

The age dependent change in the incidence of calcaneal spur

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ABSTRACT

Objective: The aim of the present study was to evaluate the association between the calcaneal spur incidence and age, gender and side.

Methods: Lateral ankle X-rays of 1335 patients (550 (41.2%) females and 758 (58.8) males; mean age: 46.5 ± 13.5 years) who referred to our hospital because of trauma were reviewed. Incidence of plantar calcaneal spur, posterior calcaneal spur and association of such incidences with age, gender and side were all evaluated.

Results: Incidences of plantar calcaneal spur and posterior calcaneal spur were detected as 32.2% (male: 31%, female: 34%) and 13.1% (male: 11%, female: 16%), respectively. Incidence of plantar calcaneal spur increased by age whereas there was not any association with gender and location. The highest incidence was detected as 41.8% over 70 years of age. Incidence of posterior calcaneal spur increased by age and female gender whereas no significant association was observed with location. The highest incidence was detected as 22.3% between 61 and 70 years of age.

Conclusion: Incidences of plantar and posterior calcaneal spur were detected as 32.2% and 13.1%, respectively. Both plantar and posterior calcaneal spur incidence increases by age. Posterior calcaneal spur occurs significantly more frequently in females while, no difference is found between the males and females in incidence of the plantar calcaneal spur.

Level of evidence: Level IV, diagnostic study.

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Introduction

Although plantar calcaneal spur and dorsal calcaneal spur (Achilles) are usually concomitant with plantar fasciitis and Achilles tendinitis, they may not present a clinical sign in all cases.¹ Up to date, there are limited number of studies about incidences of plantar calcaneal and dorsal calcaneal spur in normal population. An incidence rate varying between 11% and 46% was reported in the literature.^{2–5} This rate increases in patients with advanced age, osteoarthritis and obesity.^{6–8}

To our knowledge, there is not any study about incidence of plantar calcaneal spur and dorsal calcaneal spur in Turkish population. Furthermore, the present study with review of 1335 X-rays is

the largest study in terms of cases in the literature. The objective of the present study is to evaluate incidences of plantar calcaneal spur and dorsal calcaneal spur as well as association of these with age, gender and side.

Material and methods

Approval of the ethical committee was obtained for the present study (2016/467). X-rays of the patients who are at and older 20 years of age who referred to our emergency room because of foot-ankle trauma and had a complete lateral X-ray of the ankle between October 2014 and May 2016 were evaluated retrospectively. Patients' data were obtained through detection of bilateral X-ray of the ankle in emergency room through digital recording system of our hospital. Furthermore, ages, genders and locations of such patients were detected from digital recording system. Patients older than 20 years of age who had complete lateral X-rays of the ankle including ankle fractures were enrolled into the study. Patients who could not have standard complete lateral X-ray of the ankle due to different reasons (pain, fracture etc.) and patients younger than 20

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years of age were excluded. The standard lateral ankle X-rays where the beam was vertically applied onto the ankle, distal side of tibia, talus and calcaneus were observed from lateral profile completely and fibula is located slightly posterior to talus and tibia with a clear image of subtalar joints and calcaneus were included into the study (Fig. 1). All X-rays were evaluated by a musculoskeletal radiologist with an experience of 15 years. Same X-rays were then reviewed by an orthopedist and the patients who caused conflict were excluded from the study. Ages, genders and lesion locations of the patients whose X-rays were accessed were also reviewed. Incidences of plantar calcaneal spur, dorsal calcaneal (Achilles) spur, plantar calcaneal spur or dorsal calcaneal spur (any), plantar calcaneal spur and dorsal calcaneal spur together; and association of these rates with age, gender and location of the lesion were all reviewed. Furthermore, the patients were divided into groups by 10-years of age; and incidences as well as associated characteristics were evaluated in detail. The patients over 70 years of age were reviewed as a single group due to limited number of the cases.

Statistical analysis

The statistical analysis was performed by SPSS 22.0 software programme (IBM Corporation, Armonk, NY, USA). The mean, standard deviation, median minimum, median maximum, frequency and ratio values were used for descriptive statistics of the data. Distribution of the variables were measured by using Kolmogorov–Smirnov test. Mann–Whitney U test was used for quantitative analysis of the data. A p value of <0,05 was considered as statistically significant.

Results

The present study included 1335 patients whose lateral ankle X-rays were available and results were agreed by two specialists. Mean age of the patients were 46.5 ± 13.5 years. The patients consisted of 550 (41.2%) females and 758 (58.8) males. Right ankle X-ray was reviewed in 694 (52%) patients whereas left ankle X-ray was reviewed in 641 (48%) patients. Plantar calcaneal spur incidence was 32.2% (430 patients) and incidence of dorsal calcaneal spur was detected as 13.1% (175 patients) in 1335 lateral ankle X-rays. Plantar calcaneal and dorsal calcaneal spur were detected together in 9.8% (131 patients) of the patients. Any of plantar calcaneal spur or dorsal calcaneal spur were detected in 33% (441 patients) of the patients (Table 1).

Table 1
Results.

	Min–Max	Median	Average \pm s.d./	n-%
Age	20–88	46	45,9 \pm 13,5	
Age Ranges	20–30		180	13,5%
	31–40		287	21,5%
	41–50		398	29,8%
	51–60		276	20,7%
	61–70		139	10,4%
	71–80		49	3,7%
	81–88		6	0,4%
Gender	Female		550	41,2%
	Male		785	58,8%
Side	Right		694	52,0%
	Left		641	48,0%
Plantar Calcaneal Spur	(–)		905	67,8%
	(+)		430	32,2%
Posterior Calcaneal Spur	(–)		1160	86,9%
	(+)		175	13,1%
Plantar Calcaneal or posterior calcaneal Spur	(–)		894	67,0%
	(+)		441	33,0%
Plantar Calcaneal and posterior Calcaneal Spur	(–)		1204	90,2%
	(+)		131	9,8%

A significant increase was observed in incidence of plantar calcaneal spur by age ($p = 0.000$). There was not any significant association between gender, side of the lesion and incidence of plantar calcaneal spur ($p = 0.241$, $p = 0.267$). Distribution of plantar calcaneal spur incidence according to the age groups was presented in Table 2 and Fig. 2. Moreover, incidence of dorsal calcaneal spur significantly increased by increase of age ($p = 0.000$). Dorsal calcaneal spur incidence was detected significantly higher in females than males ($p = 0.009$). A significant association was not detected between side of lesion and incidence of dorsal calcaneal spur ($p = 0.742$). Distribution of dorsal calcaneal spur incidence according to the age groups were presented in detail in Table 3 and Fig. 2. Incidence of any of plantar or dorsal calcaneal spur significantly increased by age ($p = 0.000$). However, there was not any significant association between gender and side of the lesion ($p = 0.271$, $p = 0.749$). Distribution of incidence of any of plantar calcaneal spur or dorsal calcaneal spur according to the age groups were shown in Table 4 and Fig. 3. A significant association was detected between incidence of plantar calcaneal spur and dorsal calcaneal spur together and age ($p = 0.000$); however, no significant association was detected between gender and side ($p = 0.704$, $p = 0.473$). Distribution of incidence of plantar calcaneal spur and

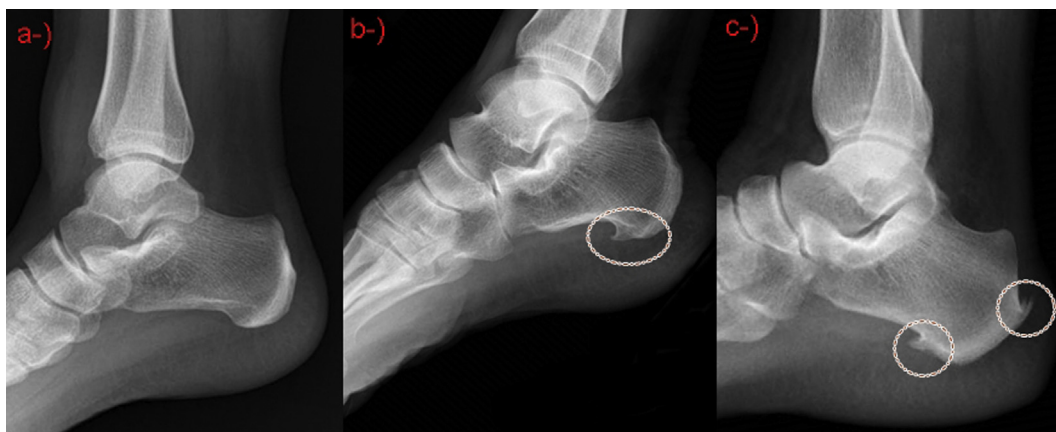


Fig. 1. a- No spur, b- Only plantar calcaneal spur, c- Plantar calcaneal spur and dorsal calcaneal spur.

Table 2
Association of plantar calcaneal spur incidence with age, gender and location.

		Plantar Calcaneal Spur (-)		Plantar Calcaneal Spur (+)		p	χ^2
		n	%	n	%		
		Age	20–30	161	89,4%		
	31–40	198	69,0%	89	31,0%		
	41–50	258	64,8%	140	35,2%		
	51–60	167	60,5%	109	39,5%		
	61–70	89	64,0%	50	36,0%		
	71–88	32	58,2%	23	41,8%		
Gender	Female	363	66%	187	34,0%	0,241	χ^2
	Male	542	69%	243	31,0%		
Side	Right	461	66,4%	233	33,6%	0,267	χ^2
	Left	444	69,3%	197	30,7%		

χ^2 Chi-square test.
A significant increase was detected with positive plantar calcaneal spur by age ($p < 0.05$). There was not any significant difference between plantar calcaneal spur positivity in females and males.

dorsal calcaneal spur together according to the age groups was presented in detail in Table 5 and Fig. 3.

Discussion

Plantar calcaneal spur is extra osseous formations on inferior side of the calcaneus due to different mechanisms. Plantar calcaneal spur was first identified by Plettner in 1900.⁹ Although it may be a significant cause for heel pain together with plantar fasciitis, it may appear asymptotically.¹ Two mechanisms are suggested for aetiology of plantar calcaneal spur. Some authors report that the condition appears due to tractional effect of plantar fascia while there are studies reporting the cause due to vertical compression rather than traction.^{10,11} Kuami et al reported in their studies where plantar fascia and plantar calcaneal spurs were examined on cadavers that the trabecle formation in spurs oriented vertically and therefore spur development may be dependent to vertical compression mechanism rather than tractional mechanism.¹¹ Since a higher incidence of plantar calcaneal spur in advanced age group⁶ is detected and an increasing association was shown with obesity and osteoarthritis in different studies, we also believe that theory of vertical compression may be more effective in development of plantar calcaneal spur.^{6–8} Achilles spur are osseous protrusions which are considered to be appeared as a result of repetitive microtraumas on connection site of Achilles tendon onto the bone.¹²

There are limited number of studies about plantar calcaneal spur and dorsal calcaneal spur incidence. Banadda et al reviewed lateral X-rays of 1228 calcanei and found incidence of plantar

Table 3
Association of incidence of dorsal calcaneal spur and age, gender and location.

		Posterior Calcaneal Spur (-)		Posterior Calcaneal Spur (+)		p	χ^2
		n	%	n	%		
		Age	20–30	173	96,1%		
	31–40	259	90,2%	28	9,8%		
	41–50	339	85,2%	59	14,8%		
	51–60	237	85,9%	39	14,1%		
	61–70	108	77,7%	31	22,3%		
	71–88	44	80,0%	11	20,0%		
Gender	Female	462	84%	88	16,0%	0,009	χ^2
	Male	698	89%	87	11,1%		
Side	Right	601	86,6%	93	13,4%	0,742	χ^2
	Left	559	87,2%	82	12,8%		

χ^2 Chi-square test.
A significant increase was detected between age increase and positive spur ($p < 0.05$). Dorsal calcaneal spur incidence rates in females were significantly higher than males ($p < 0.05$).

Table 4
Association of any of plantar or dorsal calcaneal spur with age, gender and location.

		Plantar Calcaneal or posterior Calcaneal Spur (-)		Plantar Calcaneal or posterior Calcaneal Spur (+)		p	χ^2
		n	%	n	%		
		Age	20–30	161	89,4%		
	31–40	208	72,5%	79	27,5%		
	41–50	253	63,6%	145	36,4%		
	51–60	161	58,3%	115	41,7%		
	61–70	82	59,0%	57	41,0%		
	71–88	29	52,7%	26	47,3%		
Gender	Female	359	65%	191	34,7%	0,271	χ^2
	Male	535	68%	250	31,8%		
Side	Right	462	66,6%	232	33,4%	0,749	χ^2
	Left	432	67,4%	209	32,6%		

χ^2 Chi-square test.
A significant increase was detected in positivity of Calcaneal or Achilles Spur by age increase ($p < 0.05$). There was not any significant difference of Calcaneal or Achilles spur positivity in females and males ($p > 0.05$).

calcaneal spur as 14.6%.² They reported the incidence as 17.7% in females and 13% in males.¹ Riepert et al detected incidences of plantar calcaneal spur and dorsal calcaneal spur as 11.2% and 9.3%, respectively in their study where 1027 lateral ankle X-rays were reviewed.⁴ They also detected an increase in incidence of plantar calcaneal spur and dorsal calcaneal spur by increase in age. The association between incidence and gender was also questioned and plantar calcaneal spur was reported to be observed in females

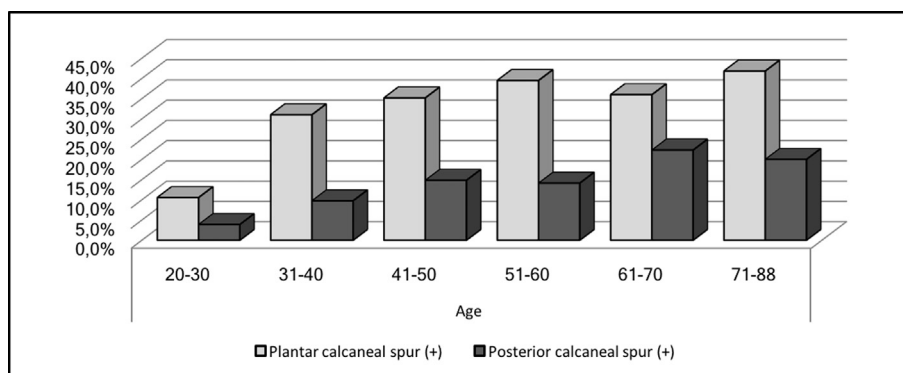


Fig. 2. Distribution of plantar calcaneal and dorsal calcaneal spur incidence according to the age groups.

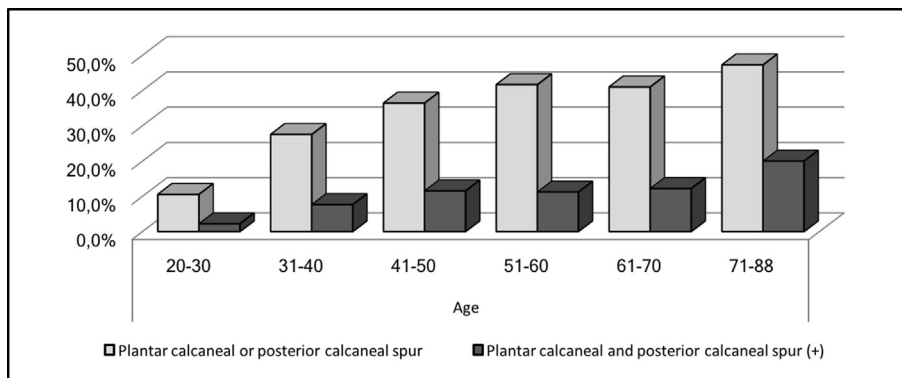


Fig. 3. Distribution of any of plantar calcaneal spur or dorsal calcaneal spur incidence and plantar calcaneal spur and dorsal calcaneal spur incidence according to the age groups.

Table 5
Association of concomitant incidence of plantar and dorsal calcaneal spur with age, gender and location.

		Plantar Calcaneal and Posterior Calcaneal Spur (-)		Plantar Calcaneal and Posterior Calcaneal Spur (+)		p	
		n	%	n	%		
Age	20–30	176	97,8%	4	2,2%	0,000	χ^2
	31–40	265	92,3%	22	7,7%		
	41–50	352	88,4%	46	11,6%		
	51–60	245	88,8%	31	11,2%		
	61–70	122	87,8%	17	12,2%		
	71–88	44	80,0%	11	20,0%		
Gender	Female	494	90%	56	10,2%	0,704	χ^2
	Male	710	90%	75	9,6%		
Side	Right	622	89,6%	72	10,4%	0,473	χ^2
	Left	582	90,8%	59	9,2%		

χ^2 Chi-square test.
A significant increase was detected in positivity of plantar calcaneal and dorsal calcaneal spur by increase of age ($p < 0.05$). There was not any significant difference in concomitant incidence of plantar calcaneal spur and dorsal calcaneal spur in females and males ($p > 0.05$).

more whereas dorsal calcaneal spur was detected more in male patients.⁴

After aforesaid studies conducted during 1990s, higher spur incidence rates were reported by Toumi et al in 2014. Toumi et al reviewed lateral X-rays of 1028 ankles and reported incidence rate of any of plantar or dorsal calcaneal spurs 38% and plantar calcaneal spur and dorsal calcaneal spur together as 11%.³ In line with previous studies, a strong association was detected between age and spur incidence. Association between gender and spur incidence was investigated; plantar and dorsal calcaneal spur incidence was reported to be higher in female patients younger than 50 years of age. The aforesaid study detected incidences of plantar calcaneal spur and dorsal calcaneal spur higher in individuals younger than 50 years whereas no gender difference was detected over 50 years of age.³

The present study where 1335 ankle X-rays were reviewed detected incidences of plantar calcaneal spur and dorsal calcaneal spur as 32.2% and 13.1%, respectively. The studies conducted during 1990s reported very low incidence rates for spur; however Toumi et al and the present study detected much higher rates.^{2,3} We may explain this as follows. In the study of Banadda et al, number of the patients who are older than 50 years of age consisted of 3.7% ($n = 46$) of all patients whereas number of the patients over 50 years of age was higher in the study of Toumi et al.^{2,3} Rate of the patients over 50 years of age was 35.2% (470 patients) in the present study. All studies report that incidence of spur increases by increase of age.^{2–4} Similarly, Menz et al reported plantar calcaneal spur rate

as 55% (119 patients) in their study where they evaluated 216 patients over 62 years of age only.⁶ Therefore, it is reasonable that low rates of the patients over 50 years of age evaluated in former studies may reduce the incidence of spur. Nevertheless, a balancedly higher number of the patients over 50 years of age in recent studies and in the present study and higher incidence of the condition in such age group may be a significant reason for higher incidence rates.

Different studies reported higher rates of plantar calcaneal spur rates in female population.^{2,4,13} However, there are studies reporting no difference between genders.^{7,14} Although we detected the incidence rates slightly higher in female patients (female: 34%, male:31%), there was not any statistically significant difference between two groups (Table 2). There is not an exact consensus about association of dorsal calcaneal spur with the gender in the literature.^{3,4} A significant association was detected between dorsal calcaneal spur and age as well as female gender in the present study (Table 3).

Limitations of the present study include unequal case numbers according to the age groups, lack of evaluation of some parameters such as clinical presentations, concomitant diseases and obesity since the cases was evaluated radiologically only and lack of evaluation of spur dimensions.

Consequently, to our knowledge, the present study has the largest number of the cases in the literature; and plantar calcaneal spur and dorsal calcaneal spur incidences in Turkish population were detected as 32.2% and 13.1%, respectively. Compared to former studies where much lower rates were reported, we believe that our results reflect more reliable and updated status since elder population were sufficiently included into the study.

Conflicts of interest

There is no conflict of interest.

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