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Clinical correlation between serum uric acid level and tophus involmente of tendon: a descriptive study

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ABSTRACT

Background: Clinical correlation between serum uric acid level and tophus involvement of tendon.
Methods: This is a non randomised multicetric prospective study carried out from December 2015 to May 2018. This is a descriptive study comprising 108 patients with diagnosis of gout according to the American College of Rheumatology (ACR) criteria. US examination included the quadriceps tendons, the patellar Tendon, peroneus tendon and the Achilles tendon. All tendons were evaluated bilaterally according to the EULAR guidelines for performing US in rheumatology.
Results: We included the patients aged between 20-60 year. In this study male patients was 86 (79.63%) and 22 (20.37%) patient were female. In this study 108 patients with serum uric acid level between 5.5 -9.0 mg/dl with age from 20 yr to 60 yr were studied. Uric acid level between 7 - 9 mg/dl found in 68.48% and it was in age between 30–45 yr of age. 73 patiens (67.59%) had pain at enthesis for at least once before inclusion in the study. Intra-tendinous tophi and hyperechoic aggregates were the most frequent lesions at the tendon in US examinations. In our study Patellar tendon is the most frequently involved tendon followed by quadriceps, Achilles and peroneus tendon.
Conclusions: Tophius involvement of tendon in the lower limbs in gout is very frequent, particularly at the patellar tendon, Quadriceps tendon and Achilles tendon.

Keywords: Tophus, Uric acid, Tendon, Ultrasound

INTRODUCTION

Gout is the most common form of inflammatory arthritis and is caused by the chronic elevation of serum uric acid (SUA) levels above the saturation point for monosodium urate (MSU) crystal formation.[1] The general prevalence of gout is 1–4% of the general population. In western countries, the prevalence is 3–6% in men and 1–2% in women. In some countries, prevalence may increase up to 10%. Prevalence rises up to 10% in men and 6% in women more than 80 years old population. Annual incidence of gout is 2.68 per 1000 persons. It occurs in men 2–6 folds more than women. Worldwide incidence of gout increases gradually because of poor dietary habits like fast foods, lack of exercises, increased incidence of obesity and metabolic syndrome.[2] Gout undergoes 4 stages during its course starting with asymptomatic hyperuriceamia. In this stage, patients may or may not have symptoms or signs and are usually accidentally discovered when measuring SUA (serum level greater than 7 mg/dl). However, some patients with hyperuriceamia may develop an acute gouty attack. Acute gouty attack is usually monoarthritic that peaks within hours to severely inflamed joint with cardinal signs of inflammation including redness, hotness, tenderness, swelling and loss of function. Although hyperuriceamia is

a characteristic feature of gout; it should be noted that during gouty attacks, SUA might drop to normal levels. Hyperuricemia is a weak marker for gout diagnosis and the disease might still be diagnosed even with normal serum levels.[3] As it is mentioned in the new 2015 European League Against Rheumatism (EULAR)/ACR gout classification criteria, the previous criteria on the classification of gout had suboptimal sensitivity and/or specificity.[4] This criterion was developed at the time when advanced imaging, such as ultrasound (US), was not available. US has demonstrated good sensitivity and specificity for two elementary lesions: hyperechoic cloudy areas have a sensitivity of 79% and specificity of 95%, and double-contour sign is detected in 92% of gouty patients but no controls, and its sensitivity and specificity are 69 and 99%, respectively, when compared with chondrocalcinosis.[5-8] MSU crystal deposition in tendons is a frequent manifestation of extra-articular gout, more frequently affecting the Achilles, quadriceps, patellar, peroneal, and the flexor and extensor tendons in the hand.[8-11] Microcrystalline deposits may be localizing in the body of the tendon, around, or even at the enthesis, frequently in more than one location.[12] Recently, Dalbeth et al. evaluated the frequency and pattern of tendon and ligament involvement in the foot of tophaceous gouty patients, by dual-energy computed tomography (DECT). These authors observed that tendon involvement is 10.8%, and the most affected tendon was the Achilles, followed by the peroneus one, the anterior tibialis tendon, and, finally, the extensor and flexor tendons in the foot. The presence of MSU crystal deposits in the body of the tendon and enthesis together was more frequently observed than that on each one isolated.[13] Tendons play an important role in affording stability, and they contribute to movement; to date, the impact of MSU crystals on tendon function is unknown.[13] It has been demonstrated, in an animal model, that MSU crystals exert an inhibitory effect on matrix metalloprotease enzyme genes (Mmp2, Mmp3, and Mmp13), collagen production, and tenocyte viability because these crystals induce tenocyte apoptosis.[14] It has been postulated that the disruption in tendon structure by the crystals limits tendon self-repair by diminishing collagen production and, on the other hand, by promoting its degradation by the catabolic enzymes produced by the inflammatory cells surrounding the crystals.[15,16] The importance of the detection of tendon involvement in gout remains in that it could condition tendon spontaneous rupture as previously described in the literature.[17-20] US is the best imaging technique to evaluate tendons: several studies have demonstrated its usefulness in diagnosing gout and its reproducibility.[21-24] The objective of the present study was to evaluate, by US, the prevalence of tendon involvement in the quadriceps, patellar, peroneus, and Achilles tendons in gout with serum uric level between 5.5 - 9 mg/dl.

METHODS

This is a non Randomised Prospective study carried out at Index medical college hospital and research center Indore and Global SNG Hospital Indore from Dec 2015 to May 2018. This is a descriptive study comprising 108 patients with diagnosis of gout according to the American College of Rheumatology (ACR) criteria fulfills the entry criterion (at least one episode of swelling, pain, or tenderness in a peripheral joint) and with serum uric acid level between 5.5 - 9 mg/dl.[25]

All patients who were presented in out patient department with single or multiple joint involment with or without previous history of joint pain with serum uric acid level between 5.5 -9 mg/dl were included in this study. Written informed consent was obtained from all participants prior to inclusion in the study. Demographics and clinical characteristics, such as age, gender, comorbidity, disease duration, pain at the enthesis in the knee or ankle, frequency of disease exacerbations, uric acid level between 5.5 - 9 mg/dl at time of evaluation, and kind of treatment, were evaluated by one of the member of consultant team. Co-morbidity like uncontrolled diabetes mellitus, cancer, chronic alcoholic, neurologic diseases were excluded. All patients include in this study were sent to ultrasound (US) examination. US examination included the quadriceps tendons, the patellar Tendon, peroneus tendon and the Achilles tendon. All tendons were evaluated bilaterally according to the EULAR guidelines for performing US in rheumatology.[26] Ultrasound machines of different center were Used. US elementary lesion evaluation comprised the intra-tendinous tophus, defined as an inhomogeneous, circumscribed, hyperechoic and /or hypoechoic aggregate, which may or may not generate posterior acoustic shadowing and which can be surrounded by a small anechoic halo.[27] After US, patient evaluated again for all parameter and treated by antiinflamatory (colchicin, Indomethacin, Diclofanec sodium), Febuxostate, rest etc. All patients were regularly followed upto complite clinical remision of symptoms and at every month with repeat serum uric acid test till it become normal.

RESULTS

We included the patients aged between 20 - 60 year but the majority of the patients were from the age group of 28 -45 year. The youngest patient was 22 years of age and the oldest patient was 60 years. In this study male patients was 86 (79.63%) and 22 (20.37%) patient were female. In this study 108 patients with serum uric acid level between 5.5 -9.0 mg/dl with age from 20 yr to 60 yr were included. Uric acid level between 7 - 9 mg/dl found in 68.48% and it was in age between 30yr – 45 yr of age. 73 patiens (67.59%) had pain at enthesis for at least once before inclusion in the study. 29 patients (26.85%) had history of serum uric acid more than 7 mg/dl and history of joint pain.

Tendon involvement in our study is presented in Table.

Intra-tendinous tophi and hyperechoic aggregates were the most frequent lesions at the tendon in US examinations. In our study Patellar tendon is the most freqently involved tendon followed by quadriceps, achilles and peroneus tendon**.** In this study isolated patellar tendon involved in 9 patients, both patellar tendon and quadriceps tendon in 5 patients, both patellar and Achilles tendon involved in 5 patients.

Table 1: Clinical demographic results of patients with gout.

	Number of patients (%)
Gender	
Male	86 (79.63)
Female	22 (20.37)
Pain in (at least one) enthesis site	73 (67.59)
Previously diagnosed high uric acid (7 mg/dl and above)	29 (26.85)
US signal changes in Tendon involvement:-	
Isolated quadriceps tendon	7 (6.48)
Isolated patellar tendon	9 (8.33)
Isolated Achilles tendon	4 (3.70)
Isolated peroneus tendon	3 (2.78)
Both quadriceps and patellar tendon	5 (4.62)
Both quadriceps and Achilles tendon	6 (5.56)
Both patellar and Achilles tendon	5 (4.62)
Total	39 / 108 (36.11)

DISCUSSION

Tendon involvement in patients with gout is frequent, as has been shown in this study and other recently published data.[7,12,22] A single study has evaluated, by means of US, the presence of tophi in different regions in order to demonstrate localization and a characteristic pattern to differentiate tendon involvement from tophi.[12] However, in that study, the study sample was too small and did not have an US definition for tophi, in terms of how these are known at present.[12,28,29] Tendon involvement, in gout, has been evaluated systematically by US and DECT in a few studies.[12,13] In our study, the most frequent affected tendon was the patellar tendon, followed by quadriceps, achilles tendon, similar to the reported by Peiteado et al.[8] Also, in the data of the study of Naredo et al, patellar tendon together with triceps had high specificity and predictive positive value to diagnosis gout so they propose Prevalence of intra-tendinous aggregates and tophi in gout Tendon involvement in patients with gout. Ventura-Ríos et al observed that the prevalence of intratendinous tophi and hyperechoic aggregates in all affected tendons was significantly higher in the gout group than in osteoarthritis. Around half of our patients exhibited tophi and hyperechoic aggregates at the Achilles tendon, similar to those detected by DECT in the foot.[13] as in other studies, because this elementary lesion is not exclusive to gout.[22] In this study male patients was four fold than female patients. Other study also shows that It occurs in men 2-6 fold more than women. The general prevalence of gout is 1-4% of the general population. Worldwide incidence of gout increases gradually due to poor dietary habits such as fast foods, lack of exercises, increased incidence of obesity and metabolic syndrome.[2] In our study patient with high uric acid 67.59 percent had at least one episodes of enthesis pain. MSU crystal deposition in tendons is a frequent manifestation of extra-articular gout, more frequently affecting the Achilles, patellar, peroneal, and the flexor and extensor tendons in the hand.[9-11] Microcrystalline deposits may be localizing in the body of the tendon, around, or even at the enthesis, frequently in more than one location.[12]

CONCLUSION

Tendon involvement in the lower limbs in gout is very frequent, particularly at the patellar tendon, Quadriceps tendon and Achilles tendon. Ultrasound is a good noninvasive procedure to detect the intratendinous topus. Patients with high uric acid level and pain in enthesis site, US can detect tophus deposion in early stage.

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