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Psoriatic arthritis in Jordan: a cross-sectional study of disease characteristics, patient-reported outcomes, and disease activity

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Abstract

Background Psoriatic arthritis (PsA) is a chronic, inflammatory rheumatic disease. We aim to describe the characteristics of PsA patients and examine factors affecting their psychological and physical well-being.

Methods This multicenter, cross-sectional study enrolled consecutive PsA patients from rheumatology clinics over six months. Data was collected through questionnaires and chart reviews. Disease activity was assessed using Disease Activity in Psoriatic Arthritis (DAPSA) and Psoriatic Arthritis Impact of Disease-12 (PsAID-12), with fibromyalgia and psychological well-being screened via Fibromyalgia Rapid Screening Tool (FiRST) and Patient Health Questionnaire-4 (PHQ-4), respectively.

Results The study enrolled 105 patients with a mean age of 45.6 ± 12.9, and 46.7% (*N* = 49) were males. The predominant disease type was polyarthritis (80%, *N* = 84), with 90.5% (*N* = 95) having psoriasis (PSO). Arthritis and PSO were diagnosed simultaneously in 18 patients (17.1%), arthritis preceded PSO in 11 patients (10.5%) by 3.5 ± 3.8 years, and PSO preceded arthritis in 76 patients (72.4%) by 10.65 ± 11.27 years. The diagnostic delay of PsA was 3.1 ± 4.9 years. Methotrexate was used by 50.5% (*N* = 53) and 20% (*N* = 21) used anti-TNF. Severe disease activity, according to DAPSA scores, was present in 38.1%, positive screening for fibromyalgia in 29.5% (*N* = 31), and 35.2% (*N* = 37) had severe depression and anxiety-related symptoms. Using multivariate regression analysis, Obesity (OR = 3.267, 95% CI: 1.015–10.513) and the presence of CVD (OR = 4.769, 95% CI: 1.121–20.293) were predictors of bone erosions. PsAID-12 scores and ESR were associated with severe depression and anxiety-related symptoms (95% OR: 1.443–4.459 and 1.001:1.078), respectively.

Conclusions Patients with PsA often face diagnostic delays, with fibromyalgia, depression, and anxiety being common, resulting in poorer patient-reported outcomes.

Keywords Psoriatic arthritis, Patient-reported outcomes, Fibromyalgia, Depression

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Introduction

Psoriatic arthritis (PsA) is a chronic inflammatory condition associated with psoriasis [1]. It is a heterogeneous disease that affects multiple body parts, including peripheral and axial joints, entheses, skin, and nails [2]. Complications of PsA are diverse and include joint damage, an increased risk of cardiovascular diseases (CVDs), metabolic syndrome, depression, and anxiety [3]. The pathogenesis of PsA is not fully understood. Still, it is believed to involve various factors, including genetic susceptibility, DNA methylation, dysbiosis, biomechanical stress, obesity, smoking, infections, and immune-inflammatory processes [4]. The worldwide prevalence of PsA among the general population is estimated at 133 for every 100,000 subjects [5], while in the Middle East and North Africa, the prevalence is 1 per 100,000 [6]. The reason for the difference in PsA prevalence between the Middle East and the rest of the world hasn't been well described in the literature. PsA patients can present with a broad spectrum of clinical manifestations, including enthesitis and dactylitis, involving one or more peripheral or axial joints. PsA can also present with extra-articular manifestations such as psoriasis, uveitis, and inflammatory bowel disease (IBD) [7]. The Classification Criteria for Psoriatic Arthritis (CASPAR), developed in 2006, is the standard tool to classify patients with PsA accurately [8].

Patients with PsA face considerable psychological burdens [9, 10], including a high prevalence of depression (9-22%) and anxiety (15-30%) among patients [11]. In addition, patients with PsA are at an increased risk of fibromyalgia compared to the general population, which can significantly affect their perception of symptoms, quality of life, and how rheumatologists manage the condition [12].

Multiple assessment tools were developed to help manage and understand the disease burden on patients with PsA, including Psoriatic Arthritis Impact of Disease-12 (PsAID-12), a patient-reported outcome measure developed by the European League Against Rheumatism in 2014 evaluating 12 domains. In addition, Disease Activity in Psoriatic Arthritis (DAPSA) is among the measures of disease activity that encompasses both clinical and laboratory features of PsA [13]. There are multiple therapeutic options for PsA, including nonsteroidal anti-inflammatory drugs (NSAIDs) and disease-modifying antirheumatic drugs (DMARDs). DMARDs can be classified as conventional synthetic (e.g., methotrexate), targeted synthetic (e.g., tofacitinib), or biologic agents, which include tumor necrosis factor (TNF) inhibitors, interleukin-17 (IL-17) inhibitors, IL-23 inhibitors, Janus kinase (JAK) inhibitors and phosphodiesterase-4 (PDE4) inhibitors. The selection of treatment is guided by disease severity, therapeutic response and drug tolerability [14–16].

There is a paucity of studies characterizing patients or evaluating the burden of the disease in the Arab regions [6]. The same applies to Jordan, where only a single-center study was conducted [17]. This study aims to demonstrate the characteristics of PsA in Jordanian patients and to study the relationship between disease activity, patient-reported outcomes, and different demographics and disease features.

Methods

Study design

This study is a cross-sectional, multi-centric study that aims to describe patients with PsA in Jordan. Data was collected from rheumatology clinics in three tertiary-care hospitals, where patients from across the country are referred. The three hospitals are Jordan University Hospital and King Abdullah University Hospital, the only two teaching hospitals in the country affiliated with the schools of medicine at the University of Jordan and the Jordan University of Science and Technology, respectively, in addition to the largest military services affiliated hospital, the King Hussein Medical Center. Patients with PsA diagnosis were approached, and those who consented to participate in the study were enrolled. Data was collected from November of 2022 till May of 2023. The study followed the methodology of the TranslAte, CulTurally adapt, and validate the PsAID in ArabIC (TACTIC) published recently [18]. The methods concurred with the Consensus-based Standards for selecting health status Measurement Instruments (COSMIN) checklist [19] and complied with published guidelines [20].

Sample size and inclusion criteria

All adult patients diagnosed with PsA, meeting the CASPAR criteria, were included in the study. Exclusion criteria included patients unwilling to participate or illiterate who showed no understanding of the questionnaire questions. The rheumatology fellows (AA, WR, RR) filled out the questionnaire in the three sites during the patients' regular visits to rheumatology clinics. All patients signed written consents.

Data collection

We gathered sociodemographic data from included participants, including age, sex, marital status, occupation, and educational level. Health-related data were also collected from medical records, including comorbidities (Hypertension, diabetes, cardiovascular diseases, hypothyroidism, osteoporosis), family history of the patients, articular and extra-articular manifestations of the disease, laboratory values (Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP)), the weight and the height of the patients and the presence of radiographic erosions was based on the rheumatologist's interpretation

of the patient's images and recorded in the clinic notes. Laboratory, treatment, sociodemographics, PsA disease activity and psychological scores (PHQ-4, HAQ, PsAID-12, DAPSA, FiRST) and comorbidities-related data were collected simultaneously.

Evaluation of PsA disease activity and psychological well-being of the patients

We evaluated the functional status of patients using the Health Assessment Questionnaire (HAQ) [21], a tool developed to assess the functional ability of patients with rheumatic diseases. We also used the four items Patient Health Questionnaire (PHQ-4) [22] in assessing symptoms related to anxiety and depression, and the Fibromyalgia Screening Tool (FiRST) was also used to estimate the rate of fibromyalgia symptoms among the patient's sample [23].

The Psoriatic Arthritis Impact of Disease-12 (PsAID-12) is a patient-reported outcome measure developed by the European League Against Rheumatism in 2014 to evaluate the patient-reported symptoms. This outcome measure intends to evaluate twelve domains (Pain, Skin problems, Fatigue, work and leisure activities, functional capacity, discomfort, sleep disturbances, anxiety, depression, coping ability, social participation, and life enjoyment). Each domain is scored from 0 (No impact) to 10 (Maximum impact), and then scores are weighted to a final score ranging from (0–10), with scores above four meaning a high PsAID-12 score. Ziadé et al. validated its Arabic version [18].

Additionally, we used the Disease Activity in Psoriatic Arthritis (DAPSA) measure, which is a doctor-administered tool used to assess musculoskeletal aspects of PsA, including five domains: joints tenderness, joint swelling, patient global assessment (PGA) (which is a subjective assessment of patients' disease activity), patients pain assessment and CRP. Scores 0–4 indicate remission, 5–14 indicate low disease activity, 15–28 indicate moderate disease activity, and scores above 28 indicate high disease activity [13]. The rheumatology fellows completed both assessment tools on the day of the patient enrollment. Forty-seven patients in this study were also included in the TACTIC study [18].

Statistical analysis

The data analysis was performed using IBM-SPSS v27. Sociodemographic data, comorbidities, laboratory values, weight and height, treatment regimens, and articular and extra-articular manifestations were reported as appropriate as counts, percentages, or means and standard deviation. The association between variables and the presence of bone erosions or high PsAID-12 scores were tested using Chi-square, analysis of variance (ANOVA), or T-test as appropriate. Statistically significant associations on univariate analysis ($P\text{-}value < 0.05$) were reassessed using multivariate logistic regression. Multivariate binary logistic regression results were reported using odds ratios (OR) and 95% confidence intervals (95% CI).

Ethical approval

Jordan University Hospital approved the study, and the IRB approval number was 10/2023/5832. All procedures followed the ethical standards of the institutional research committee and adhered to the principles of the World Medical Association Declaration of Helsinki.

Results

A total of 105 PsA patients participated in the study. Females constituted 53.3% ($n = 56$) of patients. Most of the patients were married (82.9%, $n = 87$) and unemployed (41.9%, $n = 44$). The mean age of the patients was 45.6 ± 12.9 years. One-third of the patients had a positive family history of psoriasis (33.3%, $n = 35$), and 12.4% ($n = 13$) had a positive family history of PsA. Hypertension was the most prevalent comorbidity in the patients (23.8%, $n = 25$). Table 1 shows the details of the demographic data of the patients.

Patients' journey with psoriatic arthritis

The most frequent articular manifestation was polyarthritis (80%, $n = 84$) and axial involvement in one-third of the patients (35.2%, $n = 37$). The most common extra-articular manifestation among PsA patients was psoriasis, with 90.5% ($n = 95$) having it (Table 2). Nail psoriasis was present in 54.3% of the patients ($n = 57$). Thirty patients underwent HLA-B27 testing, and 26 of them (86.7%) had positive results (Table 2). Arthritis was diagnosed at the same time as psoriasis in 18 patients (17.1%), arthritis preceded psoriasis in 11 (10.5%) patients by 3.5 ± 3.8 years, and psoriasis preceded arthritis in 76 patients (72.4%) by 10.65 ± 11.27 years. There was a significant diagnostic delay between the time of arthritis symptom onset and the time of diagnosis of 3.1 ± 4.9 years.

The most used DMARD is methotrexate (50.5%, $n = 53$), followed by sulfasalazine (26.7%, $n = 28$). As for biological DMARDs, anti-TNF therapies were used by 20% ($N = 21$) of patients, with twelve on Adalimumab, two on Infliximab, and seven on Etanercept. Secukinumab was used by 12.4% ($N = 7$) (Table 2). Among patients with polyarthritis, patients were more likely to use methotrexate (88.7% Vs. 71.2) ($P\text{-}Value = 0.022$). In comparison, patients with dactylitis and axial involvement were more likely to use anti-TNF (47.6% Vs. 25%) and (57.1% Vs. 30%) respectively (Table 3). Table 3 analyzes the features of patients using Methotrexate (The most used drug) and Anti-TNF (the most used biologic DMARD).

Table 1 Demographic features and comorbidities of 105 patients with PsA

	No. (%)	Mean ± SD
Sex		
M	49 (46.7)	
F	56 (53.3)	
Marital status		
Single	15 (14.3)	
Married	87 (82.9)	
Other	3 (2.9)	
Occupation		
Unemployed	44 (41.9)	
Retired	19 (18.1)	
White collar	26 (24.8)	
Blue collar	16 (15.2)	
Education level		
Elementary School	18 (17.1)	
Secondary School	37 (35.2)	
University	50 (47.6)	
Masters	1 (1)	
FH of psoriasis	35 (33.3)	
FH of PsA	13 (12.4)	
FH of SpA	4 (3.8)	
Age/yr		45.6 ± 12.9
Weight/Kg		78.8 ± 16.5
Height/m		1.68 ± 0.135
BMI Kg/m^2		28.1 ± 5.8
Diagnostic delay/years		3.1 ± 4.9
Comorbidities		
HTN		25 (23.8)
HLD		11 (10.5)
Obesity		18 (17.1)
DM		16(15.2)
CVD		12(11.4)
Hypothyroidism		6 (5.7)
Osteoporosis		3 (2.9)
Hepatitis B		2 (1.9)
FMF		2 (1.9)
Smoking		30 (28.6)

M: Male, F: Female, FH: Family history, yr: Years, KG: Kilograms, m: Meters, HTN: Hypertension, HLD: Hyperlipidemia, DM: Diabetes mellitus, CVD: Cardiovascular disease, FMF: Familial Mediterranean fever

Table 2 Frequency of various articular and extra-articular manifestations, treatment regimens and laboratory abnormalities in 105 patients

	No.	%
Current Treatment		
Methotrexate	53	50.5
Sulphasalazine	28	26.7
Leflunomide	4	3.8
Ciclosporin	1	1
Anti-TNF	21	20
Secukinumab	13	12.4
Ustekinumab	7	6.7
Bone erosions on radiography	39	73.1
ESR mm/hour (Means ± SD)	32.3	± 25
CRP mg/L (Means ± SD)	10.5	± 22
Nail psoriasis	57	54.3
Monoarthritis	2	1.9
Oligoyarthritis	9	8.6
Polyarthritis	84	80
Axial	37	35.2
Enthesitis	27	25.7
Dactylitis	31	29.5
HLA-B27		
Not available	75	71.4
Positive	26	24.8
Negative	4	3.8
Extra-articular		
Psoriasis	95	90.5
IBD & psoriasis	3	2.9
Uveitis & psoriasis	3	2.9
DAPSA (Means ± SD)	32.9	± 32.7
PsAID-12 (Means ± SD)	4.55	± 2.4
HAQ (Means ± SD)	0.86	± 0.62
PHQ-4	4.04	± 3.0
FiRST suggestive of fibromylagia	31	29.5

ESR: Erythrocytes sedimentation rate, mm/hour: millimeters per hour, CRP: C-reactive protein, mg/L: milligrams per liter, IBD: Inflammatory bowel disease, DAPSA: Disease activity in psoriatic arthritis, PsAID-12: 12 item psoriatic Arthritis Impact of Disease Questionnaire, HAQ: Health assessment questionnaire, PHQ-4: Patient health questionnaire, FiRST: Fibromyalgia rapid screening tool

Table 3 Features of PsA patients who are using methotrexate and anti-TNF

Variable	Methotrexate			Anti-TNF		
	Yes *N* = 53	NO *N* = 52	*P*-Value	Yes *N* = 21	No *N* = 84	*P*-Value
Age	47.3 (12.2)	43.9 (13.6)	0.187	46.1 (15.2)	45.5 (12.4)	0.854
Male	31 (58.5)	25 (48.1)	0.191	9 (42.9)	47 (56.0)	0.203
Nail Psoriasis	33 (62.3)	24 (46.2)	0.072	10 (47.6)	46 (54.8)	0.329
Polyarthritis	47 (88.7)	37 (71.2)	**0.022**	16 (76.2)	68 (81.0)	0.413
Enthesitis	16 (30.2)	11 (21.2)	0.202	6 (28.6)	21 (25)	0.467
Dactylitis	18 (34.0)	13 (25)	0.214	10 (47.6)	21 (25)	**0.042**
Axial involvement	16 (30.2)	21 (40.4)	0.187	12 (57.1)	25 (30.0)	**0.020**
Body mass index	28.7 (5.2)	27.5 (6.4)	0.281	30.0 (6.4)	27.6 (12.4)	0.087

Psychological well-being of psoriatic arthritis patients

The mean HAQ score was 0.86 ± 0.62 (Table 2). According to HAQ scores, sixty-eight patients (64.8%) had mild to moderate disability, thirty-two patients (30.5%) had moderate to severe disability, and five patients (4.8%) had severe to very severe disability. According to PHQ-4 scores, thirty-seven patients (35.2%) were normal, twenty-two patients (21%) were mild, nine patients (8.6%) were moderate, and thirty-seven patients (35.2%) were severe (Fig. 1A). In addition, sixteen patients had PHQ-4 results suggestive of anxiety (15.2%), ten patients had results suggestive of depression (9.5%), and twenty-two patients had results suggestive of both (21%) (Fig. 1B). Over a quarter of the patients (29.5%, $N = 35$) had FiRST scores suggestive of fibromyalgia despite none of the patients reporting a prior diagnosis of fibromyalgia.

Dactylitis, the use of methotrexate, high PsAID-12 scores, high DAPSA scores, high HAQ scores, and ESR were all significantly different among the PHQ-4 categories on univariate analysis. While the presence of polyarthritis (73% Vs. 96.8) and enthesitis (18.9 Vs. 42.9%) in addition to the mean PsAID-12 scores (3.68 Vs. 6.61) and the mean HAQ scores (0.68 Vs. 1.29) were significantly higher among patients with positive FiRST screening (Table 4). On multivariate regression, only PsAID-12 scores OR = 2.234 (95% CI: 1.443–4.459) and ESR OR = 1.038 (95% CI: 1.001:1.078) were predictors of the severe category using PHQ-4 (Fig. 2A). In contrast, only the PsAID-12 score OR = 2.091 (95% CI: 1.433–3.051) was significantly related to positive FiRST scores on multivariate analysis (Fig. 2B).

Factors associated with active disease and bone erosions

The mean DAPSA score was 32.7 ± 32.9, which indicates that the mean PsAID-12 score was 4.55 ± 2.4. 31 (Table 2). According to DAPSA score categories, two patients (1.9%) were in remission, twenty-five patients (23.8%) had mild disease activity, thirty patients (28.6%) had moderate disease activity, and forty patients (38.1%) had severe disease activity. 55.2% of patients had high PsAID-12 scores ($N = 58$). Factors that exhibited significant association with high PsAID-12 on univariate analysis ($P < 0.05$) are the diagnostic delay (4.09 Vs. 1.43) years, Polyarthritis (87.9% Vs. 70.2), positive screening of fibromyalgia using FiRST (46.6% Vs. 8.5%), higher PHQ-4 (5.6 Vs. 2.1), higher HAQ (1.1 Vs. 0.50) and higher DAPSA scores (41.1 Vs. 22.4) (Supplementary 1A). Using multivariate analysis, only diagnostic delay OR = 1.160 (95% CI: 1.023–1.315) and PHQ-4 scores OR = 1.550 (95% CI: 1.196 and 2.008) were significant (Supplementary 1B).

Factors significantly more common among patients with bone erosions are obesity (30.8% Vs. 4.5, *P-value* = 0.018), hyperlipidemia (20.5% Vs. 4.5%, *P-value* = 0.007), and the presence of cardiovascular disease (CVD) (23.1% Vs. 4.5%, *P-value* = 0.008). On multivariate analysis, only Obesity (OR = 3.267, 95% CI: 1.015–10.513) and the presence of CVD (OR = 4.769, 95% CI: 1.121–20.293) were predictors of bone erosions.

Discussion

This cross-sectional, multi-centric study describes the characteristics of Jordanian patients with PsA and explores potential links between their demographics, comorbidities, various disease features, and psychological status. High PSAID-12 scores and elevated ESR were associated with severe depression and anxiety-related symptoms. In addition, the presence of CVD and obesity were predictors of bone erosions. This study also highlights the current treatment regimens provided to PsA patients in Jordan.

Among the 105 participants of this study, 56 (53.3%) are females, which aligns with the existing literature [24] with a female-to-male ratio of approximately 1:1. As for the other sociodemographic characteristics of our study population, the mean age is 45.6 years, similar to the previous study conducted in the Middle East [18] but younger than studies from Europe and South America [25, 26]. This finding aligns with Lucasson et al.'s finding that lower-income countries tend to have a slightly younger age of the disease [27]. PsA is known to decrease

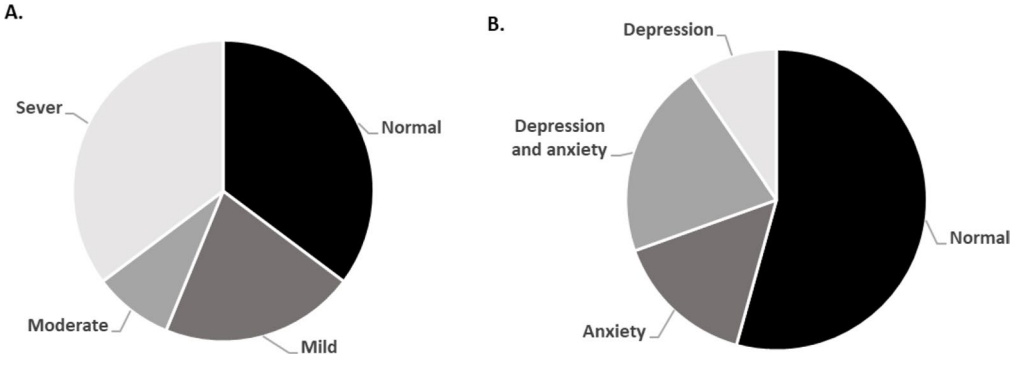

Fig. 1 Patients' categorization according to PHQ-4

Table 4 Factors associated with PHQ-4 categories or suggestive scores on FiRST

Variable	PHQ-4					FiRST		
	Normal *N* = 37	Mild *N* = 22	Moderate *N* = 9	Sever *N* = 37	*P*-Value	Negative *N* = 74	Positive *N* = 31	*P*-Value
Male	14 (37.8)	13 (59.1)	5 (55.6)	24 (64.8)	0.119	35 (47.3)	21 (67.7)	0.055
Age (years) Mean (SD)	46.8 (13.3)	45.7 (13.3)	41.2 (13.9)	45.4 (12.2)	0.715	44.8 (13.4)	47.8 (11.8)	0.303
Nail Psoriasis	20 (54.1)	11 (50)	7 (77.8)	19 (51.4)	0.514	40 (50.1)	17 (54.8)	0.941
Polyarthritis	28 (75.7)	20 (90.9)	9 (100)	27 (73.0)	0.141	54 (73.0)	30 (96.8)	**0.005**
Axial involvement	11 (29.7)	10 (45.5)	4 (44.4)	12 (32.4)	0.581	25 (33.8)	12 (38.7)	0.630
Enthesitis	5 (13.5)	9 (40.9)	2 (22.4)	11 (29.7)	0.116	14 (18.9)	13 (42.9)	**0.014**
Dactylitis	13 (35.1)	8 (36.4)	6 (66.7)	4 (10.8)	**0.004**	19 (25.7)	12 (38.7)	0.182
Methotrexate	20 (54.1)	6 (27.3)	7 (77.8)	20 (54.1)	**0.049**	37 (50)	16 (51.6)	0.880
Sulfasalazine	10 27.0	4 (18.2)	1 (11.1)	13 (35.1)	0.264	21 (28.4)	7 (22.6)	0.348
Anti-TNF	9 (24.3)	6 (27.3)	1 (11.1)	5 (13.5)	0.462	16 (21.6)	5 (16.1)	0.521
PsAID-12 Mean (SD)	2.51 (1.56)	6.04 (1.92)	7.52 (1.61)	4.97 (1.93)	**< 0.001**	3.68 (2.15)	6.61 (1.70)	**< 0.001**
DAPSA Mean (SD)	24.1 (20.5)	49.5 (53.1)	42.6 (16.3)	29.0 (25.6)	**0.025**	29.7 (35.9)	41.1 (23.1)	0.120
HAQ Mean (SD)	0.50 (0.51)	1.24 (0.589)	1.47 (0.63)	0.84 (0.53)	**< 0.001**	0.68 (0.59)	1.29 (0.51))	**< 0.001**
ESR Mean (SD)	25.1 (22.9)	42.4 (30.0)	24.6 (10.5)	35.3 (24.2)	**0.044**	31.9 (26.2)	33.5 (22.3)	0.766
CRP Mean (SD)	7.86 (11.0)	18.8 (36.3)	4.06 (3.68)	9.81 (21.0)	0.214	11.9 (25.2)	7.12 (10.7)	0.308

ESR: Erythrocytes sedimentation rate, CRP: C-reactive protein, DAPSA: Disease activity in psoriatic arthritis, PsAID-12: 12 item psoriatic Arthritis Impact of Disease Questionnaire, HAQ: Health assessment questionnaire, PHQ-4: Patient health questionnaire, FiRST: Fibromyalgia rapid screening tool

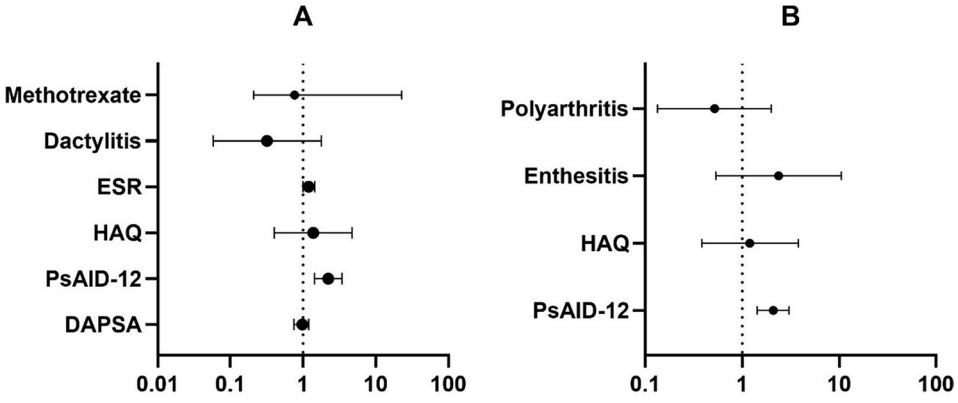

Fig. 2 **A**: Multivariate regression of factors associated with severe PHQ-4 category, **B**: Multivariate regression of factors associated with positive FiRST

patients' productivity [28], which is evident in our population, with 41.9% being unemployed. PsA is known to have a genetic background; multiple articles reported that around one-third of patients have a family history of either PsO or PsA [29, 30], which is consistent with our findings where 33.3% of patients had a family history of PsO, and 12.4% had a family history of PsA. PsA is a heterogeneous disease with overlapping signs and symptoms with other rheumatic conditions, which can lead to a diagnostic delay [31], which was observed in our study

with an average diagnostic delay of 3.1 years, similar to previous reports from different areas of the world [32]. In this study, the diagnostic delay was associated with worse patients reported outcomes using PsAID-12 score on multiple logistic regression (95% CI: 1.023–1.315).

It is established that PsA increases the risk of metabolic syndrome among its patients [33]. The prevalence of hypertension, obesity, and hyperlipidemia in our population was 23.8%, 17.1%, and 10.5%, respectively, which is comparable to other studies [18]. Smoking rates in Jordan are among the highest in the world [34], which was reflected in our study population, where 28.6% are smokers. Smoking was linked with lower adherence to therapy and poorer response to treatment in PsA when compared to non-smokers [35], which reflects the importance of implementing anti-smoking policies in the country, especially for vulnerable groups [36].

In our study, polyarthritis was the most common PsA type in 80% of patients. In comparison, only 8.6% have the oligoarticular type, which is different from other reports where a higher proportion of patients tend to have oligoarthritis [18]. The prevalence of axial involvement in PsA patients ranges between 25% and 70% [37], and we found that 35.2% of the patients in this study had axial involvement. Enthesitis, a cardinal feature of PsA affecting around 30% of patients, was observed in 25.7% of our study participants [38]. The presence of enthesitis holds a prognostic value and influences patient management [39]. The prevalence of nail psoriasis and dactylitis found in our study was 54.3% & 29.5%, respectively, which aligns with findings in the literature [40].

Psoriasis is the most prevalent extra-articular manifestation (EAM) in PsA, affecting approximately 90.5% of patients in our study, and a smaller number of patients had other EAM, such as uveitis or inflammatory bowel disease. This observation is consistent with existing literature, where psoriasis is recognized as the primary characteristic of PsA. The inflammatory processes in PsA contribute to these comorbidities, which are driven by shared immunological pathways involving cytokines such as TNF-α, IL-17, and IL-23 [26, 40, 41].

Methotrexate (MTX) was the most used drug among our population of PsA patients (50.5%), reflecting its importance in treating PsA. MTX is considered the conventional synthetic Disease-Modifying Antirheumatic Drug (csDMARD) of choice according to the EULAR guidelines [14]. Meanwhile, it is considered alongside other drugs as the first choice by others, including the Group for Research and Assessment of Psoriasis and Psoriatic Arthritis (GRAPPA) and the ACR/National Psoriasis Foundation (NPF) guidelines [15, 16]. Anti-TNF was used in (20%) of our patients, which is usually used either after the failure of csDMARDs or in cases of aggressive disease [14, [15]. Similarly, in our study, 20% of patients used anti-TNF, particularly patients with axial involvement (57.1% Vs. 30%) and dactylitis (47.6% Vs. 25%) were more likely to use anti-TNF therapy. Alongside the well-known mechanism of action of anti-TNF drugs, anti-TNF is found to significantly decrease the frequency of peripheral natural killer (NK) cells and their subset CD56dimCD16 + NK cells in PsA compared to healthy controls [42].

The exact prevalence of bone erosions among PsA patients is not well-established because as the disease advances, the percentage of patients with bone erosions tends to increase, as demonstrated by Kane et al. [43, 44]. In our study, 37.1% have bone erosions. Bone erosions can predict worse long-term outcomes, including joint destruction and functional impairment in PsA patients, especially if present at the early stages of the disease [45]. The prevalence of CVDs in our study population was significantly more common among patients with bone erosions than those without (23.07% Vs 4.5%, *P-value* = 0.08). CVDs have been linked with high levels of pro-inflammatory mediators, including TNF, which are similar mediators to those implemented in the development of bone erosions in PsA [46]. This theory may explain our finding that CVD predicts bone erosion even on multivariate logistic regression (95% CI: 1.121–20.293).

It is known that the prevalence of fibromyalgia is increased in rheumatological conditions, including PsA, where the prevalence of fibromyalgia ranges between 10 and 27% [12]. In our study population, 29.5% of patients had positive FiRST screening suggestive of fibromyalgia. The disastrous effect of fibromyalgia on PsA patients was observed in our study, where significantly higher PsAID-12 scores (3.68 Vs. 6.61) and HAQ scores (0.68 Vs. 1.29) were observed in patients with fibromyalgia. It is essential to recognize fibromyalgia among patients with PsA because it can mimic enthesitis among those patients and lead to overtreatment [47]. This fact might explain the higher rates of enthesitis among patients with positive FiRST screening (18.9% VS 42.9%) observed in our study.

The estimated prevalence of depression and anxiety among PsA patients is (9-22%) and (15-30%) respectively [11]. We found similar results, where 15.2% of patients had anxiety, 9.5% had depression, and 21% had both. The burden of bad psychological health on patients with PsA was evident, where patients having severe anxiety and depression-related symptoms had higher odds of worse patients reporting symptoms (95% CI: 1.443–4.459). The significant effect of PsA on patients' psychosocial health and quality of life should shed light on the importance of utilizing multidisciplinary approaches to those patients [9, 10]. We also found a positive association between ESR and severe PHQ-4 scores (95% CI: 1.001:1.078), which can be attributed to the fact that patients with higher ESR

have higher disease activity and consequently will have a lower quality of life and worse psychological status.

This study's advantages include being Jordan's largest and most comprehensive analysis of PsA patients. Additionally, it is a multicenter study, with patients referred from across the country, representing various socioeconomic and demographic aspects of the population. Furthermore, data was actively collected from patients presenting to the rheumatology clinics, ensuring accurate information about the presence or absence of clinical features among included patients. This approach contrasts with methods that rely solely on electronic medical records.

We acknowledge some limitations in this study, including the cross-sectional design, which doesn't allow an accurate assessment of how patients' signs, symptoms, and adherence to medications change with time. We believe a longitudinal study design will be more appropriate to assess those aspects of the disease.

Conclusion

This cross-sectional, multi-centric study provides a comprehensive analysis of PsA characteristics among Jordanian patients, exploring the relationships between demographics, comorbidities, and disease features relative to disease activity. Future longitudinal studies are recommended to investigate the dynamic aspects and characteristics of PsA deeply and address the impact of comorbid conditions and psychological factors on disease management and outcomes.

Abbreviations

ACR	American College of Rheumatology
CASPAR	Classification Criteria for Psoriatic Arthritis
CI	Confidence Interval
COSMIN	Consensus-based Standards for selecting health status Measurement Instruments
CRP	C-Reactive Protein
CVD	Cardiovascular Disease
DAPSA	Disease Activity in Psoriatic Arthritis
DMARDs	Disease-Modifying Antirheumatic Drugs
ESR	Erythrocyte Sedimentation Rate
EULAR	European League Against Rheumatism
FiRST	Fibromyalgia Rapid Screening Tool
GRAPPA	Group for Research and Assessment of Psoriasis and Psoriatic Arthritis
HAQ	Health Assessment Questionnaire
IBD	Inflammatory Bowel Disease
IBM-SPSS	International Business Machines - Statistical Package for the Social Sciences
IRB	Institutional Review Board
JAK	Janus Kinase
MTX	Methotrexate
NK	Natural Killer
NPF	National Psoriasis Foundation
NSAIDs	Nonsteroidal Anti-Inflammatory Drugs
OR	Odds Ratio
PDE4	Phosphodiesterase-4
PHQ-4	Patient Health Questionnaire-4
PsA	Psoriatic Arthritis
PsAID-12	Psoriatic Arthritis Impact of Disease-12
PGA	Patient Global Assessment
PSO	Psoriasis
TACIT	TranslAte, CulTurally adapt, and validate the PsAID in ArabIC
TNF-α	Tumor Necrosis Factor-alpha

Supplementary Information

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Supplementary Material 1

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Author contributions

FA: Idea conceptualization, study design, manuscript drafting, review, and editing. AAH & OH: Manuscript drafting and Literature review. AAH, WR, RR & AA: Data collection and manuscript drafting. AB, MAM & KA: manuscript drafting. MHA: data-analysis. All authors reviewed and approved the final manuscript.

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Data availability

Data are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Jordan University Hospital approved the study, and the IRB approval number was 10/2023/5832. All procedures followed the ethical standards of the institutional research committee and adhered to the principles of the World Medical Association Declaration of Helsinki. Informed consent was obtained.

Clinical trial number

Not applicable.

Consent for publication

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Competing interests

The authors declare no competing interests.

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