



CLINICAL AND RADIOLOGICAL FEATURES OF HAND INVOLVEMENT IN ARTHRITIS: AN OBSERVATIONAL STUDY

Rheumatology

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ABSTRACT

Introduction: Arthritis refers to the inflammation of joints and tissue surrounding it. Many arthritic diseases involving hands cause joint damage leading to deformity or loss of function. As joint deterioration and deformities tend to happen at an advanced stage of the disease, early diagnosis and treatment is important in preventing joint damage and hand function.

Methods: A cross-sectional observational study was undertaken to assess and correlate the clinical and radiological features of hand involvement in arthritis.

Results: Out of total 92 subjects were enrolled, 75 (81.52%) were females. Pain was the presenting symptom in all 75 (100%) females with swelling of the joints in 56 (74.67%). RA was the most common cause of arthritis in 65 (70.7%) patients. The most commonly involved joint in RA was wrist in 58 (89%), in OA was DIP in 10 (71.4%) and PIP and MCP in PsA in 85.7% patients. The main radiological findings in RA and PsA were soft tissue swelling and juxta articular osteopenia (JAOP) while reduced joint space, osteophytes and erosions were main findings in OA. 15.4 % RA patients with disease > 5 years had joint deformity with reduced joint space with erosions.

Conclusion: Arthritis is more common in females. RA is the most common cause of hand involvement in the present study. The most commonly affected joint is wrist in RA, DIP in hand OA and PIP and MCP in PsA. RA patients with disease duration > 5 years had joint deformity with reduced joint space with erosions as main radiological features.

KEYWORDS

Hand Involvement In Arthritis, Rheumatoid Arthritis, Osteoarthritis, Psoriatic Arthritis

INTRODUCTION

The term arthritis refers to the inflammation of joints and tissues surrounding it.¹ The pattern of joint involvement varies depending on the underlying aetiology. However, the common symptoms shared by the most are pain and stiffness in one or more joints. Hand involvement is common in rheumatologic disorders like Rheumatoid Arthritis (RA), Primary Osteoarthritis (OA), Psoriatic Arthritis (PsA), Reiter's Arthritis and Systemic Lupus Erythematosus (SLE). It varies with different types of arthritis as the target tissue affected is different; such as the synovium in RA, PsA and articular cartilage in OA.² Hand involvement occurs early in RA and PsA.

RA is the most prevalent inflammatory polyarthritis, which can cause significant disability. RA affects about 1% of the global population, the prevalence in India is around 0.5% to 0.75%. The hallmark of RA is systemic synovial proliferation and tenderness particularly in the small joints of the hands and feet. Commonly, the development of joint symptoms occurs over a period of several months but acute onset has been described. The pattern of joint involvement is typical and involves Proximal Interphalangeal (PIP), Metacarpophalangeal (MCP), wrist, elbow, shoulder, hip, knee, ankle & Metatarsophalangeal (MTP) joints.³ In hands, MCP, PIP and wrists are almost always involved. DIP generally not involved in RA as there is less synovial tissue. Rheumatoid nodules may occur on the extensor surfaces and joints due to chronic mechanical irritation and hence uncommon to be present within the first year.

OA is the most form of arthritis, a slowly progressive disease, seen in middle aged and senior adult population leading to pain and limited functionality of the joints involved. OA is primarily a degenerative than inflammatory.³ The hands are most commonly affected and is called "nodal hand OA" involving mainly Distal Interphalangeal (DIP), PIP and first MCP joints. It may be classified into various subsets such as nodal hand OA (Heberden and Bouchard nodes), generalized (multiple joints), thumb-based HOA, and erosive HOA.

PsA is a fairly common (6-48%) in psoriasis, the chronic and inflammatory disease⁴ with prevalence of 0.6% to 4.8%. The prevalence of PsA is similar in both sexes and generally occurs in the fourth decade of life. About two-thirds of PsA patients present after the appearance of a skin lesions. Moll and Wright classified PsA into five distinct clinical entities as Asymmetrical mono/oligoarticular arthritis affecting DIP, PIP, and MTP joints, Arthritis mostly affecting DIP, Arthritis mutilans, Rheumatoid factor negative symmetric polyarthritis and Spondyloarthropathy. Arthritis mutilans, a

destructive form of PsA, affects fingers and toes, seen in 5% of PsA. PsA generally has a moderate disease course, but up to 47% of patients may develop destructive arthritis characterised by inflammation leading to bone erosion and deterioration of joint architecture.

SLE is an autoimmune disease, the prevalence ranges from 7.4 to 159.4 per 100,000 people globally. Joint involvement in SLE is classically described as non-erosive, non-deforming arthritis in a distribution similar to that of RA primarily affecting small joints of hands, wrist and knee.⁵ Pain and stiffness are usually out of proportion to the degree of synovitis present. Radiologic features include scapholunate dissociation, joint space narrowing, cystic change and palmar ulnar subluxation in the wrist. Subcutaneous nodules along flexor tendons of hands are described. Periarticular calcification has been reported in small joints of hands whereas soft tissues calcification is rarely seen in SLE.

Gout is a form of inflammatory arthritis caused when monosodium urate (MSU) crystals get deposited in and around the joints. This leads to symptoms such as severe acute pain and inflammation in the peripheral joints, mostly the first MTP joint, chronic joint damage, and tophaceous MSU deposits in the joints and skin.⁶ Epidemiological data globally suggest an increasing trend in the prevalence of gout. Gout has various hand presentations like acute tenosynovitis, carpal tunnel syndrome, tophi deposition in the palm and metacarpal involvement.

Pseudogout is a major cause of mono or oligoarticular arthritis in the elderly. The attack typically involves knee but less often wrist or ankle and rarely the first MCP joint. It causes sudden onset and excruciatingly painful joint, periarticular erythema, warmth and swelling. The attack can be migratory and typically subsides in 7-10 days. Radiograph shows punctuate or linear calcific densities which occur in hyaline or fibrocartilaginous tissues known as chondrocalcinosis.

It is clear that many rheumatoid and arthritic conditions lead to joint damage in the hands potentially leading to deformity or loss of function of the hand which can severely affect the ability to work thereby putting enormous health and economic burden. Understanding the hand involvement patterns in arthritis can yield important clues to the clinician to effectively diagnose the underlying disorder. As joint deterioration and deformities tend to happen at an advanced stage of the disease, diagnosing the disorder early will lead to early treatment initiation thereby preventing joint damage and preserving the hand function. Keeping this in mind, a cross-sectional observational study

was planned using clinical manifestations in arthritis patients to identify the pattern of hand involvement in such patients.

AIMS AND OBJECTIVES

The study was planned to assess the clinical and radiological features of hand involvement in arthritis and to correlate clinical manifestations with radiological features.

METHODS

This prospective cross-sectional observational study was conducted in the tertiary care hospital in western India after obtaining approval from the Institutional Ethics Committee. The study was done as per ICMR guidelines for conduct of human research in India. Written informed consent was obtained from all the patients prior to enrolling them in the study. The sample size was calculated using formula for one proportion and its 95% confidence interval. The estimated incidence of hand involvement in patients of arthritis is approximately 60%. Assuming, 60% of study population with hand involvement, for 95% confidence interval (with a margin of error of 10%), the estimated sample size was 92 subjects. The study was conducted over a period of 1 year. Patients diagnosed with arthritis were eligible for enrolment. Patients of either sex above 18 years of age with clinical features suggestive of arthritis with hand involvement were enrolled into the study. Patients with congenital or post-traumatic deformity of hands were excluded from the study.

Demographic data, history and examination was obtained in predesigned case record form. Clinical examination findings of swelling (bony/synovial), tenderness, range of motion and deformity of each hand joint, (DIP, PIP, MCP, 1st CMC & wrist) were noted. Tenderness was graded according to the Ritchie Index from 0 to 3. (0 = Nontender, +1 = tender, +2 = tender & winced, +3 = tender, winced & withdraw). Range of motion was assessed using the goniometer. Normal range of motion for hand joints is as shown: wrist joint: dorsiflexion / palmar flexion - 70°, radial deviation - 20°, ulnar deviation - 50°. MCP joint: extension: 45°, flexion: 90°, PIP joint: flexion - 100°, DIP joint: extension - 10°, flexion - Fingers: abduction / adduction: 20°. Radiographs of the both hands (AP view) were taken in all patients which were reported by a radiologist blinded to clinical manifestations in the patients. RA was diagnosed in accordance with 2010 American College of Rheumatology classification. Depending on the duration of symptoms of arthritis, the patients with RA were stratified into the following groups: Group 1: < 2 years, Group 2: 2- 5 years, Group 3: > 5 years. Statistical analysis was done using SPSS-version 16 software.

RESULTS

Total 92 subjects were enrolled in the study, 75 (81.52%) were females and 17 (18.48%) were males ($p < 0.0001$). The majority (71.7%) of the patients were between the age group of 30-60 while 13% of the patients were < 30 years of age. In RA, 15% females had positive family history.

Pain was the presenting symptom in all 75 (100%) females and 16 (94.12%) males while swelling of the joints was presenting manifestation 56 (74.67%) females as compared to 10 (58.82%) males. The history of morning stiffness for > 0.5-1 hour, >1-3 hour, and >3 hours was observed in 14.67%, 43.5%, and 12% female patients and 5.88%, 11.76%, and 11.76% male patients respectively. History of other joints involvement mainly knee, ankle and elbow were obtained in 76.47% males and 65.33% females. Duration of symptoms < 1 year was in 29.35% patients while symptoms for 1-3 years and > 5 years were noted in 44.6% and 26.1% of patients respectively.

Figure 1 depicts RA as the most common cause of arthritis in study population seen in 65 (70.7%) patients followed by OA and PsA in 14 (15.2%) and 7 (7.6%) patients respectively. SLE, Gout and RA with OA were seen in 2 patients each.

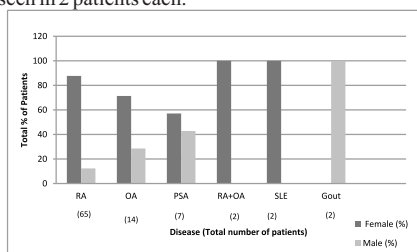


Fig 1: Incidence of arthritis in study population

As shown in Table 1, in RA, the most commonly involved joint was wrist in 58 (89%) patients followed by the involvement of MCP and PIP joints in 55 (85%) and 52 (80%) patients respectively. The most commonly involved joint in OA was DIP in 10 (71.4%) patients followed by PIP and 1st CMC with equal incidence of 10 (57.1%) patients. In PsA, PIP and MCP were the most commonly involved joints with incidence of 85.7% followed by DIP and wrist involvement in 57.1% patients. The moderate to severe tenderness at the affected joints was noted in 85% of the patients with RA and MCP joint was the most tender joint while in OA, moderate tenderness was observed at 1st CMC joint in all 14 patients. Patients with PsA revealed moderate tenderness on examination of PIP, MCP and wrist joints in all patients. Range of movements was more affected in patients with RA as compared to other forms of arthritis with maximum affection was seen in MCP flexion in 70 % and wrist joint flexion and extension in 58% of patients. Deformity at PIP and MCP joints was noted in 20 (30.8%) of patients of RA and 13 (20%) had wrist deformity. Patients with OA showed DIP deformity in 10 (71.4%) and 1st CMC deformity in 6 (42.8%). Patients with PsA revealed deformity at all joints except 1st CMC, the most common site was PIP.

Table 1. Synovial swelling and Joint Deformity

Disease N (%)	Synovial / Bony swelling	Total number N (%)	Deformity	Total number (%)
Rheumatoid Arthritis 65 (70.7)	DIP	0	DIP	0
	PIP	52 (80)	PIP	20 (30.8)
	MCP	55 (85)	MCP	20 (30.8)
	1st CMC	0	1st CMC	0
	Wrist	58 (89)	Wrist	13 (20)
Osteoarthritis 14 (15.2)	DIP	10 (71.4)	DIP	10 (71.4)
	PIP	8 (57.1)	PIP	2 (14.2)
	MCP	0	MCP	0
	1st CMC	8 (57.1)	1st CMC	6 (42.8)
	Wrist	0	Wrist	0
Psoriatic Arthritis 7 (7.6)	DIP	4 (57.1)	DIP	3 (42.8)
	PIP	6 (85.7)	PIP	4 (57.1)
	MCP	6 (85.7)	MCP	3 (42.8)
	1st CMC	0	1st CMC	0
	Wrist	4 (57.1)	Wrist	2 (28.5)

The radiological features of hand are displayed in Table 2. Soft tissue swelling, juxta articular osteopenia were most common radiological finding in patients with RA and PsA. followed by reduced joint space, erosions and osteophytes. Reduced joint space, osteophytes and erosions were main findings in patients with OA.

Table 2 : Radiological features of hands

Disease	Bony swelling	Total number N (%)
Rheumatoid Arthritis	Soft tissue swelling	56(86.1)
	Juxta-articular osteopenia	58 (89.2)
	Reduced joint space	39 (60)
	Erosions	26 (40)
	Osteophytes	18 (27.7)
Osteoarthritis	Soft tissue swelling	0
	Juxta-articular osteopenia	0
	Reduced joint space	8 (57.1)
	Erosions	4 (28.6)
	Osteophytes	8 (57.1)
Psoriatic Arthritis	Soft tissue swelling	6 (85.7)
	Juxta-articular osteopenia	6 (85.7)
	Reduced joint space	3 (42.9)
	Erosions	4 (57.1)
	Osteophytes	2 (28.6)

Table 3 reveals correlation between the duration of arthritis and clinical and radiological findings in patients with RA. Out of 39 (60%) patients with the disease duration of < 2 years, none showed joint deformity while 30% had reduced joint space and erosions. 15.4 % patients had the disease duration > 5 years and all had joint deformity with reduced joint space with erosions as main radiological features. Tophi was observed in only in 1 male patient while subcutaneous nodules were present in 10 (13.3%) of the females only.

Table 3: Correlation of Clinical and Radiological features of hands in RA

Disease duration (years)	Total number (%)	Synovial swelling	Joint deformity	Radiological features	
				Soft tissue swelling/ JAOP/ osteophytes	Erosion / Reduced joint space
< 2	39 (60)	39 (100)	0	39 (100)	13 (33.3)
2-5	16 (24.6)	12 (75)	12 (75)	16 (100)	14 (87.5)
> 5	10 (15.4)	4 (40)	10 (100)	10 (100)	10 (100)

DISCUSSION

The current study evaluated clinical manifestations and radiological features of hand involvement in arthritis as it occurs early in the disease course thereby providing the therapeutic window for timely initiation of effective treatment necessary for preservation of hand function. Hand examination is appropriately described as “calling card” for diagnosis of RA.

The most common cause of hand involvement in arthritis in the present study was RA in 70.7% followed by OA seen in 15.2% of the patients. Though osteoarthritis is more common disease seen in population, relatively low incidence (23.2%) of hand OA, though higher than our study, was noted in the study from eastern India even when patients > 40 years of age were enrolled.⁷ Females significantly outnumbered the males in RA (87.7% vs 12.3%) with female to male ratio of 7:1. The higher ratios of 8.4: 1 and 7.7: 1 were noted in the recent studies from north and western India respectively.^{8,9} In fact, worldwide the trend remains same with female predominantly affected by the disease. This has been postulated as related to hormonal status or differences in gender related life style. Similarly, the incidence of OA and PsA was higher in females. Positive family history increases the risk of RA by three to five times. Positive family history was obtained in 28% patients by Diggikar et al.^{10,11} and 14.8% patients by Vij et al⁵ similar to 15% in the current study.

A study of clinical profile of RA from a tertiary care center in the southwestern India¹² showed 100% patients with RA presented with history of joint pains similar to our study with 100% patients having pain. However, 97% patients in the above study had morning stiffness as compared to 70.7 % experiencing morning stiffness in the present study, may be due to higher disease activity of 39% in their study. Interestingly a study evaluating the characteristics of rheumatoid arthritis patients at first presentation to a specialized rheumatology department in Delhi revealed 95% of patients presenting with moderate to severe disease.⁸ Our study revealed 84.7% patients of RA with synovial swelling with wrist being the most commonly involved joint in 89% of patients and MCP in 85%. The similar incidence of 88% of the wrist joint involvement was described by above study.¹² Early identification of synovitis is of importance as it represents the location of the rheumatoid joint inflammatory process and a target for therapeutic intervention. Tenderness can be seen in early as well as the late stage of the disease as damaged joints are also tender though not the disease process is not active and was seen in 82.6 % of patients. A study on the prevalence of hand OA⁷ showed the involvement of thumb base in 22.62% patients as against 57% in the current study probably due to more population of chronic OA patients also evident from higher incidence of radiological findings suggestive of chronicity. A population-based study has demonstrated the involvement of thumb base as the most common finding. Bouchard's node/ Heberden's nodes were detected in 71% and 57% of the patients respectively. Both of them correlated well with radiological Hand OA. In RA, the limitation of movement was observed in 76% patients in both the studies. However, the joint deformity was noted in 64% patients in the study by Kumar et al¹² as compared to 33.8% in our study. This could be explained by the fact that 60% of patients of RA in our study had disease duration of < 2 years, the joint deformities being more common with prolonged disease.

The most common radiological changes in the above study were joint space narrowing in 62% and erosions in 58.7% patients while our study revealed reduced joint space and erosions in 33.3% patients with disease duration of < 2 years while with longer duration of disease of 2-5 years and > 5 years, the incidence increased to 87.5 % and 100% respectively. Our findings are similar to the study Diggikar et al.¹⁰ with joint space narrowing in 60% and joint erosions in 40% of the patients.

Correlation of clinical and radiological features of hands in RA revealed reduction joint space and erosions with increasing duration of

RA resulting in the joint deformity and functional disability. A study by Noortge et al¹³ has also described high prevalence of hand and wrist symptoms and impairments after 2 years of disease duration.

CONCLUSION

Arthritis is significantly more common in females. RA is the most common cause of hand involvement in the present study. The most commonly affected joint is wrist in RA, DIP in hand OA and PIP and MCP in PsA. RA patients with disease duration > 5 years had joint deformity with reduced joint space with erosions as main radiological features.

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