e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2022; 12(9); 323-332

Original Research Article

Clinical Spectrum of Psoriatic ArthropathySeen in Patients Attending Tertiary Care Hospital

Suhasini Arra[1], S. Vasantha Kumari[2], Sirish Kumar Shenkeshi[3], Bliss D Agape[4]

[1]Assistant Professor, Department of D.V.L, Kakatiya Medical College and MGM Hospital, Warangal, Telangana State.

[2]Assistant Professor, Department of D.V.L, Kakatiya Medical College and MGM Hospital, Warangal, Telangana State.

[3]Assistant Professor, Department of Orthopedics, Kakatiya Medical College and MGM Hospital, Warangal, Telangana State.

[4]Assistant Professor, Department of Orthopedics, Kakatiya Medical College and MGM Hospital, Warangal, Telangana State.

Received: 15-07-2022 / Revised: 23-08-2022 / Accepted: 27-09-2022

Corresponding author: Dr. Bliss D Agape

Conflict of interest: Nil

Abstract

Background: Psoriatic arthritis is a chronic disease with exacerbations and remissions for which a complete, permanent cure has not been found. In this study, an attempt is made to characterize the different types of joint involvement in psoriatic arthritis, detect the precipitating factors, and correlate the radiological features.

Methods: This study was conducted in the Departments of Orthopedics/Dermatology, Kakatiya Medical College, and MGM Hospital, Warangal. Detailed history and a complete musculoskeletal and cutaneous examination were done for these selected patients and findings were recorded on a pre=designed proforma. Rheumatoid factor was done in all patients and only those who were RA factor negative were included in this study. All patients in the study were subjected to the radiological examination of joints. Radiographs were done only for joints with evidence of arthritis, in the form of tenderness, swelling, or loss of mobility.

Results: Average age of patients examined was 43.2 years, males 42.9 years, and of females 43.8 years. The male to female ratio was 2.8:1. Onset of skin involvement was at an average of 35.1 years whereas that of the joint was 39.3 years. The average age of onset of skin involvement in males was 34.7 years and in females was 36.3 years. The average age of onset of joint involvement in males was 39.2 years and in females was 39.6 years There was a definite male preponderance in the patients with psoriatic arthropathy. This is true of all the subtypes, except in the arthritis mutilans subgroup. The male preponderance was most prominent in the oligoarticular group.

Conclusion: Psoriatic Arthritis (PsA) has a male predilection and they had an earlier onset of oligoarticular and axial involvement. The small joints of the right hand are more involved than the left and housewives had more symmetric RA like and DIP type of PsA. Many patients with psoriatic spondyloarthropathy followed a sedentary lifestyle with respect to occupation. In patients with a shorter duration of arthropathy, radiographs were either normal or showed soft tissue swelling alone, with the absence of bony changes.

Keywords: Psoriatic Arthritis, Precipitating Factors, Radiological Changes

Introduction

Psoriasis and psoriatic arthropathy, a disease so well known, can be traced down the pages of history hidden among the scriptures. It appears likely that due to the skin patches and deformity, psoriasis was regarded as a type of leprosy. Psoriatics along with true lepers were segregated and isolated in the 'Valley of lepers' for a lifetime.[1] The picture that comes to mind when one thinks of psoriatic arthropathy, is of a patient with deformed and inflamed joints. This points to the fact that despite all the treatment offered to patients in this era, the disease runs its course, affecting the quality of life, and leaving behind patients with deformed joints. The dermatoses by themselves cause a considerable impact on a patient's health, sense of well-being, self-image, and self-esteem. The arthropathy occurring, in addition, is like an insult to injury. The prevalence of Psoriasis is 1-3% of the general population in Western literature.[2 - 5] Indian literature quotes a prevalence of 0.8-5.6% but this does not reflect the true prevalence as these are hospital-based studies.19 One Indian study found radiological and or clinical evidence of psoriatic arthropathy to the extent of 62 percent of their psoriatic patients.[6] The prevalence of arthritis among psoriatic is 5-7% and the percentage becomes higher as the severity increases reaching 30-40%. [2,7,8] Hence the prevalence of psoriatic arthropathy in the general population lies between 0.02% - 0.1 %. [2,8] Activated T cells produce either pro-inflammatory (Th1) or anti-inflammatory (Th2) cytokine profiles. The Th1 profiles include interleukin-2, tumor necrosis factor, and interferon-gamma, among others, while the Th2 pattern is associated with IL-4, IL-5, and IL-10 production. In psoriatic arthritis, the Th1 profile prevails. Eliciting factors or triggers cause the movement of neutrophils and monocytes/ macrophages into the site amplifying the inflammatory response. TNF is a pro-inflammatory cytokine that plays an important role in the causation of psoriatic arthritis. It induces intercellular adhesion molecules, which mediate several processes including the migration, extravasation, and infiltration of leukocytes including T cells. The adhesion molecules induced by TNF include intracellular adhesion molecule- 1 (ICAM-1); very late antigen (VLA)-3, -5, and -6; vascular cell adhesion molecule - 1(ICAM-1); and E selectin are important in mediating inflammatory change in psoriasis as well as psoriatic arthritis. [9-11]

There exists a wealth of knowledge on psoriasis.[12-14] The detailed clinical characteristics of the disease in each of the subtypes have not been well documented in the few studies done. The newer types of PsA have not been described in India. Precipitating factors have been documented for psoriasis and not for psoriatic arthropathy. Exploring and defining definite precipitating causes could help patients specifically avoid these factors, thereby reducing the number of episodes of arthritis, leaving the patient with lesser deformity. Radiological features play a major role in differentiating psoriatic arthropathy from other causes of arthritis; this is especially true of spondyloarthropathies.[15] Radiology can occasionally be the only way of making the diagnosis with confidence in cases with no skin involvement of psoriasis. Until drugs, which completely cure psoriatic arthritis are discovered, recognizing the clinical features, avoiding the factors, which precipitate episodes of arthritis, and intervening early, would be the only weapons in combating the disease.[16] This will prevent deformities, improve quality of life, and would go a long way in avoiding unnecessary social embarrassment and stigma.

Material and Methods

This was a prospective study in the

Departments of Orthopedics and Dermatology, Kakatiya Medical College, and MGM Hospital, Warangal, Telangana State from October 2020 to March 2022. Institutional Ethical approval was obtained for the study. Written consent was obtained from all the participants of the study. All patients of psoriasis attending the outpatient/inpatient departments of Dermatology/Orthopedics of MGM Hospital, Warangal, were screened for musculoskeletal complaints. A consecutive series of patients who fulfilled the inclusion criteria and consented to be examined were included in the study.

Inclusion Criteria

1. Clinical diagnosis of psoriasis, biopsy-proven in doubtful cases.
2. Complaints of joint pain/swelling/deformity for more than one 1-month duration.
3. Rheumatoid factor negative.

Exclusion Criteria

1. Age <12 years.
2. The rheumatoid factor is positive.
3. Joint pathology attributable to other established causes. Example: Trauma.
4. Patients with radiological evidence of overt osteoarthritis will be excluded.

All patients with psoriasis attending the Dermatology OPD were screened for musculoskeletal complaints i.e., joint pains of more than one-month duration or chronic deformities. All patients in this group who had arthritis were selected for the study. Patients who complained of joint pains but did not have clinical evidence of arthritis as defined by tenderness, swelling, or limitation of movement, were excluded. Patients under the age of twelve years were excluded from the study. Detailed history and a complete musculoskeletal and cutaneous examination were done for these selected patients and findings were recorded on a pre=designed proforma. Rheumatoid factor was done in all patients and only those who were RA factor negative were included in this study. All patients in the study were subjected to the radiological examination of joints. Radiographs were done only for joints with evidence of arthritis, in the form of tenderness, swelling, or loss of mobility. The radiographs were interpreted by the Radiologist and Orthopedician and findings in the individual joints were recorded on the proforma. Patients with overt radiological evidence of other causes of arthritis such as osteoarthritis trauma were excluded. The diagnosis of psoriasis was made on clinical grounds. In cases of doubt, skin biopsy was done, and only confirmed cases were included. Informed consent was taken to include patients in the study. Statistical analysis was done using descriptive statistics.

Results

A total of 192 patients with psoriasis attending the Dermatology/Orthopedics outpatient department of the M.G.M Hospital, Warangal, were screened for joint complaints. Out of these, n=71 patients had joint complaints. n=21 among the n=71 patients had to be excluded from the study due to the following reasons; n=12 because had they arthralgia but no evidence of arthritis, n=3 as they had evidence of frank osteoarthritis on radiology and n=6 cases were lost to follow-up. Thus n=50 patients who fulfilled the inclusion criteria were taken into the study.

Table 1: Psoriatic arthropathy and Sex predilection

Type of PSA	*Frequency*	*Total %*	*Males*	*Females*	*Average No. of joints involved*
Oligo-articular	18	36%	17	1	3.15
DIP predominant	7	14%	4	3	4.42
RA like	14	28%	8	6	7.6
Arthritis mutilans	2	4%	1	1	14.5
Axial	9	18%	7	2	2.9
Total	50	100%	37	13	

The average age of patients examined was 43.2 years, males 42.9 years, and of females 43.8 years. The male to female ratio was 2.8:1. Onset of skin involvement was at an average of 35.1 years whereas that of the joint was 39.3 years. The average age of onset of skin involvement in males was 34.7 years and in females was 36.3 years. The average age of onset of joint involvement in males was 39.2 years and in females was 39.6 years (table 1). There was a definite male preponderance in the patients with psoriatic arthropathy. This is true of all the subtypes, except in the arthritis mutilans subgroup. The male preponderance was most prominent in the oligoarticular group.

Table 2: Mean age of patients in different arthropathies

Type of arthropathy	*The average age at examination*	*Males*	*Females*
Oligo-articular	53.9	43.9	64
DIP predominant	40.9	41.2	43.3
RA like	40.4	40.8	40.6
Arthritis mutilans	55.5	71	40
Axial	42.6	39.8	45.5

The mean age of onset of arthritis mutilans in the cases of the study was 29 years. The age was 43.1 years for asymmetric oligoarticular type. The age of onset of other varieties ranged between these years as depicted in table 2.

Table 3: Joint involved in right as compared to the left hand

Joint	*Right*	*Left*
DIP	28	36
PIP	34	18
IP	4	8
MCP	13	7
Wrist	4	2

The average time by which skin preceded joint involvement was 6.5 years. Arthropathy occurred after skin lesions of psoriasis in 14% of patients at an average of 5.1 years. The number of DIP and IP joints involved on the right side was lesser than on the left. However, the numbers of the PIP, MCP, and wrist joints involved on the right side were more than on the left. The total number of joints involved on the right side was more than on the left (83 joints as compared to 71) given in table 3. The maximum number of patients in each of the subtypes of arthritis, had only a few skin lesions i.e., <30%. The average number of joints affected per patient varied between 2.5 and 5%.

Table 4: Type of skin involvement with respect to sex predilection and subtype of arthritis.

Type of skin	*No. of pts.*	*M/F*	*Mean No. of joints*	*Oligo arthritis*	*DIP*	*RA like*	*Ar. mutilans*	*Axial*
Chronic plaque	44	35/9	5.2	17	5	12	2	8
Palmoplantar	1	0/1	4	0	0	1	0	0
Gen. pustular	1	0/1	4	0	0	1	0	0
Erythroderma	3	2/1	5	1	2	0	0	0
Scalp psoriasis	1	0/1	1	0	0	0	0	1
Total	50	37/13		18	7	14	2	9

The maximum number of patients had chronic plaque type of psoriasis (44 out of 50). The chronic plaque type of psoriasis had the highest average no. of joints affected (5) involved in 2%. The commonest change documented was new bone formation followed by soft tissue swelling (table 4). Office workers formed the largest group of patients among the various occupations included in the study. (23 out of 50 patients) The majority of them had the oligoarticular type of arthropathy.

Table 5: Radiologic findings with respect to the type of PSA.

Radiologic features	*Oligo arthritis*	*DIP*	*RA like*	*Arth. mutilans*	*Axial*
Normal	25	9	51	8	3
Ankylosis	0	0	2	0	1
Calcaneal spur	2	0	0	0	3
Decreased joint space	12	8	3	1	3
Diffuse osteoporosis	2	0	0	0	1
Juxta articular osteoporosis	0	0	0	0	1
Erosion tip terminal phalange	3	2	4	0	2
Erosion base terminal phalange	0	3	5	8	1
Erosion tip middle phalange	0	0	0	2	0
Erosion base middle phalange	5	0	0	5	0
Erosion tip proximal phalange	0	0	0	4	0
New bone formation	2	1	1	9	2
Periosteal reaction	12	1	1	1	7
Soft tissue swelling	7	13	40	0	1
Irregularity vertebra	-	-	-	-	5
Sacroiliitis		-	-	-	4

Among the DIP predominant and RA-like types of PSA, soft tissue swelling was the most commonly reported change. Among the spondyloarthropathies, several changes were found like sacroiliitis, calcaneal spur, etc. A few among these had peripheral joint involvement showing erosion, periosteal reaction, and, soft tissue swelling.

Discussion

The average age of onset of arthropathy in this study was 37.2 years. This is following world literature, where the onset

of psoriatic arthropathy is between the third and fifth decades. [7, 8, 17] Among the types of psoriatic arthropathy in the present series, the earliest age of onset of joint complaints was seen in the 'arthritis mutilans' group, at an average of 29 years. There were only two cases of arthritis mutilans in this study. Arthritis mutilans are known to occur at a younger age group when compared with other types of psoriatic arthropathy. [7, 8, 17, 18] Baker, Golding, et al., found the mean age of onset, among the eleven patients described as arthritis mutilans was 34.3 years. [17] Oligoarticular arthritis was the subtype of psoriatic arthritis, in which the onset of joint complaints was late; at an average of 43 years. Apart from arthritis mutilans, there is no special reference to the age of onset of arthropathy in any of the subgroups of psoriatic arthropathy. In the present study, the age of onset of arthropathy in the other groups was between these extremes. Indian studies have documented a significant male preponderance in PsA.[6, 20] which is in concordance with our study in which the males outnumber the females in a ratio of 2.8:1. The number of males exceeded the females in each of the subgroups except in arthritis mutilans where one of the patients was male, the other female. Both patients with arthritis mutilans had chronic plaque psoriasis. The commonest type of psoriatic arthropathy, in this study, was the asymmetric oligo-articular type, which accounted for 36% of the cases (n=18). The number of males in this subgroup vastly outnumbered the females (M: F=17:1). In most of the Western literature, this type is by far the commonest accounting for 70% of all cases as per Moll et al. [7, 8, 21, 22] Indian studies have shown a lesser percentage of PSA patients suffering from the oligoarticular subtype with Malaviya et al., [23] reporting 25% from Delhi, Chaudhary et al., [20] from Chandigarh, reporting 16.7% of their study population(n=30) having the oligoarticular variant. All Indian studies have reported the symmetric RA like arthritis to be the most commonest variety of PsA. In the present study, the commonest type was found to be the asymmetric oligoarticular type. A recent study from South India by Rajendran et al., [24] also demonstrated a percentage of this subtype similar to the present study (37.1%). However, in their study, the commonest type of arthropathy was RA like type (48.3%). The number of males with asymmetric oligoarticular subtype was n=17, whereas the number of female patients was only n=1, which shows a very high male predilection. Psoriatic spondyloarthritis is more common in men, but regarding the sex predilection in the other subtypes. [8] The second commonest type of psoriatic arthritis in the current study was symmetric polyarthritis RA (14 out of 50 patients i.e., 28%). This is the most commonest subtype reported amongst the studies from India with percentages varying between 48.3% and 33.3%. [20, 24] There is an isolated report in a study done by Chaudhary et al., [20] in which the percentage of this type of joint involvement is 75.8%.

Based on the type of psoriasis there were n=44 patients (88%) with chronic plaque psoriasis, n=3 with erythroderma (6%), one each with palmoplantar psoriasis, generalized pustular and scalp psoriasis. In all the subgroups of skin involvement in psoriasis the number of male patients with psoriatic arthropathy was more than females with the male to female ratio maximum in the chronic plaque-type i.e., 3.2:1. Psoriatic arthropathy occurs with exclusive nail psoriasis has been reported in several studies including that by Chaudhary et al. [20, 23] who reported a 4.3% incidence of PsA in this category. However, our study did not have any patients with nail psoriasis only. Out of the n=44 patients with chronic plaque type of psoriasis, the maximum number of patients had the oligoarticular type of PsA (38.6%). The next most frequent type of arthropathy among patients with chronic plaque

psoriasis was RA-like involvement (27.2%). The average number of joints involved per patient was highest for the group with skin involvement of 30-60% (5.9 joints). The total number of joints involved was quite high in patients with skin involvement of less than 30% of the body surface area. This could have been because the maximum number of patients (70%) had less than 30% of BSA involved. In n=40 out of the n=50 study patients, that is 80% of skin lesions preceded joint involvement and this occurred by an average of 6.5 years. Skin involvement precedes joint in 60-75% of cases, as is reported in the literature. [6, 7, 20] Arthropathy preceded skin lesions in 40% of patients studied by Malaviya and 12 and 13% of patients in two other studies respectively. [20, 23] Simultaneous involvement of joints and skin was noticed in 6% of this series. This figure varies between 10 and 37% in other Indian studies. 40,81. DIP joint involvement was seen in 46% of patients. This is in comparison with other studies from both India and abroad where DIP involvement was seen ranging between 26-32.6%.81A single study from India shows a much percentage of DIP joint arthritis i.e., 66.6%.40 Studies from India report that around 56-63% of patients have PIP joint arthropathy whereas in world literature this is less commonly involved (41-49%).40,81 In the present series 42% of patients had PIP joint arthritis. Among the large peripheral joints, the most frequently involved were the ankle and knee joints. (22%) This number is much lesser than what is quoted in studies from India and abroad (23-50%in ankle and (32-66.4%). [20, 23] Axial involvement is described as occurring in 18% with sacral involvement in 4% of the study group. This has been described in the section on spondyloarthropathy under types of psoriatic arthritis. Although there was no linear increase in the average number of joints involved and the duration of arthropathy, this figure was higher in patients who had arthropathy for durations greater than 5 years. This number was even higher in those with arthropathy greater than 10 years. There was n=23 patients in the study whose occupation was described as office worker/ desk worker. The majority among them had an oligoarticular type. (43.4%) The RA-like type was seen in six patients (26.1%), four patients (17.4%) had spondyloarthropathy and three patients (13.1%) had the DIP predominant type. Amongst the manual workers, there was almost equal distribution between oligoarticular (n=3) and RA-like type (n=4) of PsA. There were a larger number of office workers compared to manual laborers in our group possibly because the study was conducted in a private hospital which is located in a metropolitan city. The housewives, on the other hand, had both rheumatoid arthritis-like involvement (n=4) and DIP predominant type (n=3) as being commonly involved. This has not been reported in the literature so far. The total numbers of housewives in the study were small (n=11). All occupation types except the housewives' groups had oligo articular and RA like types as the commonest type of joint involvement. The number of involved joints in the left hand was compared to those in the right. This showed that the DIP, IP, and wrist were less frequently involved than the right side. The PIP and MCP joint involvement were greater on the right side. The total number of joints involved on the right side was greater than on the left (83 as compared to 71). This factor has not been explored by previous investigators. It was not documented whether patients were left or right-handed and which is a drawback in this part of the study. Koebner phenomenon, caused by repeated micro and macro trauma, has been described for joints, which could explain the above finding. [2] Ocular involvement was seen in only one patient in our study (2%). This patient had uveitis and belonged to the spondyloarthropathy group.

The factors that were investigated were occupation, stress, drugs, infections, and trauma. Only two patients reported psychological stress causing a flare in their arthritis. One patient reported that exposure to a cold environment increased his psoriasis and psoriatic arthropathy. Many patients (28%) among the group with a duration of arthropathy of fewer than 6 months did not demonstrate any radiological change, in a single symptomatic joint, they showed normal radiographs. The majority of the patients with a duration of arthropathy of fewer than 6 months (57%) had only soft tissue swelling without erosive or proliferative changes. This is to be expected as erosive changes occur only after the joint suffers the insult for a certain duration of time. After the erosive changes have set in reparative changes start; occasionally erosive and reparative changes occur simultaneously. [25] The reverse picture also holds good, that is the duration of arthropathy increased, the number of cases with soft tissue swelling decreased and the erosive and proliferative changes increased. The number of joints with ankylosis was highest in those with arthropathy for periods longer than 10 years. Erosion at the tip of the terminal phalanx, new bone formation, and sacroiliitis was the most common finding in this group. Periosteal reaction and erosion at the tip/base of the phalanx were present in the other group with joint involvement between 6 months and 10 years. As no data is comparing the duration of arthropathy with radiological changes, these parameters could not be compared. Axial skeleton as spine X-rays were taken only for symptomatic patients (9 out of 50). Studies from India have reported the presence of syndesmophytes of the marginal variety in psoriatic spondyloarthropathy patients. [24, 26] In our study only one patient had a vertebral syndesmophyte but this was of the 'claw' type, which is not specific to psoriatic arthropathy. (Claw osteophyte is a type of stress response that occurs to any sort of traction or trauma to the spine.) Vertebral squaring which has been reported in various studies is usually seen in ankylosingspondylosis, not in PsA. The various Indian studies that have reported vertebral squaring are by Mittal et al., [27] and Rajendran et al., [24] who reported an incidence of 7.2 and 0.86% respectively. In the present study, there was no vertebral squaring seen as was in a study by Kalam et al., [6] There was only one patient with cervical involvement in our study which is consistent with the fact that the cervical spine is less commonly involved in PsA. Calcaneal spurs were seen in three patients. These ill-defined spurs are known to occur because of erosive/proliferative bone changes occurring at sites of attachments of a plantar aponeurosis or Achilles tendon to the calcaneum (enthesitis). [28] The calcaneal spur was seen in 1 patient (0.5%) in the study done by Kalam et al., [6] A few studies done in India did not detect any calcaneal spurs in radiology, which shows that this is an uncommon finding in PsA. [25-27] One of these found tendoachilles calcification in 3.5% of joints observed radiologically. [24] In our study, we did not detect calcification of tendoachilles.

Conclusion

Psoriatic Arthritis (PsA) has a male predilection and they had an earlier onset of oligoarticular and axial involvement. The small joints of the right hand are more involved than the left and housewives had more symmetric RA like and DIP type of PsA. Many patients with psoriatic spondyloarthropathy followed a sedentary lifestyle with respect to occupation. In patients with a shorter duration of arthropathy, radiographs were either normal or showed soft tissue swelling alone, with the absence of bony changes. Whether repeated micro and macro trauma play a role in the right hand being more involved than the left and housewives developing more of the DIP predominant

and RA like type of PsA and whether exercises could reduce the axial involvement in sedentary workers, needs to be explored.

References

1. Browne S.G. The history of leprosy. Chapter 1 in Leprosy. 1st edition. Hastings R.C., Edinburgh, Churchill Livingstone, 1985;1-15.
2. Finzi AF, Gibelli E. Psoriatic arthritis. Int J Dermatol. 1991; 30(1):1-7.
3. Peterson K.S., Winchester R. Psoriatic arthritis. Chapter 43 in Dermatology in General Medicine, Freedberg I.M., Eisen A.Z., et al., 5th ed. New York: MacGraw Hill Inc. 1999;522-533.
4. Pavithran K. Disorder of keratinization. Chapter 28 in IADVL Textbook and Atlas of Dermatology. 2nd edition. Valia R G., Mumbai, Bhalani Publishing House, 2001; 820-821.
5. Camp R.D.R. Psoriasis. Chapter 35 in a Textbook of Dermatology,6th ed., Champion R.H., Burton J.L., et al., London: Blackwell Science Ltd, 1998; 1645-49.
6. Kalam A, Bhargava SK, Siddiqui MA, Bhushan B. Psoriatic Arthritis - A Clinico Radiological Study. Ind J Dermatol 1987;32: 57-62.
7. Ruzicka T. Psoriatic Arthritis. Arch Dermatol 1996; 132:215-219.
8. Braun-Falco O and Ruzicka T. Psoriatic Arthritis. Int J Dermatol 1994; 33(5): 320-322.
9. Ruderman EM. Evaluation and management of psoriatic arthritis: The role of biologic therapy. J Am AcadDermatol 2003;49(2):125-132.
10. Mehlis SL and Gordon KB. The immunology of psoriasis and biologic immunotherapy. J Am AcadDermatol 2003; 49: S44-50.
11. Galadari H., Fuchs B., Lebwohl M. Newly available treatments for psoriatic arthritis and their impact on skin psoriasis. Int J Dermatol. 2003; 42:231-237.
12. Kleinert S, Feuchtenberger M, Kneitz C, Tony HP. Psoriatic arthritis: clinical spectrum and diagnostic procedures. ClinDermatol. 2007 Nov-Dec; 25(6): 519-23.
13. Chandran V, Schentag CT, Gladman DD. Sensitivity of the classification of psoriatic arthritis criteria in early psoriatic arthritis. Arthritis Rheum. 2007; 57(8):1560-63.
14. Brockbank J, Gladman D. Diagnosis and management of psoriatic arthritis. Drugs. 2002;62(17):2447-57.
15. Merola JF, Espinoza LR, Fleischmann R. Distinguishing rheumatoid arthritis from psoriatic arthritis. RMD Open. 2018; 4(2): e000656.
16. Sankowski AJ, Lebkowska UM, Cwikła J, Walecka I, Walecki J. Psoriatic arthritis. Pol J Radiol. 2013 Jan;78(1):7-17.
17. Baker H, Golding DN, Thompson M. Psoriasis, and Arthritis. Ann Int Med 1963;58(6):909-925.
18. Sigler J.W. Psoriatic Arthritis. Chapter 40 in Arthritis and allied conditions: A textbook of rheumatology, Hollander J. L., Lea and Febiger. 2nd edition. 1967; p-656.
19. Pavithran K. Disorder of keratinization. Chapter 28 in IADVL Textbook and Atlas of Dermatology, 2nd ed. Valia R G., Mumbai: Bhalani Publishing House, 2001; p. 820-821.
20. Chaudhary SPR, Singh T, Kaur I, Suri S, Sehgal S, Kaur S. Clinical Profile of Psoriatic Arthropathy. Ind J Dermatol, Venereol, Lepr 1990; 56:200-203.
21. Ruderman EM. Evaluation and management of psoriatic arthritis: The role of biologic therapy. J Am AcadDermatol 2003;49(2):125-132.
22. Moll JMH. The Clinical Spectrum of Psoriatic Arthritis. Clin Ortho and Rel Research 1979; 143:66-75.
23. Malaviya AN. Psoriatic Arthropathy. Ind J Dermatol Venereol Lepr 1984; 50:127-130.

24. Rajendran CP, Ledge SG, Rani KP, Madhavan R. Psoriatic Arthritis. JAPI 2003; 51:1065- 1068.
25. Sharma T.P. and Sepaha G.C. Psoriasis- A Clinical Study. Ind J Dermatol Venereol Lepr 1964;30: 191-203.
26. Banerjee K., Banerjee R., Biswas T.K. Cervical Spine in Psoriasis. Ind J Dermatol Venereol Lepr 1995; 61:214-215.
27. M Mittal RR, Gupta S, Kaur RP. Radiological Changes in Psoriatic Arthropathy. Ind J Dermatol Venereol Lepr 1997; 63:223-224.
28. Kirkpatrick J, Yassaie O, Mirjalili SA. The plantar calcaneal spur: a review of anatomy, histology, etiology and key associations. J Anat. 2017 Jun; 230(6): 743-751.