

A Prospective Cohort Study of Psoriatic Arthritis Prevalence in a Serbian Patients with Psoriasis

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Abstract

Objective: The aim of this study was to determine the incidence and prevalence of psoriatic arthropathy and to point out the problem of their occurrence in a sample of patients diagnosed with psoriasis.

Methods: 109 patients with diagnosed psoriasis and psoriatic arthropathy, took part in the survey. The average age of patients was 48,85±10,11. We analyzed the incidence and prevalence of the psoriatic arthropathy occurrence for the patients with psoriasis.

Results: Psoriatic arthropathy registered with patients were those with arthritic changes on: sacroiliac joints with 24 (22,02%) patients, 19 (79,17%) male and 5 (20,83%) female ($p<0,001$); spine with 11 (10,09%) patients, 6 (54,56%) male and 5 (45,45%) female ($p=0,578$); peripheral joints with 74 (67,89%) patients, 33 (44,59%) male and 41 (55,41%) female ($p<0,01$). When comparing the symptoms, most of the patients (63,30%) skin changes were represented before arthritis, for 27,52% patients arthritis preceded the skin changes, and for 9,17% patients the changes were simultaneous,

Conclusion: Psoriatic arthropathy occurs more often in median age (31 to 50 years old) and it is more common for men than women. For most patient's psoriatic skin changes preceded joints affection, with the most common ones being polyarthrititis.

Keywords: psoriasis; psoriatic arthropathy; psoriasis and association

Introduction

Psoriasis is a non-infectious, chronic proliferative and inflammatory skin disease, that is an immune-mediated disease associated with many other medical conditions. Psoriasis is characterized by erythematous plaques covered with silvery scales particularly over the extensor surfaces, scalp, and lumbosacral region [1,2]. Psoriasis is caused by a combination of genetic and numerous other etiological factors [3], it is a common disease among the white people, and approximately 2-3% of the world population has it [4]. Psoriatic arthropathy (PsA) is a chronic inflammatory seronegative disease associated with psoriasis. They affect peripheral and axial skeleton with erosive arthritis characteristics on peripheral joints, and ankylosing changes on sacroiliac joints

and spine [5]. Research has shown that among the population with psoriasis, 5 to 10% people have some kind of PsA [6]. The strongest form of PsA occurs during the fourth to sixth decade of life, with the same frequency for men and women [7]. Psoriatic formations can occur on every skin part, especially on the extensor extremities, scalp, lumbosacral, gluteal and genital areas. It often affects the penis glans, while it affects the mucosa of the oral cavity less often, and it rarely affects tongue [8]. Pustular psoriasis form, generalized or localized, occurs less often. Localized pustular psoriasis affects the palm and soles skin. Localized pustular psoriasis starts on fingertips and can be accompanied by a severe form of peripheral arthritis. A third of the patients with a generalized pustular psoriasis have arthritis, which usually has a severe clinical course and

predominantly affects the spine. However, even patients with a severe arthritis clinical course can have a mild form of psoriasis that affects only one so called "hidden" area, such as scalp, armpits, umbilical cord, perineum, so it's in fact an "inverse psoriasis". Nail associated psoriatic changes are more common with PsA patients compared to the skin changes, and they occur in more than 80% of patients [8]. Nail changes, which include furrowing and onycholysis, are the only clinical psoriasis manifestations that are significantly associated with PsA development [8,9]. It affects eyes in about one third of PsA patients, including conjunctivitis, iritis, keratoconjunctivitis sicca and episcleritis [10]. Common symptoms are increased fatigue, malaise, fever and, less frequently, morning stiffness. Psoriasis and psoriatic arthropathy have a significantly negative influence on many life quality areas related to health, including physical, professional, social, psychological and sexual wellbeing [11-14].

The goal and purpose of this paper is to point out the rheumatological and orthopaedic problems that are often encountered by physiatrists during the rehabilitation treatment of patients with psoriasis with consequences on the locomotor system, based on our experience treating the psoriatic arthropathies.

Patients and Methods

A prospective cohort study was conducted. The monitored research sample includes 109 patients with a diagnosis of psoriasis and psoriatic arthropathy, aged 29-66 years. Patients were monitored on an outpatient basis and in inpatient treatment at the Special Hospital for Rehabilitation Agnes and the Special Hospital for Progressive Muscular and Neuromuscular Diseases in Novi Pazar, in the period from 2010-2016. The diagnosis was made on the basis of anamnestic data, clinical examination and additional diagnostic findings of native radiography. The patients were divided into three groups, according to the manifestation of articular affections. In the first group there were 24 patients with a diagnosis of psoriatic arthritis localized to the sacroiliac joints, the second group included 11 patients with changes in the spinal cord and in the third group were patients with affection of peripheral joints. Regarding the specifics of the symptom's development, the order of the of symptoms occurrence was observed separately, i.e.,

whether the skin changes preceded the joint changes, or vice versa, or they occurred simultaneously; and the type of cutaneous manifestation of psoriasis, i.e., whether only individual changes were present, or only diffuse, then whether the changes were found only on the nails or only on the head. The clinical picture of sacroiliitis is often mixed with lumbalgia of another etiology, i.e., lumbosacral pain. This applied primarily in cases where sacroiliitis preceded cutaneous manifestations of the disease. The non-recognition of sacroiliitis as part of psoriatic syndrome by physicians is completely justified, although it would be expected that a careful history and clinical examination would establish a clear distinction between sacroiliac joint infection and lumbar syndrome even when degenerative change has not yet developed-a change that would be radiologically verified. The ethics committees of the Special Hospital for Rehabilitation Agnes and the Special Hospital for Progressive Muscular and Neuromuscular Diseases in Novi Pazar gave their consent for conducting the research.

In the analysis of the results, standard descriptive methods were used - determination of the mean value (X) and standard deviation (SD). The comparison of the mean values of the numerical features between the two groups of respondents was performed by Student's-T test or Mann-Whitney U test (Mann-Whitney U Test), depending on the type of data distribution. In all analyzes, an estimate error of 0.05 (5%) was assumed as the limit of statistical significance. The Excel program from the Microsoft Office 2016 software package was used to enter, rank, group, tabulate and graphically display data. The calculations were performed using the SPSS program Version 20.0 (IBM SPSS Statistics 20).

Results

The study included 109 patients (78 men and 51 women). The average age of the patients included in the study was 45.88 ± 8.58 years.

A review of the patients with sacroiliac joint affection Anamnestic data on pain, which begins in the lumbosacral region with propagation towards the hips and flexors of the knee joint, and arthritic changes determined by native radiographs on the sacroiliac joints, were recorded in 24 (19 male and 5 female) patients ($\chi^2 = 18.963$ ip<0.001). The average age of patients with psoriasis with affection on the sacroiliac joints was 44.33 years. The youngest

patient was 29 years old, and the oldest 66. The largest number of patients, 14 (58.33%), were in the range from 31 to 50 years of age (Table 1). Out of 24 examined patients, in 19 (79.17%) besides sacroilitis, polyarthrititis was recorded, while in 5 (20.83%) oligoarthritis was found. Analysis of the native radiographs of the diseased subjects with symptoms of sacroiliac joint damage recorded radiological changes in terms of sclerosis of the joint edges on both sacral and iliac bone in 10 patients (41.67%), while ankylosis of the sacroiliac joints, where the joint ruptures were barely noticeable and which was fully present, was recorded in 7 patients (29.17%). In other subjects (29.17%) the changes that would be observed on X-rays were not fully developed, although there was a discrete marginal joint sclerosis with narrowing of the joint space. Analyzing the evident X-ray changes on the sacroiliac joints (a total of 17 patients with a positive X-ray finding), unilateral affect was detected in 3 patients (17.65%), symmetrical bilateral changes were observed in 9 (52.94%) while in 5 (29.41%) of patients we found bilateral changes in the sacroiliac joints, although they were not symmetrical ($\chi^2 = 10.253$ and $p < 0.001$). This asymmetry could conditionally indicate two times of sacroiliac affections occurrence. This also coincides with the anamnestic data obtained from patients, which indicates two times of symptomatology occurrence related to the sacroiliac region on different sides.

A review of the patients with spinal cord injury Arthritic changes in the joints of the spine, terminologically included under the term arthritis (i.e., spondylitis), were manifested by the appearance of morning long-term stiffness accompanied by pain most often in the lumbar segment of the spine, and much less often in the neck. The objective finding indicated spasm of the paravertebral musculature with percussive sensitivity of the Valleix points, decreased flexion and extension movements, while in the neck segment stiffness was accompanied by morning headaches.

Of the total number of the analyzed psoriasis patients, the symptomatology localized on one of the spinal segments was represented in 10.09% (11 patients: 6 men and 5 women) ($\chi^2 = 1.498$ and $p = 0.683$). In 6 (54.55%) persons there was a long-term morning stiffness localized in the thoracolumbar and lumbar region, while muscle spasm with palpatory-percutaneous sensitivity of the cervical spine was present in 5 (45.45%) patients, of whom 3 had a

headache localized in the occipital region at the same time. The age of the observed patients in whom the existence of clinical and radiological findings on the spinal column was ascertained was 49.9 years (from 32 to 66 years of age) (Table 1).

Analyzing the X-rays of the patients' spines, we found the presence of osteophytes with pronounced uncartrosis on the cervical spine in 5 (45.45%) patients and on the thoracolumbar region in 6 (54.55%) patients. In 3 patients (27.27%) we noticed the existence of horizontal osteophytes on the XI and XII thoracic vertebrae that started from the lower plateau of the vertebral body, indirectly indicating the existence of instability of the spinal segment. We accepted these phenomena as concomitant findings without a direct consequential connection with psoriasis as the underlying disease. In the cervical segment of the spine, we noticed linear longitudinal ossifications on the profile native images, which were localized on the anterior longitudinal ligament in the projection of III, IV and V of the cervical vertebra. Analyzing the thoracic spine segment, also on the radiographs, ossification of the anterior longitudinal ligament was observed in two patients at the level of IX to XII vertebra. In these patients, there were no horizontal osteophytes registered in the three patients on the last two thoracic vertebrae. We considered that it was necessary to perform an analysis of the time of appearance of X-ray changes that accompany spondylitis. Nonspecific ailments that can be described as discomfort and that belong to atypical spondylitis without a clear localization of the painful sensation are usually not accompanied by radiological confirmation. Dyscartrotic or uncartrotic changes in the neck segment occur in one patient during the first ten years after the appearance of the cutaneous manifestation of psoriasis. Uncarthrosis with dysarthrosis in the area of the cervical spine occurs in four patients in the period from ten to twenty years from the beginning of psoriasis, as well as in six patients in the thoracolumbar segment. Occurrence of ossification of the anterior longitudinal spinal ligament was noted twenty years after the onset of psoriasis in two patients. In this group of patients, simultaneous damage to peripheral joints was registered, which was present in 8 patients.

A review of the patients with peripheral joint affection

Small joints (peripheral joints) arthritis was present in 74 (67.89%) patients, 33 (44.59%) males and 41

(55.41%) females ($\chi^2 = 10.390$ and $p < 0.05$). These were the patients in whom psoriasis affected the nail plates (9 patients) while arthritis was localized on the interphalangeal joints of the hands. In 4 patients with the appearance of psoriasis on the nails, the joint manifestation of the disease was in the sense of sacroiliitis (3 patients) and spondylitis (1 patient). Small joints arthritis was present in 47.29% of patients in whom the cutaneous form of the disease was single, while in generalized forms of psoriasis the

presence of small joints arthritis was recorded in 13.51% of patients (10 patients).

Peripheral arthritis was also present in 20 patients (27.02%) in whom the psoriatic skin manifestation was localized exclusively on the hairy part of the head (capillary). The mean age of patients with peripheral joint affect was 50.16 ± 9.33 years. The youngest patient was 34 years old, and the oldest 68. The largest number of patients, 43 (58.11%), were in the range from 41 to 60 years of age (Table 1).

Table 1: Patients' presentation by sex, age and findings relevant to joint affection

Psoriatic arthropathy	Gender	Age					Total	p value
		21 - 30	31 - 40	41 - 50	51 - 60	61 - 70		
Sacroiliac joints	M	1 (4.17%)	5(20.83%)	6 (25%)	3(12.5%)	4(16.67%)	19 (79.17%)	<0.001
	F	-	2(8.33%)	1 (4.17%)	1(4.17%)	1(4.17%)	5(20.83%)	
Spine	M	-	1(9.09%)	2(18.18%)	2(18.18%)	1(9.09%)	6(54.56%)	0.683
	F	-	2(18.18%)	2(18.18%)	1(9.09%)	-	5(45.45%)	
Peripheral joints	M	-	7(9.46%)	9(12.16%)	10(13.51%)	7(9.46%)	33(44.59%)	<0.05
	F	-	8(10.81%)	11(14.86%)	13(17.57%)	9(12.16%)	41(55.41%)	
Total		1 (0.92%)	25(22.94%)	31(28.44%)	30(27.52%)	22(20.18%)	109 (100%)	

Patients presentation by priority of symptomatology and localization of skin changes of the total number of observed patients (n=109) in whom psoriasis with joint manifestation was found, and in relation to the analyzed course of the disease and the appearance of symptoms in terms of determining the priority of symptomatology (whether the cutaneous manifestation preceded joint symptomatology or

joint disease "announced" psoriasis) Chi square test did not determine a statistically significant difference in the mode of onset of the disease between the group of patients with the presence of sacroiliac arthritis and psoriatic spondylopathy on one side and patients with a picture of peripheral arthritis on the other side ($\chi^2=0.835$; $p=0.659$) (Table 2).

Table 2: Time of psoriasis onset and joint manifestations of the disease

Psoriatic arthropathy	Symptom's sequence			Total	p value	
	Skin then articular	Articular then skin	Simultaneously			
Sacroiliac joints	15(62.50%)	7(29.17%)	2(8.33%)	24(22.02%)	<0.001	
Spine	7(63.64%)	3(27.27%)	1(9.10%)	11(10.09%)		
Peripheral joints	47(63.15%)	20(27.02%)	7(9.46%)	74(67.89%)		
Total		69(63.30%)	30(27.52%)	10(9.17%)	109(100%)	

The Mann Whitney test did not show a statistically significant difference between the group of patients with psoriasis with sacroiliac joint and spinal cord infection, and those in whom joint symptoms were absent despite psoriasis ($Z = 1.187$ and $p=0.235$).

There was no statistical significance in the difference between the onset of the disease between the group of patients with the manifestation on the spinal column (thoracolumbar and cervical segment of the spinal column) and the appearance of psoriatic

arthritis on other joints. Using the Chi square test ($\chi^2=0.647$ and $p=0.374$), the stated position of non-existence of a significant difference that referred to the very beginning of the disease in these two groups was confirmed.

If we approach the description of cutaneous psoriatic manifestations, i.e. verification of their presence (which is grouped by description as occasional occurrence of cutaneous manifestations, diffuse distribution, localization only on nail plates and appearance exclusively on the hairy part of the head), **Table 3.** Types of skin manifestations of psoriasis

Psoriatic arthropathy	Type of cutaneous manifestation of psoriasis				Total	p value
	Individual changes	Diffuse changes	Only on the nails	Only on the head		
Sacroiliac joints	10(41.67%)	7(29.17%)	3(12.5%)	4(16.67%)	24(22.02%)	0.261
Spine	5(45.45%)	2(18.18%)	1(9.1%)	3(27.27%)	11(10.09%)	
Peripheral joints	35(47.29%)	10(13.51%)	9(12.16%)	20(27.02%)	74(67.89%)	
Total	50(45.87%)	19(17.43%)	13(11.93%)	27(24.77%)	109(100%)	

Discussion

Our study aimed to determine the incidence and prevalence of psoriatic arthropathy in patients diagnosed with psoriasis. Psoriatic arthropathy is a manifestation of psoriatic disease that could affect up to 48% of patients with psoriasis. The data stated in the literature speaks in favor of the most common occurrence of arthritis at the age of 30 to 55 years of age,^{15,16} while in our country in almost 80% of all patients it is at the age of 30 to 60 years of age. In the group of patients with arthritis as part of psoriasis, we had only one patient younger than thirty years, while the data from the literature indicates that the number of children or persons younger than twenty years is not negligible [17,18].

Epidemiological studies cited by John Hopkins University School of Medicine [4] indicate that there is an equal number of men and women with arthritis as a part of psoriasis. In our group related to the existence of changes in the SI joint, there were significantly more men than women (79.16% of patients or 19 out of 24), while there were 5 women (20.84%).

The research of Šakić et al. (m-5: w-2) [19], as well as Jajić and Assadi (m-7: w-4) [20] agrees that men suffer more from PsA than women. In our study, the most common PsAs were on the peripheral joints

we were not able to notice a significant statistical difference between the localization of cutaneous manifestations and the types of occurrence of affected joints ($\chi^2=5.263$ and $p=0.261$) (Table 3). Individual changes were present in most patients (45.87%); then only head related changes (24.77%); diffuse changes were present in 17.43% of the patients, and the least represented psoriatic changes were manifested only on the nails (11.93%) ($p < 0.001$).

(67.89%), followed by SIZ (22.02%) and finally spondylitis (10.09%).

Numerous studies indicate a prevalence of peripheral joint infection in patients with PsA of 60% [21-26]. The results of the Krawczyk-Wasielewska, Skorupska and Samborski studies indicate a prevalence of SI joint infection in patients with psoriatic arthritis from 34 to 78%, and in patients with psoriasis without joint manifestation from 14 to 23% [27]. The results of other authors speak in favor of a higher frequency of radiological changes in patients with polyarticular form of PsA, which was confirmed in our study [28-30].

If we observe the duration of psoriatic disease with skin changes, it usually takes ten years for psoriatic arthritis and spondylitis to appear, and this is data identical to that of the published works.¹⁷ Skin changes that precede the joint disease in psoriasis, regardless of which form of joint disease it refers to, were present in 69 of the observed patients or 63.30%; simultaneous occurrence of the disease on both skin and joints was recorded in 10 patients (9.17%), while the articular manifestation preceded the cutaneous manifestation in 30 patients (27.52%). In a study conducted in Brazil, which aimed similarly to our study to determine the prevalence of psoriatic arthritis (PsA) in a sample of 524 patients with psoriasis, the diagnosis of PsA was documented in

175 patients (33%), 49% of whom were rheumatologists recently identified. Most people with PsA (72%) had peripheral involvement, 11% had isolated axial involvement, and 17% had both peripheral and axial involvement. Almost half of the respondents with PsA did not have a previous diagnosis [31]. This finding is consistent with the results of our study, but differs from the results of a study aimed at assessing the prevalence and clinical characteristics of PsA in the Chinese population of psoriasis patients, where out of 1928 psoriasis patients, 112 patients (5.8%) had PsA, of which 92% were newly diagnosed. Oligoarthritis (48.2%) was the most common pattern of manifestation, followed by spondylitis (26.8%), polyarthritis (19.6%) and classic distal interphalangeal (DIP) arthritis (5.4%). Compared to patients without PsA, patients with PsA had more severe skin disease, higher frequency of nail changes (46.4% vs. 21.0%) and scalp involvement (90.2% vs. 76.4%) [32]. The results reported in the literature [15,33,34]. indicate that in the group of patients with lifelong manifestations of the disease in 70% of the patients there is a skin form that precedes the joint one; in 15% of all the cases both skin and joint form appear at the same time; while in 15% of the cases the articular form occurs as an introduction to the clinical form of some sort of psoriasis, regardless of whether it occurs in the form of capillary psoriasis, nail plates, numismatics or geography. Recognizing the true physical, social, and emotional burden of psoriasis and psoriatic arthropathy, as well as their associated factors, is the first step to improving the prognosis for affected patients [35].

Conclusion

Inflammatory processes on the sacroiliac joints, as a consequent condition within psoriasis, occur more often in middle age (from 31 to 50 years of age) and are more common in men with psoriasis than in females. In most patients, psoriasis skin changes were preceded by the appearance of joint symptoms, whether it was the joints of the spine or other affected joints. The appearance of skin changes is usually only local; forms of generalized psoriasis were present in 19 patients (17.43%), in the shape of psoriasis geographica.

Polyarthritis was the most common form of joint infection in psoriasis. If we observe exclusively sacroiliitis, we notice that it is most often present as bilateral and symmetrical, although there is a

possibility of unilateral affection or bilateral, but asymmetrical. Analyzing the radiological changes as part of the damage that occurs on the cervical and thoracolumbar segment of the spine, we can single out somewhat characteristic findings that would be described as ossification of the longitudinal anterior ligament. Changes of uncartrotic nature, as well as dysarthrotic elements, and the presence of claw osteophytes, are not exclusively related to psoriasis as the basic disease within which the described changes occur. Namely, these changes are common among the population in middle and old age, regardless of the presence of psoriasis.

Conflict of Interest

Authors declare no conflict of interest.

Abbreviation

PsA - Psoriatic arthropathy

References

1. Griffiths CEM, Armstrong AW, Gudjonsson JE, et al. (2021). Psoriasis. *Lancet*. 397(10281):1301-1315.
2. Thorleifsdottir RH, Sigurdardottir SL, Sigurgeirsson B, et al. (2016). Patient-reported Outcomes and Clinical Response in Patients with Moderate-to-severe Plaque Psoriasis Treated with Tonsillectomy: A Randomized Controlled Trial. *Acta Derm Venereol*.
3. Elder J, Bruce A, Gudjonsson J, et al. (2010). Molecular dissection of psoriasis: integrating genetics and biology. *J Invest Dermatol*, 130:1213-1226.
4. Gudjonsson JE, Elder JT. (2007). Psoriasis: epidemiology. *Clin Dermatol*, 25: 535-546.
5. Moll JMH, Wright V. (1973). Psoriatic arthritis. *Semin Arthritis Rheum*, 3:55-78.
6. Musculoskeletal Problems and Functioning Limitations: The Great Public Health Challenge for the 21st Century. Geneva: World Health Organization, (2003).
7. Stucki B. (2005). International Classification of Functioning, Disability, and Health (ICF). A promising framework and classification for rehabilitation medicine. *Am J Phys Med Rehabil*, 84:733-740.
8. Andrew G. Franks, Jr. (2004). Psoriatic arthritis and Reiter syndrome. In: Sontheimer RD, Provst

- TT, eds. Cutaneous manifestations of rheumatic diseases. 2nd ed. Philadelphia, 197-204.
9. Gladman DD, Anhorn KB, Schachter RK, et al. (1986). HLA antigens in psoriatic arthritis. *J Rheumatol*, 13:586-564.
 10. Banares A, Hernandez-Garcia C, Fernandez-Gutierrez B, et al. (1998). Eye involvement in the spondyloarthropathies. *Rheum Dis Clin North Am*, 24:771-784.
 11. Krueger G, Koo J, Lebwohl M, et al. (2001). The impact of psoriasis on quality of life: results of a 1998 National Psoriasis Foundation patient-membership survey. *Arch Dermatol*, 137:280-284.
 12. Langley RG, Krueger GG, Griffiths CE. (2005). Psoriasis: epidemiology, clinical features, and quality of life. *Ann Rheum Dis*, 64(S2):18-23.
 13. Dalgard FJ, Gieler U, Tomas-Aragones L, et al. (2015). The psychological burden of skin diseases: a cross-sectional multicenter study among dermatological out-patients in 13 European countries. *J Invest Dermatol*, 135:984-991.
 14. Schoels MM, Aletaha D, Alasti F, et al. (2016). Disease activity in psoriatic arthritis (PsA): defining remission and treatment success using the DAPSA score. *Ann Rheum Dis*, 75:811-818.
 15. Psoriatic Arthritis. (2011). The Johns Hopkins University School of Medicine and the Johns Hopkins Arthritis Center.
 16. Kavanaugh A, Gladman D, van der Heijde D, et al. (2015). Improvements in productivity at paid work and within the household, and increased participation in daily activities after 24 weeks of certolizumab pegol treatment of patients with psoriatic arthritis: results of a phase 3 double-blind randomized placebo-controlled study *Ann Rheum Dis*, 74:44-51.
 17. Catanoso M, Pipitone N, Salvarani C. (2012). Epidemiology of Psoriatic Arthritis. *Reumatismo*, 64(2):66-70.
 18. Sieper J, Caron P, van den Bosch F. (2012). Spondyloarthropathies: treatment. *BMJ group, eulAr textbook on rheumatic Diseases*. First edition, 276-300.
 19. Šakic D, Badovinac O, Delija A, et al. (2006). Psoriasis and psoriatic arthritis prevalence in two psychiatric surgeries – *Med Jad*, 36(3-4):83-86.
 20. Jajić Z, Assadi G. (2003). Učestalost psorijatičnog artritisa u populaciji bolesnika s psorijazom. *Acta Med Croatica*, 57:323-326.
 21. Helliwell P, Marchesoni A, Peters M, et al. (1991). A re-evaluation of the osteoarticular manifestations of psoriasis. *Br J Rheumatol*, 30:339-345.
 22. Jones SM, Armas JB, Cohen MG, et al. (1994). Psoriatic arthritis: outcome of disease subsets and relationship of joint disease to nail and skin disease. *Br J Rheumatol*, 33:834-839.
 23. Veale D, Rogers S, Fitzgerald O. (1994). Classification of clinical subsets in psoriatic arthritis. *Br J Rheumatol*, 33:133-138.
 24. Kane D. (2003). A prospective, clinical and radiological study of early psoriatic arthritis: an early synovitis clinic experience. *Rheumatology*, 42:1460-1468.
 25. Reich K, Krüger K, Mössner R, et al. (2009). Epidemiology and clinical pattern of psoriatic arthritis in Germany: a prospective interdisciplinary epidemiological study of 1511 patients with plaque-type psoriasis. *Br J Dermatol*, 160:1040-1047.
 26. Kumar R, Sharma A, Dogra S. (2014). Prevalence and clinical patterns of psoriatic arthritis in Indian patients with psoriasis. *Indian J Dermatol Venereol Leprol*, 80:15-23.
 27. Krawczyk-Wasielewska A, Skorupska E, Samborski W. (2013). Sacroiliac joint pain as an important element of psoriatic arthritis diagnosis. *Postepy Dermatol Alergol*, 30(2):108-112.
 28. Laiho K, Kauppi M. (2002). The cervical spine in patients with psoriatic arthritis. *Ann Rheum Dis*, 62:650-652.
 29. Jenkinson T, Armas J, Evison G, et al. (1994). The cervical spine in psoriatic arthritis: A clinical and radiological study. *Brit J Rheumatol*, 33:255-259.
 30. Helliwell PS, Porter G, T aylor WJ. (2006). Polyarticular psoriatic arthritis is more like oligoarticular psoriatic arthritis, than rheumatoid arthritis. *Ann Rheum Dis*.
 31. Ranza R, Carneiro S, Qureshi AA, et al. (2015). Prevalence of psoriatic arthritis in a large cohort of Brazilian patients with psoriasis. *J Rheumatol*, 42(5):829-834.
 32. Yang Q, Qu L, Tian H, et al. (2011). Prevalence and characteristics of psoriatic arthritis in Chinese patients with psoriasis. *J Eur Acad Dermatol Venereol*, 25(12):1409-1414.
 33. Mercieca C, Landewé R, Borg AA. (2012). Spondyloarthropathies: pathogenesis and clinical

- Features. u: textbook on rheumatic Diseases. BMJ group, eulAr, 255-275.
34. Ethimiou P, Markensonj A. (2006). Psoriatic arthritis. Manual of rheumatology and outpatient orthopedic Disorders, diagnosis and therapy. Fifth edition. Baltimore: Lippincott Williams & Wilkins, 318-324.
35. Menter A. (2016). Psoriasis and psoriatic arthritis overview. Am J Manag Care, 22(8S):216-224.

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