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Original Article

Hyperlipidemia in Patients with Calcific Tendinitis

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ABSTRACT

Objective: Calcific tendinitis is a disease of unclear etiology and is associated with metabolic diseases. Hyperlipidemia, one of the metabolic diseases with systemic effects, may be associated with tendinopathy and tendinitis. In this study, we aimed to evaluate the relationship between hyperlipidemia and hypertriglyceridemia, calcific tendinitis, the location of tendinitis, and the frequency of severely symptomatic tendinitis attacks.

Methods: This retrospective study included a total of 2055 patients diagnosed with calcific tendinitis between August 1, 2019, and August 1, 2021. The patients were evaluated in terms of their hyperlipidemia and hypertriglyceridemia status, statin and/or fibrate use, and the frequency of tendinitis, and the location of attack.

Results: It was observed that 64.4% (n = 230) of the patients had hyperlipidemia and 11.8% (n = 42) had hypertriglyceridemia. It was determined that the most common tendinitis area among 357 patients was the shoulder. There was no statistically significant difference between the frequency of attacks (P = .712), and the location of attack (P = .069) in patients with hyperlipidemia. There was no statistically significant difference between the frequency of attacks (P = .735) and the location of attack (P = .286) in patients with hypertriglyceridemia. However, a statistically significant difference was found between the attack area (P = .032) in patients with triglyceride values higher than the target recommended values.

Conclusion: The frequency of hyperlipidemia is high in patients with calcific tendinitis; it will be useful to evaluate patients with calcific tendinitis in terms of hyperlipidemia.

Keywords: Calcific tendinitis, hyperlipidemia, hypertriglyceridemia, LDL, shoulder

INTRODUCTION

Calcific tendinitis (CT) is a disease characterized by the accumulation of calcium hydroxyapatite deposits in tendons.[1] Calcific tendinitis usually affects individuals between the ages of 30 and 50.[2] Calcific tendinitis is more common in women than men.[3] Although the most common location is shoulder, deposit accumulation may also be observed in many areas such as the gluteus maximus, paravertebral, hip, and foot.[4-6]

The etiology of CT is still not clear yet. Although there are many intrinsic and extrinsic theories regarding its etiology, multiphasic theory is the most widely adopted theory.[7] Studies other than multiphasic theory have shown that CT is associated with many metabolic diseases such as thyroid disorders and diabetes mellitus.[7,8] It has been shown that there is a relationship between hypercholesterolemia, which is one of the systemic metabolic diseases, and tendinopathy. Therefore, the severity of tendinopathies is correlated with the severity of hypercholesterolemia.[9,10] The studies have revealed that hyperlipidemia causes tendinopathy as a result of accumulation of lipid cholesterol and triglyceride deposits on the tendon by increasing the activity of tumor necrosis factor (TNF)-alpha, interleukin (IL)-8, IL-6, increasing the macrophage activity, reducing the amount of type III collagen in the tendon, and causing changes in the tendon structure.[9,11-13]

It is noteworthy that the studies investigating the effect of hypercholesterolemia on CT are limited in our country. In this study, we aimed to evaluate the relationship between hyperlipidemia and hypertriglyceridemia, CT, the location of tendinitis, and the frequency of tendinitis attacks in Turkey.

METHODS

Study Design and Settings

Ethics committee approval for this retrospective study was obtained from the Health Sciences Ethics Committee of Muğla Sıtkı Koçman University (September 10, 2021, 198). Patients diagnosed with CT in the orthopedic outpatient clinic between August 2019 and August 2021 were examined.

Selection of the Participants

Patients between the ages of 18 and 99 who were diagnosed with CT in the orthopedic outpatient clinic between August

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2019 and August 2021 were included in the study. Patients with calcium deposits on x-ray or magnetic resonance imaging were considered to have CT.

Among patients with CT, patients with a lipid profile at the time of diagnosis were included. Patients with lack of information were excluded from the study.

Measurements and Outcomes

Demographic information of patients, chronic diseases (such as diabetes mellitus, hypertension, coronary artery disease, atrial fibrillation, cerebrovascular disease), total cholesterol, Low-density lipoprotein cholesterol (LDL), triglyceride, High-density lipoprotein cholesterol (HDL), white blood cell count, C-reactive protein (CRP), glucose, calcium levels, number of CT attacks in the last 2 years, tendinitis areas, presence of LDL level higher than target value, statin use, presence of TG level higher than target value, and fibrate use were examined. The reference LDL value was accepted as LDL < 116 mg/dL, which is the recommended target value for patients at low cardiovascular risk by the guideline.[14] The triglyceride reference value is <200 mg/dL. The patients were evaluated according to the presence or absence of hyperlipidemia at the time of admission and whether they were above the LDL target value or not, considering their treatment status. Similarly, patients were evaluated according to the presence or absence of hypertriglyceridemia at the time of admission and whether they were above the TG target value or not, considering their treatment status.

Statistical Analysis

Statistical Package for the Social Sciences 25.0 (IBM SPSS Corp., Armonk, NY, USA) program was used for data analysis in the study. Descriptive data on the clinical information and biochemical parameters of the patients were presented as n (%), median (min-max), and mean ± standard deviation. Chi-square test and Fisher's exact test were used to compare patients with hyperlipidemia, patients with LDL higher than target value, patients with hypertriglyceridemia, patients with triglyceride higher than target value, and attack frequency, and attack area. A *P*-value of <.05 was considered statistically significant.

RESULTS

The study included a total of 2055 patients diagnosed with CT in the orthopedic outpatient clinic between August 2019 and August 2021. Of these patients, 357 met the inclusion criteria of the study and 64.4% (n = 230) of the patients were female (Table 1). The mean age was 57.4 ± 11.27 (Table 1). In terms of comorbidities, 55.2% (n = 197) of the patients had hypertension, 23.8% (n = 85) diabetes mellitus, and 15.7% (n = 56) had coronary artery disease (Table 1).

Main Points

- Hyperlipidemia was observed in 64.4% of patients with calcific tendinitis (CT).
- In patients with hyperlipidemia, there was no difference in the location of the tendinitis and the number of attacks.
- Patients with CT should be scanned for hyperlipidemia.

Table 1. Demographic and Clinical Characteristics of Patients

		n	%
Age (years)	57.40 ± 11.27		
Gender	Female	230	64.4
	Male	127	35.6
Diabetes mellitus	No	272	76.2
	Yes	85	23.8
Hypertension	No	160	44.8
	Yes	197	55.2
Coronary artery disease	No	301	84.3
	Yes	56	15.7
Atrial fibrillation	No	340	95.2
	Yes	17	4.8
Cerebrovascular disease	No	350	98.0
	Yes	7	2.0
Number of attacks	1	221	61.9
	>1	136	38.1
Location of tendinitis	Foot or ankle	73	20.4
	Knee or leg	32	9.0
	Hand or wrist	107	30.0
	Forearm or arm	7	2.0
	Pelvis or hip	9	2.5
	Shoulder	116	32.5
	Vertebra	13	3.6
Hyperlipidemia	No	127	35.6
	Yes	230	64.4
Statin use	No	300	84.0
	Yes	57	16.0
LDL value above target value	No	159	44.5
	Yes	198	55.5
Hypertriglyceridemia	No	315	88.2
	Yes	42	11.8
Fibrate use	No	343	96.1
	Yes	14	3.9
Triglyceride value is above target value	No	318	89.1
	Yes	39	10,9

The mean and standard deviation value of age is given LDL, Low-density lipoprotein cholesterol.

While 61.9% (n = 221) of the patients had only 1 attack in 2 years, 136 (38.1%) patients visited the orthopedic outpatient clinic due to more than 1 attack (Table 1). The most common attack location was shoulder (32.5%, n = 116), followed by the hand and wrist (Table 1).

Hyperlipidemia was present in 64.4% (n = 230) of the patients. Only 16% (n = 57) of patients were using statins. LDL values of 55.5% (n = 198) of the patients were higher than the value recommended

Table 2. Biochemical Parameters

	Mean ± SD
Total cholesterol (mg/dL)	210.95 ± 46.54
LDL (mg/dL)	126.48 ± 39.34
Triglyceride (mg/dL)	157.46 ± 89.02
HDL (mg/dL)	53.48 ± 13.87
White blood count	7.34 ± 2.17
CRP (mg/L)	4.35 ± 7.10
Glucose (mg/dL)	114.19 ± 36.44
Calcium (mg/dL)	9.56 ± 0.56

The mean and standard deviation values of biochemical parameters are given.
SD, standard deviation; LDL, Low-density lipoprotein cholesterol; HDL, High-density lipoprotein cholesterol; CRP, C-reactive protein.

by the guideline (Table 1). Hypertriglyceridemia was present in 11.8 (n=42) of patients. The rate of fibrate use was 3.9% (n=14). In 10.9% (n=39) of the patients, triglyceride level was above the target values recommended in the guideline (Table 1). Laboratory results of the patients were as seen in Table-2.

No statistically significant difference was found between the presence of hyperlipidemia, frequency of attacks (P = .712), and location of attacks (P = .069) (Table 3).

There was no statistically significant difference between the presence of hypertriglyceridemia and the frequency (P = .735) and location of attacks (P = .286). There was no statistically significant difference between the triglyceride levels and the frequency of attacks (P = .765). However, there was a statistically significant difference between the location of attacks (P = .032) (Table 4).

DISCUSSION

In our study, 64.4% of the patients had hyperlipidemia and 11.8% had hypertriglyceridemia. It was observed that the most common CT area was the shoulder with a rate of 32.5%. There was no correlation between the patients' hyperlipidemia and the attack area and the frequency of attacks. No correlation was found between the patients having hypertriglyceridemia and

Table 3. Comparison of Attack Frequency and Attack Area, Presence of Hyperlipidemia, and Above of LDL Value Compared to Target Value

		Hyperlipidemia			LDL Value Above Target Value		
		No (n=127)	Yes (n=230)	*P*	No (n=159)	Yes (n=198)	*P*
Number of attacks	1	77 (34.8)	144 (65.2)	.712[a]	98 (44.3)	123 (55.7)	.925[a]
	>1	50 (26.8)	86 (63.2)		61 (44.9)	75 (55.1)	
Location of tendinitis	Foot or ankle	29 (39.7)	44 (60.3)	.069[b]	35 (47.9)	38 (52.1)	.221[b]
	Knee or leg	13 (40.6)	19 (59.4)		17 (53.1)	15 (46.9)	
	Hand or wrist	42 (39.3)	65 (60.7)		49 (45.8)	58 (54.2)	
	Forearm or arm	3 (42.9)	4 (57.1)		4 (57.1)	3 (42.9)	
	Pelvis or hip	2 (22.2)	7 (77.8)		2 (22.2)	7 (77.8)	
	Shoulder	38 (32.8)	78 (67.2)		50 (43.1)	66 (56.9)	
	Vertebra	0 (0.0)	13 (100.0)		2 (15.4)	11 (84.6)	

[a]Pearson chi-square test; [b]Fisher's exact test; P<.05 statistically significant.

Table 4. Comparison of Attack Frequency and Attack Area, Presence of Hypertriglyceridemia, and Above of Triglyceride Value Compared to Target Value.

		Hypertriglyceridemia			Triglyceride Value Above Target Value		
		No (n=315)	Yes (n=42)	*P*	No (n=318)	Yes (n=39)	*P*
Number of attacks	1	194 (87.8)	27 (12.2)	.735[a]	196 (88.7)	25 (11.3)	.765[a]
	>1	121 (89.0)	15 (11.0)		122 (89.7)	14 (10.3)	
Location of tendinitis	Foot or ankle	64 (87.7)	9 (12.3)	.286[b]	65 (89.0)	8 (11.0)	.032[b]
	Knee or leg	31 (96.9)	1 (3.1)		31 (96.9)	1 (3.1)	
	Hand or wrist	96 (89.7)	11 (10.3)		97 (90.7)	10 (9.3)	
	Forearm or arm	5 (71.4)	2 (28.6)		3 (42.9)	4 (57.1)	
	Pelvis or hip	8 (88.9)	1 (11.1)		8 (88.9)	1 (11.1)	
	Shoulder	101 (87.1)	15 (12.9)		103 (88.8)	13 (11.2)	
	Vertebra	10 (76.9)	3 (23.1)		11 (84.6)	2 (15.4)	

[a]Pearson chi-square test; [b]Fisher's exact test; P<.05 statistically significant.

the attack area and the frequency of attacks. There was only an association between the triglyceride value of the patients above the target value and the attack area.

According to the current literature, it is known that CT is frequently seen between the ages of 30 and 50.[2,15] In our study, the mean age of patients diagnosed with CT was found to be 57.40 ± 11.27 years. This may be due to the fact that we included patients with a diagnosis of CT who had a lipid profile at the time of admission and that young patients generally do not have a regular lipid profile, and middle-aged or elderly patients regularly have their lipid profile checked.

Although the etiology of CT is not clear, endocrine disorders such as thyroid disorders and estrogen hormone disorders are thought to play a role in the etiology.[8,16] Since it has been shown that there are estrogen and progesterone receptors in the rotator cuff, rotator cuff injuries are more common, especially in variations related to estrogen-related receptor beta gene.[17,18] This explains why CT is more common in women in the literature. In our study, we observed that females had CT more frequently, which was consistent with the literature.[3]

When we examine the studies on cholesterol and triglyceride levels in tendinopathies, Longo et al.[19] studies showed that there was no significant relationship between rotator cuff tears, cholesterol, and triglyceride levels. In a cohort study in which 498 678 patients were followed for 11 years, hyperlipidemia was found to be a risk factor for rotator cuff diseases.[20] Calcific tendinitis has been observed to be more common in female patients with hyperlipidemia in Taiwanese adults.[15] In our study, hyperlipidemia was also common in CT patients, and it was observed that 64% had hyperlipidemia. This can be considered compatible with studies showing that hyperlipidemia may be a risk factor in tendinitis patients.

Statin use is thought to be protective against rotator cuff diseases due to its anti-inflammatory effects.[20] There are studies showing that the use of statins, particularly simvastatin, reduces the risk of tendinopathy.[21] In our study, it was seen that 16% of the patients were using statins, but since the patients could not reach the target LDL values despite statin use, it was difficult to compare the frequency and location of the attacks.

There are several limitations to our study. Since the study was retrospective, there were only 357 patients meeting the inclusion criteria among 2055 patients with CT. Our mean age was higher than in other studies because young patients did not have routine lipid check. In addition, patients using both statins and fibrates in the study could not be evaluated according to drug use, since they remained above the target values.

CONCLUSION

In patients with CT, hyperlipidemia does not affect the frequency of attacks and the location of tendinitis, but the incidence of hyperlipidemia is high. Therefore, it is useful to examine patients with tendinitis in terms of lipid profile. Similarly, it would be useful to scan patients with hyperlipidemia in terms of CT.

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