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ASSOCIATION BETWEEN TOPHUS INVOLVEMENT OF TENDON AND SERUM URIC ACID LEVELS?

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ABSTRACT

Background: The balance between the rate of uric acid renal excretion and the breakdown of purines can be represented by the estimation of serum urate (SU) concentration. The solubility threshold for serum urate is approximately 7 mg/dL when its concentration raised above threshold levels, then oversaturation is seen in interstitial fluids. **Material & Methods**: In the present study 100 Patients with the diagnosis of gout according to the American College of Rheumatology (ACR) criteria and qualifying the entry criterion of serum uric acid levels between 5.5 - 9 mg/dl along with one or more episode of pain, swelling, or tenderness at peripheral joint were enrolled for the study. **Results:** Uric acid level between 7 - 9 mg/dl found in 68%, and it was in age between 21yr – 45 years of age. 27% of patients had a history of serum uric acid more than 7 mg/dl and a previous history of joint pain. The patellar tendon is the most frequently involved tendon which is followed by quadriceps tendon, Achilles tendon, and peroneus tendon**.** In this study involvement of isolated patellar tendon seen in 8 patients, the involvement of isolated quadriceps tendon seen in 7 patients, isolated Achilles tendon in 4 patients. Both quadriceps tendon and Achilles tendon involved in 7 patients. **Conclusion:** Ultrasound imaging found to be right noninvasive imaging procedure to detect the intra-tendinous tophus. Patients with hyperuricemia and pain in enthesis site, Ultrasound can detect monosodium urate crystals deposition in the early stage.

Keywords: Tophus, Tendon, Ultrasound, Uric acid.

INTRODUCTION:

The balance between the rate of uric acid renal excretion and the breakdown of purines can be represented by the estimation of serum urate (SU) concentration. The solubility threshold for serum urate is approximately 7 mg/dL when its concentration raised above threshold levels, then oversaturation is seen in interstitial fluids **(1)**. As a result of this, the chances of monosodium urate crystals (MSU deposition in tissues are increased. These monosodium urate crystals are clinically seen in tophi formation, gouty arthritis, urolithiasis and also in urate nephropathy. There has been evidence where the usefulness of urate-lowering drugs was well established in cases of hyperuricemia like urate nephropathy and gouty arthritis **(2)**. However, in asymptomatic hyperuricemic patients, the usefulness of urate-lowering drugs is debatable. There is also limited researches available regarding subclinical musculoskeletal involvement among asymptomatic hyperuricemic patients **(3)**.

The burden of hyperuricemia and gout patients has been increased during the last few decades among developed as well as developing countries. The association between gout and hyperuricemia with cardiovascular manifestations and outcomes and the benefits of early treatment measures have been studied and established recently **(4)**. The subclinical inflammation precedes the clinical manifestation of gout and MSU crystal deposition may represent a new approach in early intervention in hyperuricemia and gout. Serum urate levels above threshold in cases of long-standing hyperuricemia lead to nucleation and deposition of monosodium urate (MSU) crystals in tissues and around joints **(5)**.

The best imaging modality to diagnose the presence of monosodium urate crystals deposits in the tissues at early stages has not yet been proved. Although, the ultrasound (US) has been reported in various researches to be a valid imaging technique to detect musculoskeletal crystals deposits among patients with hyperuricemia and gout. The main ultrasonographic findings related to monosodium urate crystal deposition include hyperechoic spots within soft tissues and tendons and the presence of tophi and bone erosions. The double contour sign (hyperechoic enhancement) findings on USG represents the superficial margins of the hyaline cartilage **(6)**. Power Doppler (PD) also detects the increased blood flow around the MSU crystal deposits which indicates inflammatory activity. The aim of the present study to assess the tendon involvement of the patellar, quadriceps, peroneus, and Achilles in patients of gout with serum uric level-up to 9 mg/dl.

MATERIALS & METHODS

The present cross-sectional prospective study was conducted at Department of orthopedics of our tertiary care hospital. The study duration was of one year and eight months from January 2017 to August 2018. A sample size of 100 was calculated at 95% confidence interval at 10% acceptable margin of error by epi info software version 7.2. Patients attending to our tertiary care hospital with the clinical diagnosis of gout according to the criteria of American College of Rheumatology (ACR) of serum uric acid levels between 5.5 - 9 mg/dl along with one or more episode of pain, swelling, or tenderness at peripheral joint were enrolled for the study. Clearance from Institutional Ethics Committee was taken before the start of the study. Written informed consent was taken from each study participant. Patients who had co-morbidities like previously known, neurologic diseases, diagnosed and uncontrolled diabetes mellitus, chronic alcoholic patients and patients who had cancer were excluded from the study.

All the study participants were underwent for ultrasound (US) examination of the patellar tendon, quadriceps tendons, peroneus tendon, and Achilles tendon. All tendons were studied bilaterally as per EULAR guidelines for performing ultrasound examination in rheumatology. The ultrasound examination includes the inhomogeneous, hyperechoic or hypoechoic aggregate, circumscribed representing the intra-tendinous tophus, with or without posterior acoustic shadows and in some cases surrounded by a small anechoic halo **(7)**. All subjects were regularly followed up till complete clinical remission of all symptoms with monthly serum uric acid estimation until it became normal. Data analysis was carried out using SPSS v22. All tests were done at alpha (level significance) of 5%; means a significant association present if the p-value was less than 0.05.

RESULTS

In the present study, among the total100 patients who were aged between 20 - 64 year but the majority of the patients were from the age group of 21 -45 year. The youngest patient in the present study was of 21 years of age, and the oldest patient was 64 years of age. In the present study male patients were 79% and 21% of patients were female. In this study, out of 100 patients with serum uric acid level between 5.5 -9.0 mg/dl with age from 20 years to 64 years were included. Among 68% of patients, uric acid levels were found between 7 - 9 mg/dl and the patients were in the age group of 21yr – 45 years. 68% of patients represents pain at enthesis for minimum one time/episode before enrolled in the study. 27% of patients had previous history of serum uric acid levels more than 7 mg/dl along with a history of joint pain. (Table 1)

Table 1: Distribution of study participants according to age and gender

Parameters		No. of patients (%)
Gender	Male	79
	Female	21
Pain in (at least one) enthesis site		68
Previously diagnosed high uric acid (7 mg/dl and above)		27

Intra-tendinous tophi deposition and hyperechoic aggregates findings on USG examination were the most prevalent findings at the tendon site in the present study. In our study, the most frequently involved tendon was Patellar tendon which was followed by quadriceps tendon and Achilles tendon followed by peroneus tendon**.** In this study involvement of isolated patellar tendon seen in 8 patients, involvement of isolated quadriceps tendon seen in 7 patients, isolated Achilles tendon in 4 patients followed by involvement of isolated peroneus tendon seen in 3 patients however both the patellar tendon and quadriceps tendon were involved in 6 patients and similarly both the patellar and Achilles tendon in 6 patients. Both quadriceps tendon and Achilles tendon involved in 7 patients. (Table 2)

Table 2: Distribution according to full weight bearing (in weeks) according to the procedure.

US signal changes in Tendon involvement	No. of patients (%)
Isolated quadriceps tendon	7
Isolated patellar tendon	8
Isolated Achilles tendon	4
Isolated peroneus tendon	3
Both quadriceps and patellar tendon	6
Both quadriceps and Achilles tendon	7
Both patellar and Achilles tendon	6
Total	41%

DISCUSSION

Monosodium urate crystals deposition in various tendons in patients with gout is seen frequently among patients as has been shown in previous studies **(8)**. In the present study, among the total 100 patients who were aged between 20 - 64 year but the majority of the patients were from the age group of 21 -45 year. The youngest patient in the present study was of 21 years of age, and the oldest patient was 64 years of age. In the present study male patients were 79% and 21% of patients were female. In this study, out of 100 patients with serum uric acid level between 5.5 -9.0 mg/dl with age from 20 years to 64 years were included. Among 68% of patients, uric acid levels were found between 7 - 9 mg/dl and the patients were in the age group of 21yr – 45 years. 68% of patients represents pain at enthesis for minimum one time/episode before enrolled in the study. 27% of patients had a previous history of serum uric acid levels more than 7 mg/dl along with a history of joint pain. A study conducted by Eloy D et al. among 31 patients has evaluated 138 affected areas by US examination found that the presence of tophi in different tendons in order to demonstrate characteristic pattern and localization and to differentiate monosodium urate crystals deposition **(9)**. A study conducted by Terslev L et al. for assessment of tophi involvement among in Gout by Ultrasound examination and found that the US has high reliability for tophus and erosions, but moderate reliability for aggregates detection, however, the study sample size was too small **(10)**. Another study conducted by Dalbeth N et al. among gout patients assessing tendon involvement of feet and found monosodium urate crystals deposition among patients of tophaceous gout results from biomechanical strain and various local factors which contributes to the deposition of MSU crystals **(11)**.

In the present study, intra-tendinous deposition and hyperechoic aggregates findings on USG examination were the most prevalent findings at the tendon site in the present study. In our study, the most frequently involved tendon was Patellar tendon which was followed by quadriceps tendon and Achilles tendon followed by peroneus tendon**.** In this study involvement of isolated patellar tendon seen in 8

patients, involvement of isolated quadriceps tendon seen in 7 patients, isolated Achilles tendon in 4 patients followed by involvement of isolated peroneus tendon seen in 3 patients however both the patellar tendon and quadriceps tendon were involved in 6 patients Both quadriceps tendon and Achilles tendon involved in 7 patients. A similar study conducted by Peiteado et al. reported that ultrasound examination of 4 joints for two elemental lesions (the double contour sign and hyperechoic cloudy areas) is reliable, feasible and has content validity in diagnosis for detection the monosodium urate crystals deposition among gout patients **(12)**.

A similar study conducted by Weinger et al. reported that monosodium urate crystals deposition found predominantly among extensor tendons of the fingers and flexor tendons of the palm and wrist. Involvement of flexor tendon was reported less common in their study **(13)**. A study conducted by Terslev L et al for assessment of tophi involvement among in Gout by Ultrasound examination and found that reliability of the imaging was ranged from moderate to good in static images and found lower in comparison among patients, which represents that a standardized imaging technique should be needed, before diagnosing the monosodium urate crystals deposition among gout patients **(14)**.

CONCLUSION

We concluded from the present study that tendon involvement in the lower limbs in gout patients was very frequent, and the most common tendon involved was the patellar tendon followed by Quadriceps and Achilles. Ultrasound imaging found to be an excellent noninvasive imaging procedure to detect the intra-tendinous tophus. Patients with hyperuricemia and pain in enthesis site, Ultrasound can detect monosodium urate crystals deposition in the early stage.

REFERENCES

1. Maiuolo J, Oppedisano F, Gratteri S, Muscoli C, Mollace V. Regulation of uric acid metabolism and excretion. Int J Cardiol. 2016 Jun 15;213:8–14.
2. Martillo MA, Nazzal L, Crittenden DB. The crystallization of monosodium urate. Curr Rheumatol Rep. 2014 Feb;16(2):400.
3. Pasalic D, Marinkovic N, Feher-Turkovic L. Uric acid as one of the important factors in multifactorial disorders--facts and controversies. Biochem medica. 2012;22(1):63–75.
4. Kuo C-F, Grainge MJ, Zhang W, Doherty M. Global epidemiology of gout: prevalence, incidence and risk factors. Nat Rev Rheumatol. 2015 Nov 7;11(11):649–62.
5. Stewart S, Dalbeth N, Vandal AC, Rome K. Characteristics of the first metatarsophalangeal joint in gout and asymptomatic hyperuricaemia: a cross-sectional observational study. J Foot Ankle Res. 2015;8:41.
6. Chowalloor PV, Siew TK, Keen HI. Imaging in gout: A review of the recent developments. Ther Adv Musculoskelet Dis. 2014 Aug;6(4):131–43.
7. Gutierrez M, Schmidt WA, Thiele RG, Keen HI, Kaeley GS, Naredo E, et al. International Consensus for ultrasound lesions in gout: results of Delphi process and web-reliability exercise. Rheumatology. 2015 Oct;54(10): 1797–805.
8. Naredo E, Uson J, Jiménez-Palop M, Martínez A, Vicente E, Brito E, et al. Ultrasound-detected musculoskeletal urate crystal deposition: which joints and what findings should be assessed for diagnosing gout? Ann Rheum Dis. 2014 Aug;73(8):1522–8.
9. de Ávila Fernandes E, Sandim GB, Mitraud SA V, Kubota ES, Ferrari AJL, Fernandes ARC. Sonographic description and classification of tendinous involvement in relation to tophi in chronic tophaceous gout. Insights Imaging. 2010 Jul;1(3):143–8.
10. Terslev L, Gutierrez M, Christensen R, Balint P V., Bruyn GA, Delle Sedie A, et al. Assessing Elementary Lesions in Gout by Ultrasound: Results of an OMERACT Patient-based

Agreement and Reliability Exercise. J Rheumatol. 2015 Nov;42(11):2149–54.

11. Dalbeth N, Kalluru R, Aati O, Horne A, Doyle AJ, McQueen FM. Tendon involvement in the feet of patients with gout: a dual-energy CT study. Ann Rheum Dis. 2013 Sep 1;72(9):1545–8.

12. Peiteado D, De Miguel E, Villalba A, Ordóñez MC, Castillo C, Martín-Mola E. Value of a short four-joint ultrasound test for gout diagnosis: a pilot study. Clin Exp Rheumatol.;30(6):830–7.

13. Weniger FG, Davison SP, Risin M, Salyapongse AN, Manders EK. Gouty flexor tenosynovitis of the digits: report of three cases. J Hand Surg Am. 2003 Jul;28(4):669–72.

14. Terslev L, Gutierrez M, Schmidt WA, Keen HI, Filippucci E, Kane D, et al. Ultrasound as an Outcome Measure in Gout. A Validation Process by the OMERACT Ultrasound Working Group. J Rheumatol. 2015 Nov;42(11):2177–81.

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