



Original Research Article

Morphometric Analysis of Tendo Achilles Spur

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ABSTRACT

Background: The Tendo Achilles at the point of insertion may get ossified and thereby it may cause pain to an individual. Even normal activities like standing stretching may also cause severe action and interferes with the daily activities of the individual causing loss of productive output. This study was performed with the intention to throw some light on the formation of the Tendo Achilles spur and its' Morphometry in dry bones which might shed some new evidence for the cause. **Materials and Methods:** Two hundred eighteen dry human calcaneae were taken for the study out of which right sided were one hundred and one and left side being one hundred and seventeen. The spur was macroscopically analyzed and its Morphometry was recorded. **Results:** Of the bones examined right sided spur was approximately 46.33% and the left sided spur was 66.81% approximately. The Length, breadth and thickness of the right sided spur was 0.88mm, 2.59mm and 0.48mm with SD being 0.49, 0.58 and 0.25 respectively. The measurements on the left side were 0.87mm, 0.98 and 0.42mm and the SD being 0.36, 0.61 and 0.18 respectively. **Conclusion:** The formation of Tendo achilles spur was marginally higher on the left side than the right side. The breadth of the spur was more on the right side than the left side. The attributable cause for this could be walking style, biomechanics and metabolic reasons. These measurements can serve as a guideline for the surgeon operating in this region.

Key words: Calcaneum, calcaneae, Tendo achilles, spur, Achilles tendon.

INTRODUCTION

The Achilles tendon is the thickest and the strongest tendon in the human body and the Achilles Tendon spur is a clinical condition which causes severe pain while walking running and other activities of daily living. This condition commonly affects people who wear footwear not suitable for their activities, Persons suffering from diabetes and people with gait disturbances. Although many studies exist on the achilles

tendon spur based on its radiological appearance but not much literature exists regarding the anatomical appearance of the spur and more so very few material is available about the it in this part of the world (Figure-1).

The Tendo Achilles is a conjoined tendon of the gastrocnemius and the soleus muscles. It is inserted to the posterior surface of the calcaneum and along with its insertion the tendon of the plantaris muscle

is also inserted alongside. At the point of insertion, the fibres of the tendon are not aligned in a straight manner and are usually spirally arranged. [1] Flexion of the ankle joint is the main movement performed by this muscle. Mobility and initiation of movement starts with flexion in the gait cycle. The Tendo Achilles aids in the even distribution of weight. The Tendo Achilles thus is a constant factor in movement hence wear and tear and the blood supply to the calcaneal tendon is poor. [1] The tendon is prone for pathology only in the mid substance of the tendon because of poor blood supply. [1] Unaccustomed movement of the tendo achilles can result in disruption of the tendinous architecture at the point of insertion and this disruption calcifies to form bone which forms the primary basis for a tendo achilles spur.



Figure: 1. Tendo Achilles spur.

The mechanism of spur formation in the tendo achilles itself is unique because of the fact that a sesamoid fibrocartilage which is present at the site of insertion. This sesamoid fibrocartilage, during dorsiflexion of the foot, along with the periosteal fibrocartilage is pressed against each other due to a compressive force which varies according to the size of its tuberosity. [2] The specific pathology of calcification is due to calcium pyrophosphate dihydrate crystal or

hydroxyapatite crystal deposition. [3] Spur formation occurs in regions where tensile forces are likely to be higher and it is likely to distal than proximal. [4] A watershed zone is present 2-6 cm proximal to the insertion of Achilles Tendon has a limited blood supply which is usually the site of injury. [5]

MATERIALS AND METHODS

This study was conducted in the Department of Anatomy of Vinayaka Missions Kirupananda Variyar Medical College, Salem. Around 218 calcaneae were made available for the study. The Equipment used for the study were Vernier calipers, measuring scale and digital photographic camera.

The calcaneae were segregated into the right and left sides. The right calcaneae were 101 and left calcaneae were 117 (Table No-1). The following parameters were measured.

- 1) Length of the spur
- 2) Breadth of the spur (Figure-2)
- 3) Thickness of the spur

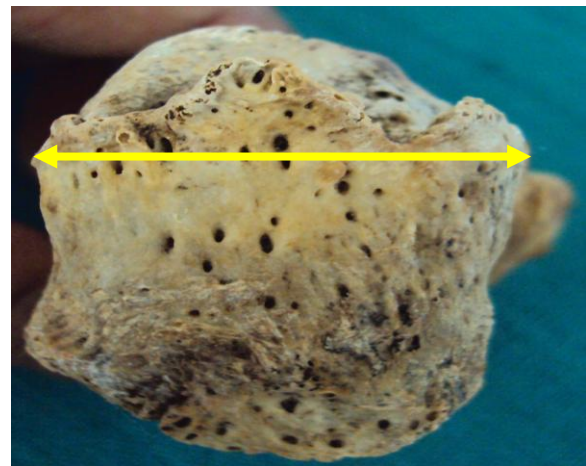


Figure: 2. Measurement of breadth of spur.

Statistical Analysis

The measurements obtained from the study were subjected to statistical analysis for mean, and standard deviation. With the

variables thus obtained paired 't' test was done for significance of the study.

RESULTS

Of the 218 calcaneae studied for the Tendo Achilles spur, 142 calcaneae showed presence of spur formation. Left sided calcaneae exhibited more spur than the right side (Table-1). The mean length of the Tendo Achilles spur in right calcaneae was 0.88 cm and the mean length of the spur in the left side was 0.87 cm (Table-2). The mean breadth of the Tendo Achilles spur in right sided calcaneae was 2.59 cm and in the left sided calcaneae was 1.98 cm (Table-3). The mean thickness of the Tendo Achilles spur in right sided calcaneae was 0.48 cm and in the left side it was 0.42 cm (Table-4). Standard deviation to rule out error margin for the measurements was done accordingly (Table-5). Statistical Test for the measurements from the parameters were performed for validating the outcome and

significance of the study (Table-6),(Table-7).

Table - 1. Total number of calcaneae with tendo achilles spur and specific side(n =218).

Total number of calcaneae with tendo Achilles spur	Total number of Right side calcaneae with tendo Achilles spur	Total number of left side calcaneae with tendo Achilles spur
142 (65.13%)	65 (64.35%)	77 (66.81%)

Table - 2. Length of the Tendo Achilles spur.

Total number of calcaneae	Right side Mean length	Left side Mean length
142	0.88 cm	0.87 cm

Table - 3. Breadth of the Tendo Achilles spur.

Total number of calcaneae	Right side Mean breadth	Left side Mean breadth
142	2.59 cm	1.98 cm

Table - 4. Thickness of the Tendo Achilles spur

Total number of calcaneae	Right side Mean thickness	Left side Mean thickness
142	0.48 cm	0.42 cm

Table – 5. Standard deviation

Length		Breadth		Thickness	
Right side	Left side	Right side	Left side	Right side	Left side
0.49684	0.36031	0.58584	0.61650	0.25353	0.18676
4	8	5	3	5	2

Table – 6: Chi-Square test

	Length right	Length left	Breadth right	Breadth left	Thickness right	Thickness left
Chi-Square	47.569 ^a	59.727 ^b	19.769 ^c	26.442 ^d	.000 ^e	.000 ^e
df	26	31	37	44	4	4
Asymp. Sig.	.006	.001	.991	.983	1.000	1.000

a. 27 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 2.4.

b. 32 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 2.4.

c. 38 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 1.7.

d. 45 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 1.7.

e. 5 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 1.0.

Table – 7: Paired Samples Test.

Pairs	Paired Differences				t	df	Sig. (2-tailed)	
	Mean	Std.Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Length right – Length left	.01923	.62285	.07726	-.13510	.17357	.249	64	.804
Breadth right- Breadth left	.04338	.89269	.11072	-.17781	.26458	.392	64	.696
Thickness right –Thickness left	.05800	.32453	.14513	-.34496	.46096	.400	4	.710

DISCUSSION

The spur of Tendo Achilles is a type of calcaneal exostosis due to long standing inflammation of the Achilles Tendon. [6] In the present study of cadaveric bones, more

than half the calcaneae had exhibited a spur or a calcified Tendo Achilles at the point of insertion which indicates that Tendo Achilles spur is a common occurrence. The Tendo Achilles at the point of insertion turns

from being oval to an arcuate structure covering the calcaneal tuberosity which results in a spur formation due to constant wear and tear. [7] The reason for the formation of the Tendo Achilles spur could be due to difference in the point of insertion which results in repeated inflammation. Regarding the mechanism of spur formation is the tendon undergoes micro injury and degeneration and subsequent inadequate repair results in the formation of spur. [8]

The ossification of the Achilles tendon at the point of insertion is due to repetitive microtrauma. [9] This repetitive microtrauma when undergoes healing could become calcified and becomes a Tendo Achilles spur. However the formation of spur in the Tendo Achilles could be due to other factors also like chronic overuse injuries and insertional tendonitis. The spur formation results in difficulty by restricting mobility of the individual and interferes with activities of daily living.

CONCLUSION

The documentation of the physical description of the Tendo Achilles spur in dry bones indicates that this spur formation is not an isolated condition but rather a common occurrence as more than fifty percent of the calcaneae studied exhibited spur formation. The measurements obtained from the parameters may serve as a guideline to surgeons and physicians contemplating a procedure in this region.

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