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Foot Disorders in Rheumatology Practice; Clinical, Ultrasonographic And Electrophysiological Study

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ABSTRACT

Background: Foot disorders are highly prevalent and a significant source of disability in patients with rheumatic diseases, yet they are often under-evaluated in routine rheumatology practice. A comprehensive assessment combining clinical, imaging, and electrophysiological tools is essential for accurate diagnosis and management.
Aim: To detect different aspects of foot involvement in rheumatic disease and to detect the effect of foot involvement on disease activity and disability.
Patients and methods: A cross-sectional study was conducted on 50 patients (25 with RA and 25 with Gout), were recruited from the outpatient clinic of rheumatology and rehabilitation department of Minia university hospital between February 2023 and September 2023 for foot examination.
Results: Foot pain was reported by 52% of RA and 60% of Gout patients. RA patients showed more widespread joint involvement, higher disability scores (MHAQ: 1.12±0.66), and a greater prevalence of structural deformities (44%) and peripheral neuropathy (36%). Gout patients had predominant involvement of the 1st metatarsophalangeal (MTP) joint, with 48% showing erosions on MSUS, and lower overall disability (MHAQ: 0.57±0.73).
Conclusion: Foot involvement is common in both RA and Gout, but with distinct patterns. RA is associated with more generalized involvement and higher disability, while Gout predominantly affects the 1st MTP joint. A multimodal assessment is crucial for characterizing foot pathology in rheumatic diseases.

KEYWORDS: Foot disorders, Rheumatoid Arthritis, Gout, ultrasonographic study, electrophysiological study.

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INTRODUCTION

Foot problems are extremely common in the rheumatology population. Even in the general population, between 20% and 24% of all adults will have had foot pain in the past month and some 60% will have had an episode of foot pain in the past 6 months [1]. The prevalence of foot problems increases steadily with age and is gender-biased, being five times higher in females than males [2].

A recent rheumatology out-patient clinic survey identified foot problems in 89% of rheumatology patients. Furthermore, 60% of these patients did not have adequate access to foot care services.

Despite its high prevalence in rheumatology patients, foot pathology is often trivialized, especially when co-existing with other musculoskeletal morbidity, such as knee or hip pain [3]. This is despite ample evidence that foot pain, either alone or as comorbidity, contributes significantly to disability [4].

Problems in the foot may be either primary, for example those arising directly from joint/soft tissue disease, or may be secondary to foot deformity, which leads indirectly to an increase in the prevalence of associated conditions. Plantar callosities occur in 66% of people with musculoskeletal/connective tissue disease, digital corns/callus in 24% and ulcerations in 17%.

Expertise in dealing with foot problems is often limited among rheumatologists, and it has been argued recently that better integration of foot health services into rheumatology would be beneficial [5].

Foot problems associated with inflammatory arthritis are common, particularly in Rheumatoid arthritis (RA). Other inflammatory arthritis conditions such as gout, spondyloarthritis (Spa) and psoriatic arthritis (PA) also affect the foot [6].

Evaluation mainstays of the foot in rheumatology clinic include; clinical, electrophysiological and imaging techniques (MSUS) [7].

Musculoskeletal ultrasound (MSUS) is an attractive method of imaging because of its low cost, absence of harmful radiation, and rapidity of imaging. Compared with standard radiography, ultrasonography (US) is shown to be superior at detecting joint erosions early in the course of the disease. In addition, it can study tendon and nervous involvement, which often accompanies and, in some cases, precedes the evidence of the disease at the joint level [8].

Our study aimed to detect different aspects of foot involvement in rheumatic disease and to detect the effect of foot involvement on disease activity and disability.

PATIENTS AND METHODS

The present study included 50 patients with rheumatic diseases (Rheumatoid arthritis and Gouty arthritis (diagnosed according to ACR & EULAR criteria) 25 patients each, were recruited from the outpatient clinic of rheumatology and rehabilitation department of Minia university hospital between February 2023 and September 2023 for foot examination. Each inflammatory arthritic condition was based upon medical records documented in rheumatology clinic, Minia university hospital.

Inclusion criteria:
Participants diagnosed with rheumatic disease (Rheumatoid arthritis, Gouty arthritis) were eligible if they were over 18 years old with or without current foot complaint.

Exclusion criteria:
Patients were excluded if they had foot pain due to: L5 and S1 radiculopathies, space occupying lesions at the tarsal tunnel, foot trauma and fractures, congenital or post-traumatic foot deformity, varicose veins and deep venous thrombosis or lower limb edema, systemic or local diseases other than rheumatic diseases and upper motor neuron lesions or lesions affecting any part of the lower motor neuron pathway other than the peripheral nerves (saphenous neuropathy, sciatic neuropathy and proximal affection of tibial, and common peroneal nerves).

METHODS:

All Patients were subjected to: History taking: Personal history, rheumatological symptoms and past history, **examination of both feet and ankle** was carried out for all patients: **neurological:** muscular weakness, muscular waste, pinprick and tinel sign, and **locomotor**: of metatarsophalangeal, subtalar, midtarsal and ankle joints.

Assessment of disease activity according to the Rheumatic disease:
Rheumatoid arthritis Disease Activity Score (DAS 28): DAS 28 is a continuous measure of RA disease activity. It assess 28 joints and 28 tender joint count (range, 0–28), 28 swollen joint count (range, 0–28), ESR, and patient global assessment on a visual analog scale (range, 0–100). The DAS28 measures the overall disease activity on a scale of 0–10. Its value can also be used to classify patients according to their response to treatment: a change of at least 0.6 is usually considered as response.
Assessment of functional disability was performed using the **Modified Health Assessment Questionnaire (MHAQ)** a physical function status questionnaire used in the evaluation of a variety of rheumatic diseases. Assessment of foot function was carried out using the **Swindon Foot and Ankle Questionnaire (SFAQ)** is a simply worded 10-point foot-and-ankle screening questionnaire.

Investigations:
Laboratory: Erythrocyte sedimentation rate **(ESR)**, C-reactive protein **(CRP),** Complete Blood Count **(CBC)** (WBS, Platelets, Hemoglobin), **Rheumatoid factor** (rose waaler test), **Anticcp** (ELIZA) for Rheumatoid arthritis patients and serum **uric acid** for Gout arthritis patients.

Imaging:
Plain X-ray joints on both feet: using **the SENS (simple erosion narrowing score) method** by summing the number of eroded and narrowed joints on selected joints (MTPs and 1st IP) on foot radiographs, whereas an erosion is absent (score of 0) or present (score of 1) and joint space narrowing is absent (score of 0) or present (score of 1) with maximum score 24. The SENS showed a good intra- and inter-reader reliability and is sensitive to change. Joint erosions and JSN are scored in 12 joints (2 first interphalangeal joints and 10 metatarsophalangeal joints) in the feet.

Musculoskeletal ultrasound testing: Assessment of bilateral ankle and MTP joints by systematic multiplanar, bilateral and dynamic gray-scale US and Power Doppler ultrasound (PDUS) for evaluation of synovitis and power Doppler signals.

Ultrasound protocol and patient position:
All US scans were performed using Siemens ACUSON P300 Ultrasound System (Siemens Healthcare, Boulevard, Malvern, USA) multi-frequency 10-18 MHz linear transducer for high detail resolution of superficial structures using the 18 MHz.The foot is positioned flat on a bed with the knee flexed. With the ankle not over flexed it may be difficult to visualize the ankle and to maintain contact of the transducer on the skin. The anterior longitudinal midline scan was applied for detecting synovitis.

Electrophysiological testing: All neurophysiological and electromyographic studies were done using Neuropack S1, MEB-9400K, 4 channels EMG/EP Measuring System, Nihon Kohden, Japan. Nerve conduction (motor and sensory) studies were done on bilateral tibial, deep peroneal, superficial peroneal, and sural nerves.

Ethical considerations

The nature of the present study was explained to all patients. The clinical examination, nerve conduction studies and ultrasound imaging represent standard care and pose no ethical conflicts. A consent was obtained from all patients.

RESULTS

Table 1 Foot complaints in RA are notably prevalent, with 52% reporting foot pain primarily involving the forefoot and ankle. Arthralgia is reported frequently, particularly in the forefoot (36%) and ankle (36%) and least in midfoot (16%). Neurological complaints such as paresthesia are present in 28% of cases. Clinical examination findings closely mirror these complaints. Arthralgia and arthritis are most commonly identified in the forefoot (up to 36% and 24%, respectively) and least in midfoot (16%). Enthesitis and tendonitis are also observed, with Achilles tendon involvement seen in up to 16% of patients, and tibialis posterior tendonitis in 12%. Neurological assessment reveals sensory abnormalities such as paresthesia (20%) and positive Tinel's sign (16%). Range of motion is limited more in the forefoot (24%) and ankle (20%) and less in midfoot (12%).

In our **Rheumatoid arthritis** cohort (N=25), foot function averaged 3.48 ± 2.58 on the SFAQ (range 0–8), reflecting mild to moderate impairment. Overall disability by MHAQ was 1.12 ± 0.66 (range 0–2.4), with 40% of patients classified as mildly disabled, 32% moderate, and 8% severe. Structural deformities were common: 44% had toe deformities (20% hallux valgus more evident than others) and less common in varus subtalar deformity (4%) (table 2).

Table 3 shows that in the **Rheumatoid arthritis** group, erosions were seen in 40% of metatarsophalangeal (MTP) joints and 16% of ankle joints. Joint space narrowing affected 52% of MTP joints and 32% of ankle joints. The mean SENS score was 5.56 ± 7.08, with individual scores ranging from 0 to 21.

Table 4 shows that sonographic examination was performed on the metatarsophalangeal (MTP) joints and ankles identifying synovitis and erosions in all **Rheumatoid arthritis** patients included in the study. The first MTP joint was the most commonly affected, with synovitis and erosions present in 10 of 25 patients (40 %) and least in 4th MTP (8%, 0% respectively). It was followed by the ankle (24 %). Synovitis and power doppler are summoned in MSUS GLOESS score, higher grades were scored in 1stMTPs and less in 4th MTP in GLOESS score. Enthesitis and tendonitis were also commonly detected, particularly involving more in the Achilles tendon and tibialis posterior, each in 20% of patients and less in extensor tendons (4%).

Peripheral neuropathy was a notable extra-articular manifestation in this **Rheumatoid arthritis** cohort, affecting over one-third of patients (36%). The most common pattern was entrapment neuropathy, observed in nearly a quarter of cases, less frequent were generalized neuropathies sensory alone in 4% and mixed motor–sensory in 8%. Absent mononeuritis multiplex in all RA patients (table 5).

Table 6 shows that sixty percent of Gout patients reported foot pain, with 48% noting forefoot discomfort (the most evident region) and 16% hindfoot (least common region). On examination, 32% of patients had forefoot arthritis which was more obvious than others. Enthesitis affected mainly in 16% at the Achilles tendon more plantar fascia (8%), Tendonitis was more prevalent in the tibialis posterior and peroneal tendons, each affecting 8% of patients, compared to other tendons. Neurologic findings were minimal, with no reported sensory complaints but a positive Tinel's sign in 8%; range-of-motion restriction was seen more in forefeet (12%) and none in midfoot.

In our **Gout** cohort (N=25), foot-specific functional limitations were modest: the mean SFAQ score was 3.00 ± 3.01 (range 0–9), indicating mild to moderate functional impairment across patients. Functional disability, assessed by the MHAQ, averaged 0.57 ± 0.73 with scores ranging from 0 to 2.4. Most patients fell below the mild-disability threshold (>1.3), but 6 (24%) experienced mild disability, 4 (16%) moderate (1.3–1.8), and 1 (4%) severe (>1.8). Structural deformities were relatively uncommon beyond the toes: 5 patients (20%) had toe deformities, predominantly hallux valgus (12%) and hallux rigidus (4%), while none exhibited claw toe, mallet toe, splay toe, midfoot (arch) deformities, subtalar varus/valgus changes, or ankle deformities (table 7).

Table 8 shows that in the Gout cohort, Erosions were found in 48% of MTP joints, compared to just 8% of ankle joints. Joint space narrowing affected 36% of MTP joints and 20% of ankles. The mean SENS score was 3.52 ± 5.03 (range 0–13).

Table 9 shows that in this Gout cohort (N = 25), First MTP: nearly half of patients (12/25; 48 %) had gray-scale synovitis, and just over half (13/25; 52 %) showed erosions, underscoring a classic "podagra" distribution followed by ankle (synovitis in 6/25 (24 %), erosions in 4/25 (16 %)). Other MTPs were less involved. For enthesitis, the Achilles tendon was affected in 5/25 (20%), with plantar fasciitis in 3/25 (12%). Additionally, MSUS identified tendonitis in the peroneal tendons in 4 of 25 patients (16%), compared to 2 of 25 (8%) in the tibialis posterior, with all other tendon sites showing even lower frequencies.

Peripheral neuropathy was rare in this Gout cohort, affecting only 1 of 25 patients (4%), and it presented solely as an entrapment neuropathy. No cases of symmetric sensory or mixed motor–sensory polyneuropathy, nor mononeuritis multiplex, were observed (table 10).

Table 1: Foot Complaint and clinical examination in Rheumatoid arthritis patients:

Rheumatoid arthritis (N=25)					
Foot complaint			**Foot examination**		
Foot pain	13 (52%)		**Arthralgia**	**Forefoot**	9(36%)
Arthralgia	**Forefoot**	9 (36%)		**Midfoot**	4(16%)
	Midfoot	4 (16%)		**Hindfoot**	6(24%)
	Hindfoot	6(24%)		**Ankle**	8(32%)
	Ankle	9(36%)	**Arthritis**	**Forefoot**	6(24%)
Arthritis	**Forefoot**	8(32%)		**Midfoot**	4(16%)
	Midfoot	4(16%)		**Ankle**	5(20%)
	Ankle	7(28%)	**Enthesitis**	**Achilli's tendonitis**	3(12%)
Enthesitis	**Achilli's tendonitis**	4(16%)		**Planter fasciitis**	4(16%)
	Planter fasciitis	5(20%)	**Tendonitis**	**Tibialis posterior**	3(12%)
Neurological Complaint	7(28%)			**Peroneal**	2(8%)
Limitation in range of motion	**Forefoot**	6(24%)		**Tibialis anterior**	2(8%)
	Midfoot	0(0%)		**Extensor halluces longus**	1(4%)
	Hindfoot	5(20%)		**Extensor digitorum longus**	0(0%)
	Ankle	5(20%)	**Limitation in range of motion**	**Forefoot**	6(24%)
Skin lesion	**Ulcer**	2(8%)		**Midfoot**	2(8%)
	Raynaud's	1(4%)		**Hindfoot**	4(16%)
Foot deformity	11(44%)			**Ankle**	5(20%)
			Neurological examination	**Weakness**	1(4%)
				Wasting	1(4%)
				Sensation (Paresthesia)	5(20%)
				Tinel sign	4(16%)
			Skin examination	**Ulcers**	2(8%)
				Raynaud's	1(4%)

Table 2: SFAQ questionnaire, MHAQ questionnaire and foot deformity in Rheumatoid arthritis patients:

Rheumatoid arthritis (N=25)	
SFAQ	
Range (0-10)	0-8
Mean ±SD	3.48± 2.58
MHAQ	
Mean ±SD	1.12±0.66
Range (0 - >1.8)	0-2.4
Mild (>1.3)	10(40%)
Moderate (1.3-1.8)	8(32%)

Severe (>1.8)	2(8%)
Foot deformity	
Toe deformity	11(44%)
Hallux valgus	5(20%)
Hallux rigidus	3(12%)
Claw toe	3(12%)
Mallet toe	2(8%)
Splay toe	0(0%)
Charcot joint	0(0%)
Midfoot (Arch deformity)	6(24%)
Subtalar (Varus deformity)	1(4%)
Subtalar (Valgus deformity)	3(12%)
Ankle deformity	5(20%)

SFAQ: Swindon foot and ankle questionnaire, **MHAQ:** modified health assessment questionnaire

Table 3: X-ray findings in Rheumatoid arthritis patients:

Rheumatoid arthritis(N=25)		
Erosion	**MTPs**	10(40%)
	Ankle	4(16%)
Joint space narrowing	**MTPs**	13(52%)
	Ankle	8(32%)
SENS Score	**Mean ±SD**	5.56±7.08
	Range (0-24)	0-21

MTP, Metatarsophalangeal, **SENS**, simple erosion narrowing score

Table 4: Foot Musculoskeletal ultrasonographic study in Rheumatoid arthritis patients:

Rheumatoid arthritis (N=25)						
MSUS joint examination		**MSUS GLOESS score**			**MSUS Enthesitis**	
Synovitis						
1st MTP	10(40%)	**1st MTP**	**G1**	5(20%)	**Achilles Tendonitis**	5(20%)
2nd MTP	6(24%)		**G2**	3(12%)	**Planter fasciitis**	4(16%)
3rd MTP	3(12%)		**G3**	2(8%)	**MSUS Tendonitis**	
4th MTP	2(8%)	**2nd MTP**	**G1**	2(8%)		
5th MTP	2(8%)		**G2**	4(16%)	**Tibialis Posterior**	5(20%)
Ankle	6(24%)		**G3**	0(0%)	**Peroneal tendons**	4(16%)
Power doppler		**3rd MTP**	**G1**	2(8%)	**Tibialis anterior**	3(12%)
1st MTP	4(16%)		**G2**	1(4%)	**Extensor halluces longus**	1(4%)
2nd MTP	3(12%)		**G3**	0(0%)	**Extensor digitorum longus**	1(4%)
3rd MTP	2(8%)	**4th MTP**	**G1**	2(8%)		
4th MTP	2(8%)		**G2**	0(0%)		

5th MTP	2(8%)		**G3**	0(0%)
Ankle	3(12%)	**5th MTP**	**G1**	1(4%)
Erosion			**G2**	1(4%)
1st MTP	10(40%)		**G3**	0(0%)
2nd MTP	4(16%)	**Ankle**	**G1**	1(4%)
3rd MTP	2(8%)		**G2**	4(16%)
4th MTP	0(0%)		**G3**	1(4%)
5th MTP	5(20%)			
Ankle	6(24%)			

MTP, Metatarsophalangeal joint, **GLOESS,** global OMERACT-EULAR score system, **G**, Grade, **MSUS,** Musculoskeletal ultrasound.

Table 5: Electrodiagnostic study and patterns in Rheumatoid arthritis patients:

Rheumatoid arthritis(N=25)	
Entrapment neuropathy	6(24%)
Symmetric sensory polyneuropathy	1(4%)
Symmetric mixed motor and sensory polyneuropathy	2(8%)
Mononeuritis multiplex	0(0%)
Total cases of peripheral neuropathy	9(36%)

Table 6: Foot Complaint and clinical examination in Gout patients:

Gout (N=25)					
Patients' complaint			**Foot examination**		
Foot pain	15(60%)		**Arthralgia**	**Forefoot**	11(44%)
Arthralgia	**Forefoot**	12(48%)		**Midfoot**	4(16%)
	Midfoot	6(24%)		**Hindfoot**	3(12%)
	Hindfoot	4(16%)		**Ankle**	5(20%)
	Ankle	6(24%)	**Arthritis**	**Forefoot**	8(32%)
Arthritis	**Forefoot**	7(28%)		**Midfoot**	1(4%)
	Midfoot	2(8%)		**Ankle**	3(12%)
	Ankle	4(16%)	**Enthesitis**	**Achilli's tendonitis**	4(16%)
Enthesitis	**Achilli's tendonitis**	5(20%)		**Planter fasciitis**	2(8%)
	Planter fasciitis	3(12%)	**Tendonitis**	**Tibialis posterior**	2(8%)
Neurological Complaint	0(0%)			**Peroneal**	2(8%)
Limitation in range of motion	**Forefoot**	4(16%)		**Tibialis anterior**	1(4%)
	Midfoot	0(0%)		**Extensor halluces longus**	1(4%)
	Hindfoot	1(4%)		**Extensor digitorum longus**	1(4%)
	Ankle	3(12%)	**Limitation in range of motion**	**forefoot**	3(12%)
Skin lesion	**Ulcer**	0(0%)		**Midfoot**	0(0%)
	Raynaud's	0(0%)		**Hindfoot**	1(4%)
Foot deformity	3(12%)			**Ankle**	2(8%)
			Neurological examination	**Weakness**	0(0%)
				Wasting	0(0%)
				Sensation	0(0%)

		(Paresthesia)	
		Tinel sign	**2(8%)**
	Skin examination	**Ulcers**	**0(0%)**
		Raynaud's	**0(0%)**

Table 7: SFAQ questionnaire, MHAQ questionnaire and foot deformity in Gout patients (N=25)

Measure / Deformity	Category / Type	Gout (N=25)
SFAQ	Range (0-10)	0 - 9
	Mean ± SD	3.00 ± 3.01
MHAQ	Mean ± SD	0.57 ± 0.73
	Range (0 - >1.8)	0 - 2.4
	Mild (>1.3)	6 (24%)
	Moderate (1.3-1.8)	4 (16%)
	Severe (>1.8)	1 (4%)
Foot Deformity	**Toe Deformity**	**5 (20%)**
	Hallux Valgus	3 (12%)
	Hallux Rigidus	1 (4%)
	Claw Toe	0 (0%)
	Mallet Toe	0 (0%)
	Splay Toe	0 (0%)
	Other Deformities	
	Charcot Joint	0 (0%)
	Midfoot (Arch Deformity)	0 (0%)
	Subtalar (Varus Deformity)	0 (0%)
	Subtalar (Valgus Deformity)	0 (0%)
	Ankle Deformity	0 (0%)

SFAQ: Swindon foot and ankle questionnaire, **MHAQ:** modified health assessment questionnaire

Table 8:X-ray findings of Gout patients:

Gout (N=25)		
Erosion	**MTPs**	12(48%)
	Ankle	2(8%)
Joint space narrowing	**MTPs**	9(36%)
	Ankle	5(20%)
SENS Score	**Mean ±SD**	3.52±5.03
	Range (0-24)	0-13

MTP, Metatarsophalangeal, **SENS,** simple erosion narrowing score.

Table 9: Foot Musculoskeletal ultrasonographic study in Gout patients:

Gout (N=25)						
MSUS joint examination		**MSUS GLOESS score**			**MSUS Enthesitis**	
Synovitis						
1st MTP	12(48%)	**1st MTP**	**G1**	4(16%)	**Achilles Tendonitis**	5(20%)

2nd MTP	3(12%)		**G2**	6(24%)	**Planter fasciitis**	3(12%)
3rd MTP	1(4%)		**G3**	2(8%)	**MSUS Tendonitis**	
4th MTP	0(0%)	**2nd MTP**	**G1**	1(4%)		
5th MTP	0(0%)		**G2**	1(4%)	**Tibialis Posterior**	2(8%)
Ankle	6(24%)		**G3**	1(4%)	**Peroneal tendons**	4(16%)
Power Doppler		**3rd MTP**	**G1**	0(0%)	**Tibialis anterior**	1(4%)
1st MTP	5(20%)		**G2**	1(4%)	**Extensor halluces longus**	0(0%)
2nd MTP	0(0%)		**G3**	0(0%)	**Extensor digitorum longus**	1(4%)
3rd MTP	0(0%)	**4th MTP**	**G1**	0(0%)		
4th MTP	0(0%)		**G2**	0(0%)		
5th MTP	0(0%)		**G3**	0(0%)		
Ankle	3(12%)	**5th MTP**	**G1**	0(0%)		
Erosion			**G2**	0(0%)		
1st MTP	13(52%)		**G3**	0(0%)		
2nd MTP	5(20%)	**Ankle**	**G1**	1(4%)		
3rd MTP	0(0%)		**G2**	3(12%)		
4th MTP	0(0%)		**G3**	2(8%)		
5th MTP	0(0%)					
Ankle	4(16%)					

MTP, Metatarsophalangeal joint**, GLOESS,** global OMERACT-EULAR score system**, G,** Grade, **MSUS,** Musculoskeletal ultrasound.

Table 10: Electrodiagnostic study and patterns in Gout patients:

Gout (N=25)	
Entrapment neuropathy	1(4%)
Symmetric sensory polyneuropathy	0(0%)
Symmetric mixed motor and sensory polyneuropathy	0(0%)
Mononeuritis multiplex	0(0%)
Total cases of peripheral neuropathy	1(4%)

DISCUSSION

Our findings on arthritis prevalence are consistent with known disease characteristics. The highest rates of both forefoot arthritis (32%) and ankle arthritis (28%) were observed in the RA group. This aligns with the understanding that RA classically and symmetrically affects the small joints of the forefoot. While the p-values for these findings (0.08 and 0.10, respectively) are not statistically significant, they do suggest a strong trend. The forefoot, particularly the MTP joints, is the most frequently affected area in RA, with some studies reporting involvement in up to 50% of patients and often as one of the first sites of disease onset. Ankle involvement is also common in RA, with recent research reporting a prevalence of 53.7% **[9].**

In gout, the first metatarsophalangeal (MTP) joint is a common target for monosodium urate crystal deposition, a condition famously known as podagra **[10].** While forefoot involvement is a classic feature of RA, it can also be the initial manifestation of the disease in a notable percentage of cases **[11].**

The presence of paresthesia was more common in RA (20%), which may be related to conditions like tarsal tunnel syndrome. This is a known complication of chronic inflammatory arthritis, where nerve entrapment can cause paresthesia and a positive Tinel sign **[12].**

In contrast, tendinopathy in RA is a common consequence of chronic synovitis. The prevalence of tibialis posterior tendonitis and peroneal tendonitis in RA is similar across different patient cohorts, reinforcing that these are reliable prevalence rates for tendon pathologies in RA **[13].**

These findings are consistent with recent research. **A 2024 study by Mohammed et al. [14]** reported that 31.6% of RA patients had foot deformities, and 23.3% had affected midtarsal joints. Similarly, a review by **Mann and Nunes [15]**emphasized that lesser toe deformities, such as mallet toes, are common, painful, and often disabling complications in RA.

Rheumatoid arthritis (RA) patients had the highest prevalence of joint space narrowing (JSN) in both the metatarsophalangeal (MTP) joints (52%) and ankles (32%). They also had a high rate of MTP erosions (40%). The mean simple erosion narrowing Score (SENS) was the highest at 5.56±7.08. MTP joints are often affected early in RA, with erosive changes in the feet sometimes appearing even before those in the hands **[16].**

Gout patients had the highest prevalence of MTP erosions (48%) and a high rate of MTP joint space narrowing (36%). Their mean SENS score (3.52±5.03) was the second highest, after RA. Radiographically, gout can be distinguished by specific features such as "punched out" erosions with sclerotic margins and overhanging edges **[17].**

Musculoskeletal ultrasound (MSUS) findings showed distinct patterns for gout and rheumatoid arthritis (RA), with statistically significant differences.

In our study, gout patients had the highest rates of MSUS synovitis (48%) and Power Doppler signal (20%) in the first metatarsophalangeal (MTP) joint. This directly correlates with the highest rate of erosion in this joint (52%), a finding that is statistically significant ($p<0.001$). These results are consistent with **a 2021 study by Silva et al. [18]** which found similar rates of synovial hypertrophy (47.4%) and bone erosion (33.3%) in gout patients. Our data for **gout** patients also showed a notable rate of **Achilles enthesitis** (20%) and **peroneal tenosynovitis** (16%). These findings are supported by a report from the 2024 EULAR congress, which found that ultrasound abnormalities, including tophi in joints and entheses, were prevalent in 72.2% of a 54-patient cohort **[19].** This indicates that enthesopathy is a common feature of gout.

Rheumatoid arthritis (RA) patients showed more widespread involvement across the MTP joints. While not the highest for the first MTP joint, RA had a high prevalence of synovitis (40%) and Power Doppler signal (16%) there and 24% of patients had ankle synovitis. Unlike gout, which has a predilection for the first MTP joint, RA frequently affects the MTP joints in a more generalized fashion **[20].**

Notably, Rheumatoid arthritis (RA) was the only group with significant erosion in the second MTP (16%) and fifth MTP (20%) joints and 40% prevalence of erosions in the first metatarsophalangeal (MTP) joint, a figure comparable to the 30% MTP synovitis reported in a study by **Ventura et al. [21]** on established RA.

CONCLUSION

In conclusion, this study underscores the high prevalence and significant impact of foot pathology in rheumatic patients, revealing distinct patterns between Rheumatoid Arthritis (RA) and Gout. RA is characterized by widespread joint involvement, greater structural deformity, and higher functional disability, often compounded by peripheral neuropathy. In contrast, Gout demonstrates a predilection for the first metatarsophalangeal joint, with notable erosive changes but less overall disability. These findings highlight that foot assessment should be an integral part of rheumatologic evaluation. The combined use of clinical, ultrasonographic, and electrophysiological tools provides a comprehensive approach for accurate diagnosis and management, ultimately aiming to improve patient mobility and quality of life.

LIMITATIONS

The primary limitation of this study is the **small sample size** (25 patients per disease cohort). While the data showed strong trends and some statistically significant findings, a larger cohort would be needed to confirm these results and reduce the risk of chance findings. The study's small size also means that some clinically relevant correlations, particularly those with smaller effect sizes, may have been missed.

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