)



Discussion

An enthesophyte is a bony spur forming at ligament or tendon insertion into bone, growing in the direction of natural pull. It can be regarded as skeletal response to stress. Osseous spurring of the plantar

aspect of the calcaneus was first documented in 1900 by German physician Plettner who coined the term Kalkaneussporn (calcaneal spur).⁹ The dorsal spurs varied in height and were always directed superiorly due to the pull of tendocalcaneus. Plantar spurs also varied in length, but were always directed anteriorly due to traction of plantar fascia.¹⁰

Table 3: Comparison of incidence of calcaneal spurs with the previous studies

Author	Year	No. of calcaneum	Total spurs (%)	Plantar spurs (%)	Dorsal spurs (%)	Both spurs (%)
Prichssuk and Subhadrabandhu ¹²	1994	82	15.5	-	-	-
Riepert et al. ¹³	1995	264	15.7	11.2	9.3	-
Menz et al. ¹¹	2008	216	55.1	55	48	-
Perumal and Anand ¹⁴	2013	218	56	-	-	-
Kullar JS et al. ¹⁵	2014	200	26.5	6.5	15.5	4.5
Deepshikha kori et al. ¹⁶	2015	600	17.7	60.3	35	4.7
Rajkohila J et al. ¹⁰	2016	300	39.33	15	12.33	11
Present study	2020	350	36.57	21.4	10.2	4.8

In the present study, the incidence of plantar spurs was more than that of dorsal spurs which is in accordance with Resnick et al., Prichssuk and Subhadrabandhu, Riepert et al., Menz et al., Perumal and Anand, Deepshikha kori et al., Rajkohila J et al. But Kullar JS et al. reported lower incidence of plantar spurs. (Table - 3)

Table 4: Comparison of incidence of calcaneal spurs in relation with talar articular facets with the previous studies

Author	Year	Incidence of calcaneal spurs in relation with the talar articular facets			
		Type 1	Type 2	Type 3	Type 4
Kullar JS et al. ¹⁶	2014	18%	8%	0	0.5%
Rajkohila J et al. ¹⁰	2016	29.6 %	6.9%	1.8%	0.6%
Biswal R et al. ⁸	2018	17.8%	8.4%	5.6%	0.9%
Present study	2020	75 %	17.96 %	7 %	0 %

According to present study, spurs are frequently associated with Type I (75%) followed by Type II (17.96%). These findings are consistent with Kullar JS et al., Rajkohila J et al., Biswal R et al. (Table - 4)

Conclusion

In conclusion, the present study shows that the calcaneal spurs are more frequent in type I calcanei. Plantar fasciitis due to calcaneal spur may be one of the causes of heel pain. The morphology of human calcanei and their articular facets is of interest to anatomists, but more importantly the relationship is critical in anthropometry, kinesiology, orthopaedic surgery, physical therapy and rehabilitation.¹

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