STUDY OF CALCANEAL SPURS ON THE BASIS OF TALAR ARTICULAR FACETS IN THE POPULATION OF ODISHA

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ABSTRACT

Introduction: Calcaneous is largest of seven tarsal bones of foot and forms prominence of heel. Most of the times an osteophytic outgrowth (calcaneal spur) has been observed in the plantar and dorsal aspect of the foot. The aim of this study is to analyse the incidence of calcaneal spur in relation to morphological variations of talar articular facets of calcaneus in the state of Odisha, India.

Materials and Methods: The material for the study consisted of 107 dry (56 right and 51 left), adult calcanei of unknown sex obtained from Department of Anatomy. The calcaneal spurs were studied in detail and classified according to types of calcaneus.

Results: The incidence of type 1 calcanei was predominant (66.36%) with least incidence being type 4(1.86%) in the present study. Maximum incidence of calcaneal spurs were found in Type I calcanei (17.8%) followed by 10.28% in Type 2, 4.7% in Type 3 and 0.9% in type 4.One out of 107 calcanei had presented with spur on the sustentaculum tali (0.9%). The incidence and type of calcaneal spurs were compared with those of previous studies and etiology of heel pain has been discussed.

Conclusion: Calcaneal spurs are related to type of calcanei with the highest frequency in Type 1 and least in Type 4. Other factors, which contribute toward increase in incidence of spurs, are increasing age and weight, concurrent orthopedic diseases, and heel pain.

KEW WORDS: Talar articular facets, dorsal spur, plantar spur and sustentacular spur.

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INTRODUCTION

Calcaneus or oscalcisis is the largest irregular bone and forms a major component of the bony arches of foot. It supports the body's weight as well as acts as a calf muscle lever [1].

It has six surfaces out of which the plantar or

inferior surface and dorsal or posterior surface are commonly presenting with spurs. Spur formation occurs at the site of ligament and tendon insertions into a bone and tends to grow in the direction of natural pull of ligaments and tendons involved [2]. In 1900 the bony spur formation of the plantar aspect of the calcaneus was first documented by the German physician Plettner, who coined the term Kalkaneussporn (calcaneal spur) [3]. Calcaneal spurs are of two types: Dorsal/posterior spurs and plantar/inferior spurs. It may remain asymptomatic or produce pain in the heel [4]. They may represent variations in the morphological pattern of the talar articular facets of the calcaneus [5]. Spur formation was found to be significantly less common in sustentaculum tali with two separate facets than in the other configurations [6]. This study is undertaken to assess the incidence of calcaneal spurs and the type of calcaneum commonly associated with it in the population of odisha.

MATERIALS AND METHODS

This was an observational study comprising of 107 dry (55 right and 52 left), adult calcanei of unknown sexes obtained from the Department of Anatomy for the present study. Calcanei were labeled from 1 to 107 with suffix R(right) or L (left). Morphological study of posterior (dorsal spurs) and inferior (plantar spurs) surfaces of the calcanei was done.

The calcanei were classified on the basis of talar articular facets (present on the middle third of superior surfaces). The incidence of calcaneal spurs were studied in detail.

Classification of calcanei on the basis of talar articular facets

Type1- Fused (continuous) anterior & middle facets separate posterior facet

Type2- Separate anterior, middle facets and posterior facet

Type 3- Absence of anterior facet (only middle facet present)but separate posterior facet

Type 4- Fused anterior, middle & posterior facets

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

Exclusion criteria: Any calcaneum looking pathological on general examination was discarded from the study.

Statistical analysis: Incidence of various patterns of the talar articular facets of the calcaneum with plantar and dorsal spurs were calculated as percentage and compared with

available literatures. Chi-Square test and Student's t-test in Microsoft Excel 2007 was used for the statistical analysis.

RESULTS

Table 1: Classification of calcanei on the basis of talar articular facets in our study.

Classification	Right	Right Left		Percentage
Туре І	36	35	71	66.36%
Type II	12	11	23	21.50%
Type III	6	5	11	10.28%
Type IV	1	1	2	1.86%
Total	55	52	107	100%

Fig 1: Showing the type of calcaneus i.e. A – Type 1, B – Type 2, C- Type 3, D and E both are Type 4.



Table 2: Incidence and type of calcaneal spurs in the present study.

Spurs	Plantar	%	Dorsal	%	Both	%	Total	%
Type 1	6	5.6	11	10.28	2	1.8	19	-17.80%
Type 2	3	2.8	5	4.7	1	0.9	9	-8.41%
Туре 3	2	1.8	3	2.8	0	0	5	-4.70%
Type 4	0	0	1	0.9	0	0	1	-0.90%
Total	11	10.28	20	18.7	3	2.8	34	-31.77%
Percentage	-10.28%		-18.70%		-2.80%		-31.77%	

Fig 2: Showing plantar calcaneal spur Fig 3. Showing dorsal calcaneal spur.



Total incidence of calcaneal spurs was found as 31.77% of total calcanei studied. The incidence of only dorsal spurs in all the calcanei was (18.7%) out of which the Type I calcanei presented with 11(10.28%) followed by Type II 5(4.7%), type III (2.8%) and 0.9% in type IV. The incidence of only plantar spur was found in 10.28% in total out of which the Type I calcanei presented with 6 (5.6%) % followed by Type II 3 (2.8%), type III 2(1.8%) and absent in type IV.Both dorsal and plantar spurs were found in 3(2.8%) in total out of which Type I 2(1.8%) followed by Type II 1 (0.9%) and the Type III and Type IV had either plantar or dorsal spur. [Table 3, Fig 2, Fig 3 and Fig 4].

Fig 4: Showing both plantar and dorsal spur Fig 5. Showing sustentacular spur.



In the present study we observed one sustentacular spur in type 1 calcaneus out of 107 specimens which constituted (0.93%) of calcanei and(2.9%) of the total spurs studied. (Fig 5)

DISCUSSION

In the present study the talar articular facets of 107 calcanei were compared with the work of the earlier researchers. We observed four different pattern (types) with highest incidence of type I calcanei followed by type II, III and IV respectively as studied by Gupta SC et al.,Garg R et al.,Verhagen FD and Nemade KS et al. Our study is corroborative with the above workers except the study of Barbaix E et al. where lower incidence type I and higher incidence of type II were being observed in Belgians. **[Table no .2]** [6,7, 8,9,10]

 Table 3: Comparison of classification of calcanei on the basis of talar articular facets.

Author	Years	Population	Ν	Type 1 (%)	Type 2 (%)	Type 3 (%)	Type 4 (%)
Gupta SC et al	1977	Indian	401	67	26	5	2
Verhagen FD	1993	American	176	53.41	39.77	6.82	0
Barbaix E et al	2000	Belgian	134	25	64	11	0
Garg R et al	2012	Indian	310	72.26	24.52	1.3	1.6
Nemade KS et al	2013	Indian	220	65.45	25.45	9.09	-
Present study	2017	Indian	107	66.36%	21.50%	10.28%	1.86%

The incidence of calcaneal spurs was 31.77%, which is similar to Kuller JS et.al. 2014 in Punjab but it was higher than Riepert et al.1995 of Europe and lower than Agarwal S et al.2016 in New Delhi. [Table 4] The incidence of plantar spurs is lower (10.28%) in our study than that of dorsal spurs (18.7%) as compared to Kuller

JS et.al and Agarwal S et al.2016. There observation was being 6.5% and 13.79% for plantar spur and 15.5% and 26.92% for dorsal spur respectively. **[Table no 4]** Lastly the type I calcanei is more frequently encountered and associated with the highest frequency of calcaneal spurs. **[11.12.13]**

Fable	4:	Comparison of incidence and type of calcaneal
spurs	in	different studies.

Worker in years	nonulation	No	Plantar	Dorsal	Both spurs	Total spurs
worker III years	population		spurs (%)	spurs (%)	(%)	(%)
Riepertet.al.1995	European	264	11.2	9.3	-	15.7
Agarwal S et al. 2016	Indian (New Delhi)	580	13.79	20.92	20.52	61.38
Kuller JS et.al. 2014	Indian (Punjab)	200	6.5	15.5	4.5	26.5
Present study 2017	Indians (Odisha)	107	10.28	18.7	4.7	33.68

CONCLUSION

Calcaneal spurs are related to the type of calcanei with the highest frequency in Type I. These findings support the theory that plantar calcaneal spurs may be an adaptive response to vertical compression of the heel rather than longitudinal traction at the calcaneus. Anatomical knowledge of the correlation between calcaneal spur and type of calcaneum may be useful in clinical practice as calcaneal spurs are one of the cofactors for heel pain.

Conflicts of Interests: None

REFERENCES

- [1]. Snell RS. Bones of the foot. In: Clinical Anatomy for Medical Students. 6th ed. Philadelphia, Baltimore, New York, London, Buenos Aires, Hong Kong, Sydney, Tokyo: Lippincott, Williams and Wilkins, A Wolters Kluwer Company; 1993:551 2.
- [2]. Bunning and Barnett. Variations in the talocalcaneal articulations. J.Anat.London. 1963;97:643.
- [3]. Plettner P. Exostosen des Fersenbeins. Jahresbericht der GesellschaftfürNatur und Heilkunde in Dresden; 1900.
- [4]. Healey JE Jr, Seybold WD. A Synopsis of Clinical Anatomy. 1st ed. Philadelphia, London, Toronto: WB Saunders Company; 1969: 286.
- [5]. Robinson HM. Symmetrical reversed plantar calcaneal spurs in children. A normal variant? Radiology 1976;119:187 8.
- [6]. Gupta SC, Gupta CD, Arora AK. Pattern of talar articular facetsin Indian calcanei. J Anat 1977;124(3):651–5.
- [7]. Verhagen FD. Arthritis of the subtalar joint associated with sustentaculumtali facet configuration. J Anat 1993;183:631–4.

Biswal R, Mishra D. N, Mohapatra C. STUDY OF CALCANEAL SPURS ON THE BASIS OF TALAR ARTICULAR FACETS IN THE POPULATION OF ODISHA.

- [8]. Barbarix E, Roy PV, Clarys JP. Variations of [12]. Agarwal S, Garg S and Vasudeva N. Subtalar Joint anatomical elements contributing to subtalar joint stability: intrinsic risk factors for posttraumaticlateral instability of the ankle. Ergonomics; 2000; 43(10):1718-1725.
- [9]. Garg R, Dagal N, Kumar S, Shekhawat S. Study of patterns oftalar articular facets of human calcanei and their clinicalimplications in population of Rajasthan. Indian J Basic Appl Med Res 2013;7(2):643-50.
- [10]. Nemade KS, Meshram MM, Kasote AP, Kamdi NY. Arthritis of the subtalar joint associated with sustentaculumtali facet configuration. Int J Anat Res. 2014; 2(4):684-88.
- [11]. Riepert T, Drechsler T, Urban R, Schild H, Mattern R. The incidence, age dependence and sex distribution of the calcaneal spur. An analysis of its x ray morphology in 1027 patients of the central European population. Rofo. 1995; 162:502 05.

- Instability and Calcaneal Spurs Associated with the Configuration of the Articular Facets of Adult Human Calcaneum in Indian Population.Journal of Clinical and Diagnostic Research. 2016 Sep, Vol-10(9): AC05-AC09.
- [13]. Kullar JS, Randhawa GK, Kullar KK. A study of calcaneal enthesophytes (spurs) in Indian population. Int J App Basic Med Res. 2014; 4:S13-16.

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