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IMAGING FINDINGS OF COMMON MUSCULOSKELETAL DISORDERS: EXCERPT FROM A PAKISTANI TERTIARY CARE HOSPITAL

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Abstract

Background: Musculoskeletal disorders prevail commonly and affect a large number of people globally. They are major contributors to global disability and out-of-office workdays. The most common sites that undergo repeated stress and experience musculoskeletal problems are the wrist, elbow, and heel.

Objective: To determine the frequency of common musculoskeletal disorders like De Quervain's tenosynovitis, lateral epicondylitis, and plantar fasciitis.

Methods: This observational, cross-sectional study was conducted at a tertiary care hospital in Karachi, Pakistan. Patients of any gender, aged between 20 to 60 years, who presented to the orthopedic or radiology department and were diagnosed with either De Quervain's tenosynovitis, lateral epicondylitis, or plantar fasciitis were enrolled in the study. Clinically relevant diagnostic tests, such as the Cozen's test or the Finkelstein test, were performed. Findings from imaging tests, including X-ray, ultrasound, and MRI, were also recorded. Data collection was conducted using a study proforma.

Results: A total of 42 patients were enrolled in our study, with an equal distribution of male and female participants and a mean age of 43 ± 8.5 years. Among the 42 participants, 18 (42%) were diagnosed with De Quervain's tenosynovitis, 14 (33%) had lateral epicondylitis, and 10(23%) were diagnosed with plantar fasciitis. De Quervain's tenosynovitis predominantly affected females, while lateral epicondylitis was more common among males. The prevalence of these diagnoses was higher among patients aged 40 and above.

Conclusion: Musculoskeletal disorders like De Quervain's tenosynovitis, plantar fasciitis, and lateral epicondylitis are common conditions presented with varying imaging findings. Prompt and early

diagnosis of these diseases can lead to improved recovery, a reduced number of days missed from work, and preventing unnecessary burden on the healthcare system.

Key words: De Quervain's tenosynovitis, lateral epicondylitis, or plantar fasciitis, imaging

INTRODUCTION

Musculoskeletal disorders are a common group of disorders affecting over 1.71 billion people worldwide.[1] These disorders have emerged as the leading contributors to global disability. Musculoskeletal disorders result in decreased work efficiency of an individual as they limit mobility and dexterity, resulting in reduced well-being, early retirement, and loss of the ability to be an active member of society. The burden of such disorders has been rapidly increasing as the population increases and ages. The disability resulting from these disorders is expected to rise in the coming decades. The highest number of people affected by musculoskeletal conditions are found in high-income countries.[1] About 30% of all primary care office visits are due to musculoskeletal complaints.[2] Soft tissue musculoskeletal pain syndromes can occur independently or in conjugation with underlying systemic inflammatory diseases. Common sites that develop independent soft tissue pain syndromes include the head and neck, chest wall, shoulder, elbow, knee, hand, wrist, hip and pelvic girdle, and foot.[3] However, this study focuses on the three most common soft tissue musculoskeletal disorders of the wrist, elbow, and foot repeatedly presenting in a tertiary care hospital in Karachi, Pakistan. Population studies have shown that musculoskeletal pain of the hand has a prevalence of 9%-17%, whereas disorders of the elbow prevail in 8%-12% of the population.[4] About 10% of all adults are reported to have experienced significant foot and ankle pain, with the prevalence increasing with age.[5] De Quervain's tenosynovitis is an inflammatory condition of the sheath surrounding the two tendons which bring about movement of thumb, resulting from overuse of the tendon, specifically by repetitive movements at work or while playing a sport. The tendons are located between the wrist and the thumb, which may become very painful to movements after swelling. This condition is best diagnosed on clinical grounds by Finkelstein's test. The test is considered positive if pain at the base of the thumb is exacerbated while the thumb is placed in the palm and the wrist is bent towards the little finger.[6] Depending on the severity of the disease, de Quervain's can be resolved by rest, splinting, anti-inflammatory drugs, physiotherapy, steroid injections, and in worst cases, surgery.[6] Apart from the Finkelstein test, De Quervain's disease can be diagnosed by X-ray and MRI. Focal radial styloid abnormalities are a significant finding on radiographs.[7] Lateral epicondylitis is a medial and lateral elbow condition, commonly known as tennis elbow, and is considered a chronic tendinosis disorder.[3] The Extensor carpi radialis brevis muscle is the most commonly affected muscle. This condition is caused by overuse activities associated with occupation, athletics, or hobbies.[3] However, the societal impact is high considering the absenteeism from work and healthcare usage.[11,12] The majority of the cases of lateral epicondylitis are self-limiting and can be entirely resolved by avoiding aggravating activities. Physiotherapy and non-steroidal anti-inflammatory drugs are usually prescribed to shorten the duration of discomfort. Other treatment modalities include corticosteroid injections and, in severe cases, surgical modalities.[12,13] Plantar fasciitis is a common condition affecting at least one in 10 people.[14] In the US, it accounts for almost 1 million clinical visits.[15] It is a chronic degenerative process that affects the foot's dense, fibrous, collagenous connective tissue, originating at the calcaneus's medial tubercle.[16] In adults, plantar fasciitis is considered the most common cause of heel pain. It has a lifetime incidence of 10%, and a greater incidence has been reported in women of age 40-60 years.[17] The condition presents most commonly has heel pain with maximum severity in the initial few steps taken in the morning. It is characterized by sharp, intense pain, which is relieved upon resting. Plantar fasciitis is a result of repetitive injury to the plantar fascia; hence, people who work more standing on their feet, athletes, and military personnel are at the highest risk. Evidence of association of BMI >27 kg per m2 with this condition has also been reported.[18] Plantar fasciitis can be diagnosed on clinical grounds by taking a history of repetitive stress, pain patterns in the affected area, and clinical examination. Diagnosis is established in most cases by clinical examination; however, imaging may help rule out other foot pathologies. Radiology is not recommended for

diagnosing plantar fasciitis, whereas ultrasound and MRI have been found useful. Imaging is recommended when pain lasts more than three months and does not respond to therapy. Plantar fasciitis is effectively treated by a non-operative treatment which involves acidity modification, ice massage, NSAID, anti-inflammatory drugs, strengthening exercise, and heel padding.[15] De Quervain's tenosynovitis, lateral epicondylitis, and plantar fasciitis are commonly occurring painful conditions that contribute to increased absenteeism from work and decreased productivity, leading to economic losses and placing a burden on the healthcare system. Despite their prevalence, limited literature exists on these conditions. This study aims to examine the imaging findings of De Quervain's tenosynovitis, lateral epicondylitis, and plantar fasciitis, as well as the frequency of their occurrence in the outpatient department of a tertiary care hospital in Karachi, Pakistan. By identifying patterns in diagnostic modalities and facilitating early diagnosis, this research seeks to enhance recovery outcomes for these musculoskeletal conditions.

MATERIAL AND METHOD

This observational, cross-sectional study was conducted at one of the tertiary care hospitals in Karachi, Pakistan. Non-probability, convenience sampling was employed to recruit patients presenting to the orthopedic and radiology department of the hospital from August 2019 to January 2020. Institutional ethical approval was obtained, and informed consent was sought from the participants. Patients of either gender, of age between 20 to 60 years, who presented to the orthopedic or radiology department and diagnosed with either De Quervain's tenosynovitis, lateral epicondylitis, or plantar fasciitis were enrolled in the study. Patients with evidence of infections like osteomyelitis and cellulitis were excluded. During the patient's hospital visit, consent was sought, and information on participant characteristics, clinical features like site, intensity, and duration of pain were recorded. Clinically relevant diagnostic tests, like Cozen's test or Finkelstein test, were also performed. Findings from the imaging test, i.e., X-ray, Ultrasound, MRI, were also recorded. Mean, and standard deviation was reported for describing quantitative variables. Frequency and percentages were reported for qualitative variables. Disease-specific, i.e., De Quervain's tenosynovitis, lateral epicondylitis, or plantar fasciitis findings and sites were reported in frequencies. STATA version 16.0 was used for statistical analysis.

RESULTS

A total of 42 patients were enrolled, with an equal distribution of males and females and a mean age of 43 years. Among the participants, five patients had hypertension, and four had diabetes. Regarding diagnoses, 18 patients (42%) were identified with De Quervain’s tenosynovitis, 14 (33%) with lateral epicondylitis, and 10 (23%) with plantar fasciitis. Clinical assessments revealed that 11 patients experienced severe pain, 16 had moderate pain, and eight had mild pain. In terms of swelling, seven patients had moderate swelling, while 32 had mild swelling. **Table 1.**

Table 1: Demographics and clinical findings of patients with musculoskeletal disorders **n=42**

Variables		**n (%)**
Gender	Male	21 (50)
	Female	21 (50)
Diagnosis	De Quervain's tenosynovitis	18 (42.8)
	Lateral epicondylitis	14 (33.3)
	Plantar fasciitis	10 (23.8)
Comorbidities	Hypertension	5 (11.9)
	Diabetes	4 (9.5)
	Diabetes and Hypertension both	1 (2.4)
Severity of pain	Mild	8 (22.8)
	Moderate	16 (45.7)
	Severe	11 (31.4)
Swelling	Mild	32 (82)
	Moderate	7 (18)

The study presented imaging findings of patients with musculoskeletal disorders, including De Quervain's disease, based on X-ray, ultrasound, and MRI. Out of 18 patients with De Quervain's disease, the common X-ray findings were cortical erosion and periosteal reaction in 5 cases, cortical erosion, sclerosis and periosteal reaction among 3, and osteopenia among 4 patients, while ultrasound showed increased fluid within the tendon compartment in 6 cases. MRI findings indicated increased fluid within the tendon sheath. Most patients reported mild swelling, with moderate to severe pain reported by 12 cases. Table.2

In 14 patients diagnosed with lateral epicondylitis, X-ray findings included sclerosis with calcification, osteopenia, and cortical regularity with soft tissue calcification. Ultrasounds revealed thickening of the common extensor with heterogeneity and increased fluid within the first extensor tendon compartment. MRI findings showed increased fluid within the tendon sheath. Pain severity varied, with 1 reporting mild, 8 moderate, and 4 severe pain, while most experienced mild swelling (n=12) and one reported moderate swelling. Furthermore in 10 patients diagnosed with plantar fasciitis, X-ray findings included calcaneal spur in 7 patients and an enlarged heel spur in one patient, while ultrasound revealed increased fascia thickness (>4.5mm) in 2 patients. Pain severity varied, with 5 reporting mild, 3 moderate, and 2 severe pain. Additionally, 3 participants had mild swelling, while 6 experienced moderate swelling, as shown in table 2.

Table 2: Disease-specific radiological findings of patients with musculoskeletal disorders **n=42**

Radiological findings and disease site		**n**
Dequervains disease (n=18)		
X-ray findings	Cortical Erosion and Periosteal reaction	5
	Cortical Erosion, Sclerosis and Periosteal reaction	3
	Osteopenia	4
Ultrasound findings	Edematous thickening	1
	Increased fluid within the first extensor tendon compartment	6
	Thickening, diffuse heterogeneity, and area of focal hypo-echogenicity	1
Pain	Moderate	7
	severe	5
Swelling	Mild	17
Lateral epicondylitis (n=14)		
X-ray findings (n=10)	Sclerosis with calcification	3
	Osteopenia	6
	Cortical regularity with soft tissue Calcification	1
Ultrasound findings	Thickening of common extensor with heterogeneity	4
	Increased fluid within the first extensor tendon compartment	1
Pain	Mild	1
	Moderate	8
	Severe	4
Swelling	Mild	12
	Moderate	1
Plantar Fasciitis (n=10)		
X-ray findings	Calcaneal spur	7
	Enlarged heel spur	1
Ultrasound findings	Increased thickness of fascia greater than 4.5mm	2
Pain	Mild	5
	Moderate	3
	Severe	2
Swelling	Mild	3
	Moderate	6

DISCUSSION

Musculoskeletal disorders (MSDs) are on the rise, particularly among individuals in their prime working years, due to various factors such as repetitive stress, workplace injuries, strenuous exercises, and poor posture.[19] Globally, work-related musculoskeletal disorders are prevalent, with reported rates ranging from 28% to 96%.[20] MSDs encompass a range of conditions affecting muscles, bones,

and joints throughout the body.[21] This study focuses primarily on the most common diagnoses associated with MSDs: De Quervain's tenosynovitis, lateral epicondylitis, and plantar fasciitis, which affect the wrist, elbow, and foot, respectively.

In our study, we presented the physical examination and imaging findings obtained from X-ray, ultrasound, and MRI. The most prevalent diagnosis observed was De Quervain's tenosynovitis, followed by lateral epicondylitis and plantar fasciitis, with the affected areas being the right and left radial styloid, lateral epicondyle, and plantar surface of the heel, respectively. However, we observed that De Quervain's tenosynovitis predominantly affected females, while lateral epicondylitis was more common among males. Patients aged 40 years and above were predominantly affected by these musculoskeletal disorders. Interestingly, we did not find any gender differences in symptom presentation, as they were similar within each diagnosis. This is consistent with a study conducted in New Zealand, which reported a higher prevalence of musculoskeletal disorders affecting the wrist/hand among females and those affecting the elbow among males. Additionally, no significant differences in the prevalence of musculoskeletal disorders were noted across different age categories.[22] Other studies also indicated that De Quervain's tenosynovitis is the most frequently diagnosed condition among females. The majority of diagnoses were established through the use of the Finkelstein test. In a study conducted in Jeddah, 67% (n=238) tested positive for De Quervain's disease using the Finkelstein test.[8] Similarly, a study in Karachi, Pakistan involving 700 participants reported a De Quervain's tenosynovitis prevalence of nearly 60% (n=412), confirmed by the Finkelstein test.[9] According to research from the Netherlands, the prevalence of tennis elbow in the general population ranges from 1% to 3%. Lateral epicondylitis is typically diagnosed based on symptoms and physical examination, with imaging studies rarely being necessary.[10] Cohen-Rosenblum et al.[23] conducted a study aimed at characterizing occupational musculoskeletal injuries among female adult reconstruction surgeons. They found that the most commonly reported issues included low back pain among 52.9%, pubic symphysis pain was in 35.3% cases, 29.4% carpal tunnel syndrome and 17.6% patients had De Quervain's tenosynovitis out of 17.[23] Lateral epicondylitis is mainly diagnosed based on symptoms and physical examination and rarely warrants imaging studies.[12] On x-ray, the presence of calcifications in the proximal common extensor tendon may support the underlying tennis elbow. On ultrasound, there might be heterogeneous thickening of the tendon with areas of decreased echogenicity, given that degenerative tendinopathy has taken place.
MRI is usually done to quantify the destruction because of severe disease.[12,13] Primary reason being explored in this study was SMS-texting. Therefore, it can be concluded that De Quervain's tenosynovitis is a frequently occurring complaint in the outpatient department. The most common findings among patients with De Quervain's tenosynovitis were cortical erosion, sclerosis, and periosteal reaction, increased fluid within the first extensor tendon compartment, and increased fluid within the tendon sheath appearing high on T2W images using x-ray, ultrasound, and MRI, respectively, whereas, for patients with lateral epicondylitis and plantar fasciitis, the most common findings were osteopenia and calcaneal spur using x-ray, respectively.

CONCLUSION

In conclusion, musculoskeletal disorders such as De Quervain's tenosynovitis, plantar fasciitis, and lateral epicondylitis are highly prevalent among individuals of working age. Diagnosis typically involves a physical examination and simple radiological tests like X-rays. These diagnostic measures are not only cost-effective but also aid in early detection, enabling timely treatment to alleviate symptoms and promote complete recovery for affected individuals.

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