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ORIGINAL ARTICLE

Use of Psoriasis Epidemiology Screening Tool (PEST) to Identify Psoriatic Arthritis in Bosnia and Herzegovina

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Abstract

Background/Aim: Psoriatic arthritis (PsA) is chronic inflammatory disease with estimated prevalence of 6 % to 41 % in patients with psoriasis. The aim of this study was to determine the prevalence of PsA in Bosnian patients with psoriasis in everyday dermatological practice by using psoriasis epidemiology screening tool (PEST) screening test for detection of PsA.

Methods: This cross-sectional study included patients with a confirmed diagnosis of psoriasis. Data on patient demographics, clinical characteristics and treatment history, were collected using a questionnaire. Clinical characteristics of psoriasis included clinical cutaneous manifestations and plaques and psoriasis area and severity index (PASI). The risk of having PsA was evaluated by PEST (scores ≥ 3 indicate risk of PsA). The data were analysed using the Chi-square and Independent t-test.

Results: Of 79 included psoriatic patients, 22.8 % had a PEST ≥ 3. Psoriatic patients with PEST ≥ 3 were more likely to have certain comorbidities such as cardiovascular diseases ($p = 0.044$) and psychological disorders ($p = 0.022$). The psoriatic patients with PEST < 3 and PEST ≥ 3 did not differ in PASI severity, but psoriatic patients with PEST ≥ 3 were more likely to have nail psoriasis ($p < 0.001$).

Conclusion: In the present study, using PEST questionnaire, one fifth of Bosnian patients were suspected of having PsA, highlighting a need for improved screening for PsA in daily dermatological practice. Earlier care is important because these patients were more likely to have cardiovascular diseases, psychological disorders and nail disease.

Key words: Psoriasis; Arthritis, psoriatic; PEST; PASI; Screening; Dermatologists.

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Introduction

Psoriasis is a chronic, inflammatory, multisystem disease associated with numerous comorbidities such as, inflammatory bowel diseases, uveitis, psychological disorders, metabolic syndrome (abdominal obesity, insulin resistance, diabetes, hypertension, atherosclerosis), cardiovascular diseases (CVD) and psoriatic arthritis (PsA).[1] PsA is chronic inflammatory disease with estimated prevalence of 6 % to 41 % in patients with psoriasis.[1] The incidence of PsA is directly related to the severity of the clinical picture of psoriasis, however, even patients with a milder form of psoriasis can develop PsA.[2, 3] Genetic predisposition, immune factors and environmental factors are thought to be responsible for the development of PsA. It is known that pro-inflammatory cytokines secreted from activated T-cells, especially tumour necrosis factor alpha (TNF-α), interleu-

kins (IL-17, IL-18 and IL-23) induce the proliferation and activation of synovial and epidermal fibroblasts. CD8+, IL-17+ cells, natural killer cells and innate lymphoid cells are present in high concentrations in the synovial fluid and skin lesions of patients with PsA.[3] Environmental factors involved in pathogenesis are infections (streptococci, *Borrelia burgdorferi*, viruses), trauma, recurrent oral ulcerations, bone fractures, etc.[4]

PsA is manifested as the arthritis of the distal interphalangeal joints, asymmetric oligoarthritis, symmetric polyarthritis, spondylarthritis and mutilating arthritis.[3] Symptoms include tenderness and/or swelling, pain and stiffness in one or more joints, most commonly the hands, feet, ankles and knees. From the onset of arthritis symptoms to referral to a rheumatologist and diagnosis of PsA, 6-12 weeks or even longer can pass.[5] If the diagnosis and therapy are delayed for more than six months, there is a 4.2 times higher probability that joint erosions will develop and a two times higher probability that the patient will have functional disability.[5, 6] Considering the fact that up to 84 % patients with PsA develop manifest skin lesions before clinically evident joint involvement,[7] dermatologists play a crucial role in minimising diagnostic delays by actively screening patients with psoriasis for PsA.

Several simple and validated screening tests have been proposed to detect PsA in patients with psoriasis, including the psoriatic arthritis screening and evaluation (PASE),[8] the Toronto PsA screening questionnaire (ToPAS),[9] the screening tool for rheumatologic investigation in psoriatic patients (STRIPP)[10] and the psoriasis epidemiology screening tool (PEST).[11] Due to its simplicity and ease of use, PEST has an advantage over other tests.[2] Although it consists of five simple questions, PEST presents results with sensitivity and specificity of 92 % and 78 %, respectively.[6] It has been shown that PEST test had slightly better diagnostic performance than PASE and ToPAS in detecting PsA in patients with psoriasis.

While the PEST questionnaire has been used for detecting PsA in different countries,[2] there are no data about its use for the Bosnian population. The aim of this study was to determine the prevalence of PsA in a Bosnian patients with psoriasis in everyday dermatological practice by using PEST screening test for detection of PsA.

Methods

The Ethical Board of the Faculty of Medicine approved the study (No 18/4,48/23) and the research was carried out following the guidelines of Good Clinical Practice and the Helsinki Declaration. Before participating in the study, all enrolled patients gave written informed consent.

This cross-sectional study was conducted at the Skin and Venereal Diseases Clinic of the University Clinical Centre of the Republic of Srpska in Banja Luka, Bosnia and Herzegovina. Dermatology patients aged 18 and over with a confirmed diagnosis of psoriasis and no diagnosis of PsA were included from 1 May 2023 to 1 April 2024. Data on patient demographics, clinical characteristics and treatment history, were collected using a questionnaire. Demographics data included age, sex, body mass index (BMI), divided to: BMI < 30, BMI ≥ 30; physician-reported history of comorbidities, family history of psoriasis and smoking status. The history of psoriasis included onset of the disease (before or after the age of 40) and prior and current use of psoriasis medication. Clinical characteristics of psoriasis included several clinical cutaneous manifestations of psoriasis but most like presents as chronic, symmetrical, erythematous, scaling papules and plaques and psoriasis area and severity index (PASI).

PASI is an indicator of erythema, infiltration, desquamation and percentage of skin involvement. Patients with a PASI score of < 10 were considered to have a mild form of psoriasis, with a score between 10 and 20 moderate or moderate to severe and with a PASI score of > 20, a severe form of the disease. All patient completed PEST questionnaire which consists of five simple questions: 1) Have you ever had a swollen joint or joints?; 2) Has your doctor ever told you that you have arthritis?; 3) Do you have indentations (holes) on your fingernails or toenails?; 4) Have you ever had heel pain?; and 5) Have you ever had a toe or finger that was swollen and painful for no apparent reason?; with "yes" or "no" response. Each "yes" response to any of the five questions had a value of 1 point. Based on PEST score psoriatic patients were classified that had no risk of having PsA (PEST < 3) or had risk of having PsA (PEST ≥ 3).[11]

Statistical analysis

Statistical analysis was performed in SPSS Programme v 20.0 (*IBM Corp*, Armonk, NY). Results

were presented as mean ± standard deviation (SD) for continuous variables and percentages for categorical variables. Statistical comparisons between PEST groups were performed using Independent t-test and Chi-square test for continuous and categorical variables, respectively. Values of $p < 0.05$ were considered statistically significant.

Results

Results of PEST questionnaire is showed in Table 1. Patients most commonly answered 'yes' to "Do you your fingernails or toenails have holes or pits?" (44.3 %). Of 79 included psoriatic patients, 18 (22.8 %) had a PEST ≥ 3. Patients who had PEST ≥ 3 most commonly answered 'yes' to "Have you ever had a swollen joint (or joints)?" (94.4 %) ($p < 0.001$) and "Have you had a finger or toe that was completely swollen and painful for no apparent reason?" (94.4 %) ($p < 0.001$), followed by "Do your finger nails have holes or pits?" (88.9 %) ($p < 0.001$), "Have you ever had pain in your heel?" (38.9 %) ($p = 0.094$) and "Has a doctor ever told you that you have arthritis?" (22.2 %) ($p = 0.009$).

Table 1: The results of psoriasis epidemiology screening tool (PEST) questionnaire

Questions	N	%
Q1. Have you ever had a swollen joint (or joints)?		
Yes	27	34.2
No	52	65.8
Q2. Has a doctor ever told you that you have arthritis?		
Yes	5	6.3
No	74	93.7
Q3. Do you your fingernails or toenails have holes or pits?		
Yes	35	44.3
No	44	55.7
Q4. Have you had pain in your heel?		
Yes	19	24.1
No	60	75.9
Q5. Have you had a finger or toe that was completely swollen and painful for an apparent reason?		
Yes	28	35.4
No	51	64.6
PEST score		
PEST < 3	61	77.2
PEST ≥ 3	18	22.8

Table 2: Demographic characteristics of psoriatic patients with PEST < 3 and PEST ≥ 3

Variables	PEST < 3 n = 61	PEST ≥ 3 n = 18	p-value
Age, mean ± SD (years)	**46.6 ± 16.3**	**52.7 ± 11.9**	**0.148**
Sex n (%)			
Female	22 (36.1)	6 (33.3)	0.831
Male	39 (63.9)	12 (66.7)	
BMI, n (%)			
BMI < 30	23 (37.7)	14 (77.8)	0.269
BMI ≥ 30	38 (62.3)	4 (22.2)	
Comorbidities, n (%)			
Hypertension	20 (32.8)	6 (33.3)	0.965
CVD	3 (4.9)	4 (22.2)	0.044

Diabetes	6 (9.8)	1 (5.6)	1.000
Inflammatory bowel diseases	2 (3.3)	2 (11.1)	0.222
Psychological disorders (anxiety, depression)	2 (3.3)	4 (22.2)	0.022
Smoking status, n (%)			
Smoker	23 (37.7)	10 (55.6)	0.177
Non-smoker	38 (62.3)	8 (44.4)	
Family history of psoriasis, n (%)			
Yes	20 (32.8)	5 (27.8)	0.688
No	41 (67.2)	13 (72.2)	
Psoriasis onset, n (%)			
Before age of 40	46 (75.4)	12 (66.7)	0.461
After age of 40	15 (24.6)	6 (33.3)	
Psoriasis duration, mean ± SD (months)	**15.6 ± 10.5**	**16.9 ± 11.8**	**0.648**
Prior medication intake, n (%)			
Local	50 (82.0)	15 (83.3)	1.000
Phototherapy	29 (47.5)	7 (38.9)	0.517
Methotrexate	16 (26.2)	6 (33.3)	0.555
Retinoids (Acitretin)	3 (4.9)	1 (5.6)	1.000
Ciclosporin	1 (1.6)	0 (0.0)	1.000
Biological	2 (3.3)	0 (0.0)	1.000
Biosimilars	3 (4.9)	0 (0.0)	1.000
Current medication intake, n (%)			
Local	40 (65.6)	14 (77.8)	0.398
Phototherapy	8 (13.1)	2 (11.1)	1.000
Methotrexate	12 (19.7)	3 (16.7)	1.000
Retinoids (Acitretin)	1 (1.6)	0 (0.0)	1.000
Ciclosporin	0 (0.0)	0 (0.0)	-
Biological	16 (26.2)	4 (22.2)	1.000
Biosimilars	2 (3.3)	0 (0.0)	1.000

SD: standard deviation; PEST: psoriasis epidemiology screening tool; BMI: body mass index; CVD: cardiovascular diseases;

Psoriatic patients with PEST ≥ 3 were more likely to have certain comorbidities such as CVD (eg coronary artery disease, heart failure) (22.2 % vs 4.9 %) (p = 0.044) and psychological disorders (22.2 % vs 3.3 %) (p = 0.022). No difference in other demographic characteristics (age, sex, BMI, other comorbidities beside CVD and psychological disorders, smoking status, family history of psoriasis, psoriasis onset and duration and prior and current medication intake) between psoriatic patients with PEST < 3 and PEST ≥ 3 was found (Table 2).

Table 3: Clinical characteristics of psoriatic patients with PEST < 3 and PEST ≥ 3

Variables	PEST < 3 n = 61	PEST ≥ 3 n = 18	p-value
PASI			
PASI < 10 (mild form)	15 (24.6)	6 (33.3)	0.4420
PASI 10 - 20 (moderate to severe)	31 (50.8)	10 (55.6)	
PASI > 20 (severe)	15 (24.6)	2 (11.1)	
Psoriasis localisation			
Scalp	38 (62.3)	14 (77.8)	0.2690
Nails	29 (47.5)	17 (94.4)	**< 0.0001**
Folds	23 (37.7)	9 (50.0)	0.4170
Palms and/or soles	11 (18.0)	1 (5.6)	0.2780

PEST: psoriasis epidemiology screening tool; PASI: psoriasis area and severity index;

The groups did not differ significantly in terms of PASI severity. Psoriatic patients with PEST ≥ 3 were more likely to have nail psoriasis (94.4 % vs 47.5 %) ($p < 0.001$) (Table 3). Other psoriasis localisation except palms and/or sores were higher in patients with PEST ≥ 3, but the differences were not statistically significant.

Discussion

This cross-sectional study identified patients with possible PsA in the dermatology clinic using a PEST questionnaire. A prevalence of possible PsA (PEST ≥ 3) in psoriasis patients of 22.8 % was found in the entire sample. When comparing patients with PEST < 3 and PEST ≥ 3, patients with PEST ≥ 3 were more likely to have CVD, psychological disorders (anxiety, depression) and nail psoriasis.

The average age of patients from the sample was 46.62 in PEST < 3 group and 52.67 in PEST ≥ 3 group, which correlates with the bimodal distribution of psoriasis and the appearance of the second peak incidence in the 5th and 6th decade of life.[3, 12] In the paper by Trettel et al which related to the influence of age on health care in Germany and which included over 3000 patients, more than 60 % of patients were aged 35-64.[13] The fact that more than two thirds of patients in both groups had psoriasis before the age of 40 indicates that it is Type I psoriasis, which often occurs in several members of the same family and has a more severe clinical picture. According to the PASI score, more than half of the patients in both groups have moderate to severe psoriasis. In most studies, the prevalence of moderately severe and severe psoriasis is between 10 % and 30 %.[14, 15] A positive family history of psoriasis was identified in 31.6 % of presented patients. The results of a multicentre observational study showed a positive family history in 10.8 % of patients with psoriasis and that in these patients the disease onset occurred much earlier, lasted longer and that PsA is much more common.[16]

The results of several studies and a meta-analysis revealed that 10 % of patients with psoriasis have undiagnosed PsA.[17] The treatment of PsA is often delayed because the disease is often not diagnosed in time or is misdiagnosed, which often leads to poor outcomes.[18, 19] Even a six-month delay in the diagnosis of PsA from the onset of symptoms is known to be associated with structural joint damage and worse long-term physical function.[20] Although there are various tools for determining the presence of PsA in populations, including PEST, little is known about their utility and they are rarely applied in everyday practice of dermatologists. According to available literature there are no data about use PEST utilisation in dermatological practice in a Bosnian population. Among 79 patients with a confirmed diagnosis of psoriasis and no diagnosis of PsA, 22.8 % had PEST ≥ 3 which requires further rheumatological evaluation. The prevalence of previously undiagnosed PsA in present study is within the range encountered in other studies where PEST questionnaire was used.[17]

In the present study patients with PEST ≥ 3 was more likely to have CVD, psychological disorders (anxiety, depression) and nail disease. Various studies have reported the significant association between CVD and psoriasis. Although some studies found similar CVD risk between psoriatic and PsA patients,[21] others found increased risk of CVD events in PsA.[22] The pathophysiological mechanisms underlying the association of CVD with psoriasis and PsA can be attributed to multifactorial causes, including genetics, Th1- and Th17-pathways, neutrophils, angiogenesis and abnormalities in endothelial cells and adipose tissues.[23-25] In the present study psoriatic patients with PEST ≥ 3 were more likely to have CVD indicating the necessity for improved CVD risk assessment in PsA in order to prevent or reduce cardiovascular morbidity and mortality. Namely, recent studies have shown that CVD is the main cause of death in PsA patients.[26]

Psoriasis and PsA can reduce the quality of life and are known to be associated with depression and anxiety.[27] A recent systematic review showed a prevalence of depression in patients with PsA ranging from 5 to 51 %, depending on tools/thresholds used to define cases[28] and anxiety ranging from 15 to 30 %.[29] The link between depression and PsA proves challenging. Convincing evidence points towards the involvement of inflammatory reactions in the development of depression. This is evident through the heightened presence of proinflammatory cytokines, acute phase reactants and chemokines in individuals diagnosed with major depression, despite their overall good health.[30] Pro-inflammatory

cytokines levels involved in the pathogenesis of PsA, such as IL-6, IL-17 and TNFα, are raised in patients with anxiety, as well.[31] Hyperactivity of the hypothalamic-pituitary-adrenal axis is often present in depression resulting in the release of elevated levels of corticotropin-releasing hormone which has been proposed to contribute to the pathological mechanisms associated with joint inflammation in arthritis.[32] Therefore, a bi-directional relationship between PsA and depression appears to exist.
Depression was furthermore shown to increase the perception of pain. Studies showed an interconnection between pain from PsA and depressive symptoms, pointing towards a shared inflammatory cause for both.[33]

While psoriasis can manifest in various locations on the body, specific clinical manifestations may serve as predictors for PsA. Nail disease is among the strongest predictors for development of PsA.[34] The close connection between the nail, enthesis and the tendon of the DIP joint has been established.[35] Consequently, inflammation associated with PsA in the DIP joint can readily extend into the nail matrix, manifesting as skin eruptions around the nails and the nail itself.[35, 36] The hazard ratios for PsA in patients with nail psoriasis are 2.93.[12] In the case of mild psoriasis, 83 % of patients with scalp and nail psoriasis meet the CASPAR criteria for PsA.[37]

Presented study also has some limitations. This study was conducted at a single institution and the number of patients included in the study was limited. However, this is one of the main tertiary care centres in the country. Diagnosis of possible PsA reported by dermatologists according to PEST and data about confirmation by a rheumatologist is not reported. Some of medication used may have suppressed the presentation of musculoskeletal symptoms, affecting patients' responses to the PEST questionnaire. However, a higher percentage of individuals diagnosed with PsA who were already undergoing systemic treatment would challenge this theory. Further research is needed to characterise patients by individual PEST score and to assess outcomes over time. Several national and international consensus documents, as well as other projects, recommend a multidisciplinary approach involving primary care physicians, dermatologists and rheumatologists, in order to establish more effective strategies for early and accurate detection of PsA.[2, 18, 19]

Conclusion

In the present study, using PEST questionnaire, 22.8 % of Bosnian patients were suspected of having PsA, highlighting a need for improved screening for PsA in daily dermatological practice. Patients with PEST ≥ 3 were more likely to have CVD, psychological disorders (anxiety, depression) and nail disease. Only a multidisciplinary approach that includes primary care physicians, dermatologists and rheumatologists can lead to a more effective strategy for early and accurate detection of psoriatic arthritis.

Ethics

The study was approved by The Ethical Board of the Faculty of Medicine University of Banja Luka, decision No 18/4,48/23, dated 03 April 2023. Written informed consent was obtained from patients prior to their participation in the study and for publishing of the anonymised data. The study was organised and implemented based on the adherence to the Ethical Principles for Medical Research Involving Human subjects (The Declaration of Helsinki, 8th Revision, 2013).

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Conflicts of interest

The authors declare that there is no conflict of interest.

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Data access

The data that support the findings of this study are available from the corresponding author upon reasonable individual request.

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