

Prevalence of Axial and Peripheral Musculoskeletal Manifestations and Comorbidities in Adult Patients with Psoriatic Arthritis in Qassim, Saudi Arabia

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Abstract

Introduction/objectives: This study aimed to describe the demographic, clinical, and therapeutic characteristics of adult patients with psoriatic arthritis (PsA) in Qassim, Saudi Arabia, and to identify independent predictors of axial and peripheral arthritis.

Method: In this retrospective cross-sectional study, 185 adult patients with PsA attending rheumatology and dermatology clinics were reviewed. Associations between axial or peripheral arthritis and demographic, clinical, and comorbidity variables were assessed using chi-square(χ^2)/Fisher's exact tests and the Mann-Whitney Z-test, followed by multivariate logistic regression adjusted for age at diagnosis, BMI, and vitamin D deficiency.

Results: The cohort was young (mean age 39.2±14.5 years) with balanced gender distribution (96, 51.9% male) and early onset PsA (96, 51.9% diagnosed before age 30). Skin-related symptoms were the most frequent presentation (122, 65.9%). Axial arthritis was uncommon (18, 9.7%); peripheral arthritis affected 60 patients (32.4%). Vitamin D deficiency was highly prevalent (124, 67.0%). Systemic therapy was given to 132 patients (71.4%), most frequently methotrexate (38, 20.5%). Axial arthritis was independently predicted by presenting symptoms (adjusted odds ratio (AOR)=0.189, 95% CI 0.056-0.644, p=0.008 for skin-related vs arthritis-dominant presentation). Peripheral arthritis was independently predicted by female gender (AOR=2.137, 95% CI 1.117-4.085, p=0.022) and presenting symptoms (AOR=0.057, 95% CI 0.023-0.142, p<0.001).

Conclusions: PsA in this Saudi cohort is characterized by early onset, balanced gender distribution, a high metabolic comorbidity burden, and conservative biologic use. Presenting symptoms were the strongest independent predictors of both arthritis phenotypes, while female gender predicted peripheral involvement, providing region-specific insights for tailored management.

Categories: Rheumatology, Internal Medicine, Dermatology

Keywords: axial arthritis, comorbiditis, peripheral arthritis, psoriatic arthritis, saudi arabia

Introduction

Psoriatic arthritis (PsA) is a chronic, immune-mediated inflammatory disease arising in a subset of patients with psoriasis, a skin condition affecting approximately 2%-3% of the global population [1]. PsA involves both peripheral and axial joint manifestations in addition to cutaneous lesions, with musculoskeletal symptoms present in nearly 47% of newly diagnosed psoriasis patients [1] and axial involvement reported in 25%-70% of PsA cases depending on diagnostic criteria [2]. PsA is also frequently associated with systemic comorbidities such as metabolic syndrome, obesity, diabetes, hypertension, dyslipidemia, and depression that significantly affect disease burden and quality of life; lipid metabolism disorders and hypertension are commonly the most frequent [3].

In Saudi Arabia, psoriasis prevalence has been reported at up to 5.33%, with earlier onset and male predominance [4]. However, regional data on the prevalence and pattern of musculoskeletal manifestations and comorbidities among PsA patients remain scarce, particularly in Qassim. Given this gap, this study aims to describe the demographic, clinical, and therapeutic characteristics of adult PsA patients in Qassim, determine the prevalence of axial and peripheral musculoskeletal manifestations and associated

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comorbidities, and identify independent predictors of each phenotype.

Materials And Methods

Study design and setting

This was a retrospective, cross-sectional observational study conducted at the rheumatology and dermatology outpatient clinics of King Fahad Specialist Hospital, Buraidah, Qassim, Saudi Arabia.

Study population and sampling

Adult patients (≥ 18 years) with a confirmed diagnosis of PsA by a rheumatologist or dermatologist and complete relevant medical records were included; patients with other inflammatory arthritis, incomplete records, or age < 18 years were excluded. A total of 185 eligible patients during the study period were identified through convenience sampling and included in the final analysis.

Data were collected retrospectively from electronic medical records of patients evaluated over an approximately one-year period following institutional ethical approval (2025-2026). Axial arthritis was diagnosed based on clinical assessment by the treating rheumatology consultant, as documented in patient records; while imaging was performed as part of routine clinical care for symptomatic patients, radiographic data were not uniformly available in a structured format for inclusion in this analysis. No missing data were present in the final dataset, as complete records were available for all 185 patients included. Age at diagnosis, BMI, and vitamin D deficiency were selected a priori as adjustment variables in the multivariate models based on their established clinical relevance to PsA disease burden and treatment response; age at diagnosis was specifically included to account for variation in disease onset patterns within the cohort.

Data collection

Data were collected retrospectively from electronic medical records using a structured data collection form developed by the authors specifically for this study (Appendix A), covering demographics (age, sex, nationality); disease characteristics (age at diagnosis, duration, presenting symptoms, family history); clinical findings (pattern of joint involvement, body surface area (BSA) [5], Psoriasis Area and Severity Index (PASI) [6], Nail Psoriasis Severity Index (NAPSI) [7]; comorbidities (hypertension, diabetes, dyslipidemia, obesity, smoking, chronic kidney disease, vitamin D deficiency); and treatment data (topical therapy, phototherapy, systemic/biologic agents, duration, side effects, discontinuation).

Statistical analysis

Analyses were performed using IBM SPSS Statistics v26.0 (IBM Corp, Armonk, NY, USA). Normality was assessed with the Kolmogorov-Smirnov test; categorical variables were summarized as frequencies/percentages and continuous variables as mean $\pm$ SD or median (IQR). Bivariate associations between axial or peripheral arthritis and patient characteristics were examined using the chi-square (χ^2)/Fisher's exact test and the Mann-Whitney Z-test. Variables significant on bivariate analysis were entered into multivariate logistic regression, adjusted for age at diagnosis, BMI, and vitamin D deficiency, with adjusted odds ratios (AORs) and 95% CIs reported; significance was set at $p < 0.05$.

Ethical considerations

This study was approved by the Regional Research Ethics Committee, Qassim Province, Ministry of Health, Saudi Arabia (National Committee of Bioethics (NCBE) Registration No. H-04-Q-001; Approval No. 607-47-000828, dated 16 July 2025), and conducted per the 1964 Declaration of Helsinki and later amendments. As a retrospective review of existing records with no direct patient contact, individual informed consent was waived. Patient confidentiality was maintained throughout, with no identifiers used in data entry or reporting.

Results

A total of 185 patients with PsA were reviewed and analyzed. Demographic and clinical features are shown in Table 1. The cohort was relatively young (mean age 39.2 ± 14.5 years), with a slight majority younger than 40 years (98, 53.0%). Gender distribution was nearly equal (96 males, 51.9%; 89 females, 48.1%), and most patients were Saudi (181, 97.8%). Age at diagnosis was significantly younger than current age (mean 29.9 ± 15.2 years), with half the cohort diagnosed before age 30 (96, 51.9%). Overweight status was the most common BMI category (77, 41.6%), followed by normal BMI (58, 31.4%) and Class I obesity (32, 17.3%). Skin-related symptoms were the predominant presentation (122, 65.9%), while arthritis alone was reported by 42 patients (22.7%). Axial involvement was uncommon (18, 9.7%), whereas peripheral arthritis was present in 60 patients (32.4%). Family history of psoriasis/PsA was reported in 17 patients (9.2%). Vitamin D deficiency was highly prevalent (86, 46.5% deficient; 34, 18.4% severely deficient). Disease severity indices were generally low: BSA 3% (IQR 1-11), PASI 3 (IQR 1-8.8), NAPSI 0 (IQR 0-0).

Study variable	N (%)
Age in years (mean ± SD)	39.2 ± 14.5
Age <40 years	98 (53.0%)
Age ≥40 years	87 (47.0%)
Gender: Male	96 (51.9%)
Gender: Female	89 (48.1%)
Nationality: Saudi	181 (97.8%)
Nationality: Non-Saudi	4 (2.2%)
Age at diagnosis, years (mean ± SD)	29.9 ± 15.2
Age at diagnosis <30 years	96 (51.9%)
Age at diagnosis ≥30 years	89 (48.1%)
BMI, kg/m ² (mean ± SD)	27.3 ± 4.97
Underweight (<18.5 kg/m ²)	3 (1.6%)
Normal (18.5–24.9 kg/m ²)	58 (31.4%)
Overweight (25–29.9 kg/m ²)	77 (41.6%)
Obesity Class I (30–34.9 kg/m ²)	32 (17.3%)
Obesity Class II (35–39.9 kg/m ²)	12 (6.5%)
Obesity Class III (≥40 kg/m ²)	3 (1.6%)
Presenting symptoms: Arthritis	42 (22.7%)
Presenting symptoms: Skin-related	122 (65.9%)
Presenting symptoms: Both	21 (11.4%)
Axial arthritis: Yes	18 (9.7%)
Peripheral arthritis: Yes	60 (32.4%)
Family history of psoriasis/psoriatic arthritis: Yes	17 (9.2%)
Vitamin D status: Normal	60 (32.4%)
Vitamin D status: Deficient (<5)	86 (46.5%)
Vitamin D status: Severe (<10)	34 (18.4%)
Vitamin D status: Very severe (10–20)	5 (2.7%)
Body surface area (%), median (IQR)	3 (1–11)
Psoriasis Area and Severity Index, median (IQR)	3 (1–8.8)
Nail Psoriasis Severity Index, median (IQR)	0 (0–0)

TABLE 1: Demographic and clinical characteristics of the patients (n=185)

Treatment patterns showed strong reliance on topical therapy, with Daivobet used by 137 patients (74.1%), while 28 (15.1%) received no topical treatment (Table 2). Among topical users (n=157), most had been treated for more than two years (126, 80.3%), with good tolerability (side effects 0.6%; discontinuation 4.5%). Phototherapy (narrowband UVB (NB-UVB)) was also used long-term in 156 patients (84.3%), well tolerated (side effects 1.1%; discontinuation 6.5%). Systemic therapy was given to 132 patients (71.4%); methotrexate was most common (38, 20.5%), followed by risankizumab (21, 11.4%). Of systemic users, 67 (50.8%) had been treated for more than two years, with side effects in 3.0% and discontinuation in 11.4%.

Variable	N (%)
Topical agent: No	28 (15.1%)
Topical agent: Daivobet	137 (74.1%)
Topical agent: Others	20 (10.8%)
Topical duration (n=157): <1 year	4 (2.5%)
Topical duration (n=157): 1–2 years	27 (17.2%)
Topical duration (n=157): >2 years	126 (80.3%)
Topical side effects (n=157): Yes	1 (0.6%)
Topical discontinued (n=157): Yes	7 (4.5%)
Phototherapy (NBUVB) duration: <1 year	16 (8.6%)
Phototherapy (NBUVB) duration: 1–2 years	13 (7.0%)
Phototherapy (NBUVB) duration: >2 years	156 (84.3%)
Phototherapy side effects: Yes	2 (1.1%)
Phototherapy discontinued: Yes	12 (6.5%)
Systemic agent: No	53 (28.6%)
Systemic agent: Methotrexate	38 (20.5%)
Systemic agent: Ustekinumab	19 (10.3%)
Systemic agent: Risankizumab	21 (11.4%)
Systemic agent: Adalimumab	17 (9.2%)
Systemic agent: Ixekizumab	12 (6.5%)
Systemic agent: Etanercept	10 (5.4%)
Systemic agent: Others	15 (8.1%)
Systemic duration (n=132): <1 year	27 (20.5%)
Systemic duration (n=132): 1–2 years	38 (28.8%)
Systemic duration (n=132): >2 years	67 (50.8%)
Systemic side effects (n=132): Yes	4 (3.0%)
Systemic discontinued (n=132): Yes	15 (11.4%)

TABLE 2: Disease treatment characteristics among patients with psoriatic arthritis (n=185)

NBUVB: narrowband UVB

Results are expressed as numbers and percentages (%).

Figure 1 shows vitamin D deficiency was the most frequent comorbidity (124, 67.0%), followed by hypertension (24, 13.0%) and dyslipidemia (23, 12.4%). Diabetes and smoking were each reported in 19 patients (10.3%); chronic kidney disease was least prevalent (3, 1.6%).

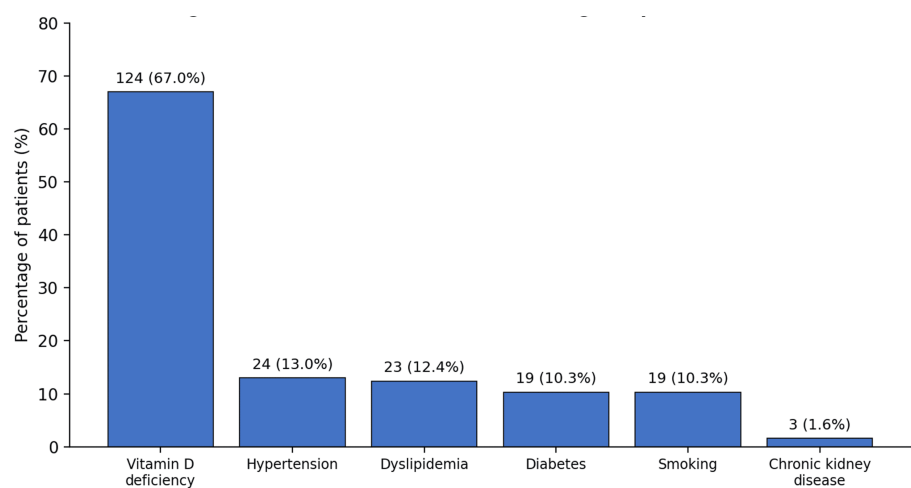


FIGURE 1: Associated comorbidities among patients with psoriatic arthritis (n=185)

Table 3 shows that the only significant factor associated with axial arthritis was presenting symptom type: axial involvement was significantly associated with arthritis-dominant presentation (8, 61.5%) versus non-axial patients (34, 22.5%) ($\chi^2=9.567$, $p=0.002$). No other demographic, clinical, or comorbidity variables, including age, gender, age at diagnosis, BMI, peripheral arthritis, family history, diabetes, hypertension, dyslipidemia, smoking, or vitamin D deficiency, showed significant associations (all $p>0.05$); severity indices were also comparable between groups ($p=0.724$ - 0.799).

Factor	Axial , Yes (n=18)	Axial, No (n=167)	Test	P-value
Age <40 years	7 (38.9%)	91 (54.5%)	$\chi^2=1.588$	0.208
Age ≥40 years	11 (61.1%)	76 (45.5%)	$\chi^2=1.588$	0.208
Male	7 (38.9%)	89 (53.3%)	$\chi^2=1.351$	0.245
Female	11 (61.1%)	78 (46.7%)	$\chi^2=1.351$	0.245
Age at diagnosis <30 years	8 (44.4%)	88 (52.7%)	$\chi^2=0.443$	0.506
Age at diagnosis ≥30 years	10 (55.6%)	79 (47.3%)	$\chi^2=0.443$	0.506
BMI: Normal/Underweight	4 (22.2%)	57 (34.1%)	Exact test	0.462
BMI: Overweight	10 (55.6%)	67 (40.1%)	Exact test	0.462
BMI: Obese	4 (22.2%)	43 (25.7%)	Exact test	0.462
Presenting symptoms: Arthritis	8 (61.5%)	34 (22.5%)	$\chi^2=9.567$	0.002**
Presenting symptoms: Skin-related	5 (38.5%)	117 (77.5%)	$\chi^2=9.567$	0.002**
Peripheral arthritis: No	7 (38.9%)	53 (31.7%)	$\chi^2=0.379$	0.538
Peripheral arthritis: Yes	11 (61.1%)	114 (68.3%)	$\chi^2=0.379$	0.538
Family history: No	18 (100%)	150 (89.8%)	Exact test	0.381
Family history: Yes	0 (0%)	17 (10.2%)	Exact test	0.381
Diabetes: Yes	1 (5.6%)	18 (10.8%)	Exact test	0.699
Hypertension: Yes	2 (11.1%)	22 (13.2%)	Exact test	1.000
Dyslipidemia: Yes	4 (22.2%)	19 (11.4%)	Exact test	0.249
Smoking: Yes	2 (11.1%)	17 (10.2%)	Exact test	1.000
Vitamin D deficiency: Yes	14 (77.8%)	110 (65.9%)	Exact test	0.431
Body surface area, median (IQR)	5 (0–12)	3 (1–10.5)	Z=0.353	0.724
Psoriasis Area and Severity Index, median (IQR)	4 (0–10.3)	3 (1–8.3)	Z=0.255	0.799
Nail Psoriasis Severity Index, median (IQR)	0 (0–5)	0 (0–0)	Z=0.344	0.730

TABLE 3: Relationship between axial arthritis and demographic/clinical characteristics (n=185)

χ^2 : chi-square test; Exact test: Fisher's exact test; Z: Mann-Whitney Z-test; **Significant at $p<0.05$.

Table 4 shows several significant associations with peripheral arthritis. Patients ≥40 years were more likely affected (35, 58.3% vs. 52, 41.6%; $\chi^2=4.557$, $p=0.033$), as were females (37, 61.7% vs. 23, 38.3%; $\chi^2=6.539$, $p=0.011$). The strongest association was presenting symptoms, with arthritis-related presentation overwhelmingly more common among affected patients (29, 69.0% vs. 13, 10.7%; $\chi^2=55.918$, $p<0.001$). Patients with peripheral arthritis had lower median BSA (1%, IQR 0-7) and PASI (1, IQR 0-5) than those without (BSA 4%, $p<0.001$; PASI 4, $p<0.001$). Other variables showed no significant associations (all $p>0.05$).

Factor	Peripheral – Yes (n=60)	Peripheral – No (n=125)	Test	P-value
Age <40 years	25 (41.7%)	73 (58.4%)	$\chi^2=4.557$	0.033**
Age ≥40 years	35 (58.3%)	52 (41.6%)	$\chi^2=4.557$	0.033**
Male	23 (38.3%)	73 (58.4%)	$\chi^2=6.539$	0.011**
Female	37 (61.7%)	52 (41.6%)	$\chi^2=6.539$	0.011**
Age at diagnosis <30 years	25 (41.7%)	71 (56.8%)	$\chi^2=3.719$	0.054
Age at diagnosis ≥30 years	35 (58.3%)	54 (43.2%)	$\chi^2=3.719$	0.054
BMI: Normal/Underweight	17 (28.3%)	44 (35.2%)	$\chi^2=0.879$	0.644
BMI: Overweight	27 (45.0%)	50 (40.0%)	$\chi^2=0.879$	0.644
BMI: Obese	16 (26.7%)	31 (24.8%)	$\chi^2=0.879$	0.644
Presenting symptoms: Arthritis-related	29 (69.0%)	13 (10.7%)	$\chi^2=55.918$	<0.001**
Presenting symptoms: Skin-related	13 (31.0%)	109 (89.3%)	$\chi^2=55.918$	<0.001**
Family history: No	57 (95.0%)	111 (88.8%)	Exact test	0.276
Family history: Yes	3 (5.0%)	14 (11.2%)	Exact test	0.276
Diabetes: Yes	7 (11.7%)	12 (9.6%)	$\chi^2=0.188$	0.665
Hypertension: Yes	9 (15.0%)	15 (12.0%)	$\chi^2=0.323$	0.570
Dyslipidemia: Yes	9 (15.0%)	14 (11.2%)	$\chi^2=0.538$	0.463
Smoking: Yes	4 (6.7%)	15 (12.0%)	Exact test	0.312
Vitamin D deficiency: Yes	45 (75.0%)	79 (63.2%)	$\chi^2=2.554$	0.110
Body surface area (%), median (IQR)	1 (0–7)	4 (1–12)	Z=3.768	<0.001**
Psoriasis Area and Severity Index, median (IQR)	1 (0–5)	4 (1–10)	Z=3.565	<0.001**
Nail Psoriasis Severity Index, median (IQR)	0 (0–0)	0 (0–5)	Z=1.925	0.054

TABLE 4: Relationship between peripheral arthritis and demographic/clinical characteristics (n=185).

χ^2 : chi-square test; Exact test: Fisher's exact test; Z: Mann-Whitney Z-test; ** Significant at $p<0.05$.

Note: The Diabetes row has been corrected from the statistician's original figures, which showed non-diabetic (complement) percentages mislabeled against the diabetic counts; the corrected values (7/60, 12/125) reconcile exactly with the overall diabetes prevalence reported in Table 1 (19/185, 10.3%).

Table 5 identifies independent predictors after adjustment for age at diagnosis, BMI, and vitamin D deficiency, and Figure 2 presents these findings as a forest plot. Presenting symptoms remained the only significant predictor of axial arthritis, with skin-related presentation showing markedly lower odds than arthritis-dominant presentation (AOR=0.189, 95% CI 0.056-0.644, $p=0.008$). Peripheral arthritis had two significant independent predictors: female gender (AOR=2.137, 95% CI 1.117-4.085, $p=0.022$) and skin-related presentation, which lowered the odds substantially (AOR=0.057, 95% CI 0.023-0.142, $p<0.001$). Age group was not an independent predictor after adjustment (AOR=1.689, $p=0.228$).

Model 1: Axial arthritis	AOR	95% CI	P-value
Presenting symptoms: Arthritis (Ref)	-	-	-
Presenting symptoms: Skin-related	0.189	0.056-0.644	0.008**
Model 2: Peripheral arthritis	AOR	95% CI	P-value
Age <40 years (Ref)	-	-	-
Age ≥40 years	1.689	0.720-3.959	0.228
Gender: Male (Ref)	-	-	-
Gender: Female	2.137	1.117-4.085	0.022**
Presenting symptoms: Arthritis (Ref)	-	-	-
Presenting symptoms: Skin-related	0.057	0.023-0.142	<0.001**

TABLE 5: Multivariate logistic regression: independent predictors of axial and peripheral arthritis (n=185).

Adjusted for age at diagnosis, BMI level, and vitamin D deficiency.

AOR: adjusted odds ratio; CI: confidence interval. ** Significant at p<0.05.

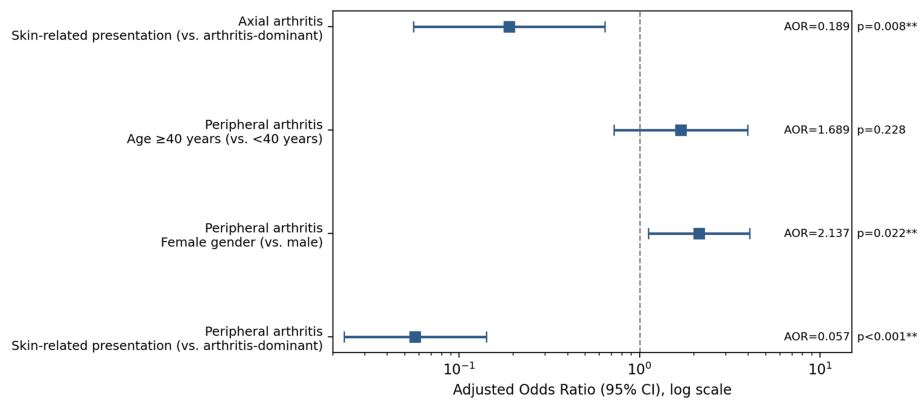


FIGURE 2: Forest plot of adjusted odds ratios (AOR) with 95% CIs for independent predictors of axial and peripheral arthritis, derived from the multivariate logistic regression models in Table 5 (n=185).

** Significant at p<0.05

Across the seven systemic/biologic treatment groups (Appendix B), most demographic and clinical variables showed no significant differences (all p>0.05). Skin severity indices, however, differed significantly across agents (BSA and PASI, p<0.001), with risankizumab and ustekinumab users showing the highest median values, and TNF inhibitors/ixekizumab users the lowest; methotrexate users were intermediate. NAPS1 did not differ significantly (p=0.293). Full results are presented in Appendix B.

Discussion

This cohort of 185 patients with PsA showed patterns both consistent with and distinct from regional and international studies. The mean age of 39.2 years reflects a relatively young PsA population, consistent with global onset estimates in the fourth decade of life [8]. The near-equal gender distribution contrasts with the male predominance often reported in Europe and North America [9], but aligns with other Middle Eastern cohorts [10], possibly reflecting genetic, environmental, or healthcare-access differences. Notably, early onset, with half the cohort diagnosed before age 30, younger than Western cohorts [11], may reflect greater psoriasis awareness, earlier dermatology referral, or genetic predisposition in this population [4].

BMI patterns showed a predominance of overweight/obesity, consistent with the known PsA-metabolic dysfunction association [12]. The high prevalence of vitamin D deficiency (67.0%) mirrors other Middle Eastern populations, attributable to limited sun exposure, clothing practices, and diet [13]. Disease severity indices were generally low, suggesting milder disease or earlier diagnosis compared with Western cohorts reporting higher psoriasis burden [3].

Treatment patterns showed strong, well-tolerated reliance on topical therapy and phototherapy, reflecting regional preferences, while Western practice favors earlier biologic use [14]. Methotrexate remained the leading systemic agent, consistent with international first-line guidelines [15], though overall biologic use was more conservative than in Western registries [16], likely reflecting cost and access. The comorbidity profile, vitamin D deficiency, hypertension, and dyslipidemia, is consistent with recognized cardiometabolic clustering in psoriatic disease [17]; chronic kidney disease was uncommon, as reported elsewhere [18].

Presenting symptoms were the only significant predictor of axial arthritis, consistent with axial PsA being more associated with inflammatory back pain than cutaneous findings and lacking strong demographic/metabolic predictors [19,20]. Peripheral arthritis showed more associations overall, with older age, female gender, and arthritis-dominant presentation as key correlates [21,22], patterns well documented in the literature. Interestingly, lower PASI/BSA scores among peripheral arthritis patients suggest joint-dominant disease can occur with milder skin involvement, differing from studies reporting parallel skin-joint severity [23], possibly reflecting earlier dermatologic intervention in this setting. On multivariate analysis, presenting symptoms remained the strongest independent predictor of both phenotypes, and female gender independently predicted peripheral arthritis, consistent with global trends [24,25]. It is important to note that presenting symptoms, as the strongest predictor identified, may reflect diagnostic pathways and referral patterns rather than a true underlying biological risk factor; this distinction should be considered when interpreting the clinical significance of this association.

The high prevalence of vitamin D deficiency observed in our cohort may be understood within a reciprocal, self-perpetuating relationship between vitamin D status and psoriatic disease activity: vitamin D exerts antioxidant and immunomodulatory effects, suppressing production of pro-inflammatory cytokines such as IL-6 and TNF- α implicated in psoriasis and PsA pathogenesis, while active inflammatory disease and associated behaviors (e.g., reduced sun exposure due to lesion-covering) may further lower vitamin D levels, perpetuating this cycle. Supporting this interplay, patients with deficient or insufficient vitamin D levels have been shown to be more susceptible to disease exacerbation upon exposure to an external trigger [26]. We also note that classification thresholds for vitamin D status vary considerably across institutions and reference laboratories, which may limit direct comparability of deficiency prevalence estimates across studies, including ours. While vitamin D supplementation has been explored as an adjunctive measure in cutaneous psoriasis management, its specific efficacy in modulating arthritis activity in PsA remains insufficiently studied and warrants dedicated future investigation.

Overall, these findings describe a PsA population with early onset, mild skin disease, a high metabolic comorbidity burden, and strong dependence on topical/phototherapy, differences from international literature that may reflect regional genetic, healthcare-access, and treatment-availability factors, underscoring the need for context-specific management approaches and further regional studies.

Strengths of the study

This study presents a detailed description of PsA in a clinical population in Saudi Arabia, providing important regional data that remain scarce in the literature. The relatively large cohort (N=185) improves the reliability of demographic and clinical estimates, and the systematic evaluation of skin, nails, and joints provides a more nuanced understanding of phenotype distribution. Metabolic and vitamin D profiling together enhance comorbidity analysis, offering a multidimensional view of psoriatic disease. Importantly, the study employs homogeneous diagnostic criteria and standardized severity indices, allowing comparison with international cohorts. The identification of presenting symptoms as independent predictors of axial and peripheral involvement yields clinically actionable insights that may enhance early recognition and targeted management in similar healthcare settings.

Limitations of the study

Several limitations should be considered when generalizing these results. First, the single-center design may limit generalizability, as patient characteristics and treatment patterns may be influenced by local referral dynamics and institutional practices. Second, retrospective data collection may introduce information bias, particularly in documenting symptom onset, comorbidities, and prior treatments. Radiographic data were not uniformly available, and axial disease may have been underclassified. Third, although univariate analysis showed significant associations between peripheral arthritis and both BSA and PASI, these variables were not included in the multivariate regression model due to their highly skewed distributions and counterintuitive directional effects, which would have affected model stability and interpretability. Finally, the cross-sectional design does not allow analysis of temporal relationships, such as the transition from psoriasis to PsA or the longitudinal evolution of disease severity. Other external factors, such as insurance coverage and medication availability, were not formally measured but may also influence patterns of

biologic utilization. Additionally, the use of convenience sampling may have introduced selection bias, as patients were not randomly selected from the broader PsA population in the region, which could limit the generalizability of the prevalence estimates reported.

We further acknowledge that the observed prevalence of axial arthritis (9.7%) is lower than reported in several published cohorts, which may reflect under-detection or classification bias given the reliance on clinical assessment rather than standardized radiographic criteria. Additionally, the strong reliance on presenting symptoms as a predictor variable may be subject to documentation bias inherent to retrospective chart review. Finally, our multivariate models adjusted for a limited set of covariates (age at diagnosis, BMI, and vitamin D deficiency), and residual confounding from unmeasured factors cannot be excluded.

Conclusions

This study provides important demographic, clinical, and phenotypic characteristics of PsA in a Saudi cohort, showing both similarities to global trends and unique regional patterns. This population is characterized by younger age at diagnosis, balanced sex distribution, a high metabolic comorbidity burden, and lower biologic utilization compared to Western cohorts. Presenting symptoms were the strongest predictor of axial and peripheral involvement, emphasizing the importance of early clinical recognition in guiding management. These findings add important regional data to the expanding literature on psoriatic disease and highlight the need for further studies with longitudinal follow-up, radiographic evaluation, and wider multicenter representation.

Appendices

Appendix A

Section	Variable	Coding / Response Options
Demographics	Age (currently)	Number in years
Demographics	Gender	Male = 1
Demographics	Gender	Female = 2
Demographics	Nationality	Saudi = 1
Demographics	Nationality	Non-Saudi = 2
Anthropometrics	Weight	Numeric, kg
Anthropometrics	Height	Numeric, cm
Anthropometrics	Calculated BMI	Numeric (kg/m²)
Anthropometrics	BMI Category	Underweight = 1
Anthropometrics	BMI Category	Normal = 2
Anthropometrics	BMI Category	Overweight = 3
Anthropometrics	BMI Category	Obesity Class I = 4
Anthropometrics	BMI Category	Obesity Class II = 5
Anthropometrics	BMI Category	Obesity Class III = 6
Clinical profile	Age at diagnosis	Number in years
Clinical profile	Date of diagnosis	Year/Month/Day
Clinical profile	Presenting symptoms	Skin-related = 1
Clinical profile	Presenting symptoms	Arthritis = 2
Clinical profile	Axial arthritis	Yes = 1
Clinical profile	Axial arthritis	No = 2
Clinical profile	Peripheral arthritis	Yes = 1
Clinical profile	Peripheral arthritis	No = 2
Clinical profile	Body surface area (BSA)	0–100 (%)
Clinical profile	PASI	0–72

Clinical profile	NAPSI	0–60
Clinical profile	Family history of psoriasis/PsA	Yes = 1
Clinical profile	Family history of psoriasis/PsA	No = 2
Treatment – Topical	Topical agent	Daivobet = 1
Treatment – Topical	Topical agent	Others (e.g., herbs) = 2
Treatment – Topical	Duration	<1 year = 1
Treatment – Topical	Duration	1–2 years = 2
Treatment – Topical	Duration	>2 years = 3
Treatment – Topical	Side effects	Yes = 1
Treatment – Topical	Side effects	No = 2
Treatment – Topical	Discontinued	Yes
Treatment – Topical	Discontinued	No
Treatment – Topical	Discontinued – reason (if yes)	Failed treatment = 11
Treatment – Topical	Discontinued – reason (if yes)	Medication side effects = 12
Treatment – Topical	Discontinued – reason (if yes)	Others = 13
Treatment – Phototherapy (NBUVB)	Duration	<1 year = 1
Treatment – Phototherapy (NBUVB)	Duration	1–2 years = 2
Treatment – Phototherapy (NBUVB)	Duration	>2 years = 3
Treatment – Phototherapy (NBUVB)	Side effects	Yes = 1
Treatment – Phototherapy (NBUVB)	Side effects	No = 2
Treatment – Phototherapy (NBUVB)	Discontinued	Yes
Treatment – Phototherapy (NBUVB)	Discontinued	No
Treatment – Phototherapy (NBUVB)	Discontinued – reason (if yes)	Failed treatment = 11
Treatment – Phototherapy (NBUVB)	Discontinued – reason (if yes)	Medication side effects = 12
Treatment – Phototherapy (NBUVB)	Discontinued – reason (if yes)	Others = 13
Treatment – Systemic (current)	Systemic agent	MTX = 1
Treatment – Systemic (current)	Systemic agent	Cyclosporine = 2
Treatment – Systemic (current)	Systemic agent	Acitretin = 3
Treatment – Systemic (current)	Systemic agent	Sulfasalazine = 4
Treatment – Systemic (current)	Systemic agent	Etanercept = 5
Treatment – Systemic (current)	Systemic agent	Infliximab = 6
Treatment – Systemic (current)	Systemic agent	Adalimumab = 7
Treatment – Systemic (current)	Systemic agent	Ustekinumab = 8
Treatment – Systemic (current)	Systemic agent	Secukinumab = 9
Treatment – Systemic (current)	Systemic agent	Ixekizumab = 10
Treatment – Systemic (current)	Systemic agent	Brodalumab = 11
Treatment – Systemic (current)	Systemic agent	Risankizumab = 12
Treatment – Systemic (current)	Systemic agent	Guselkumab = 13
Treatment – Systemic (current)	Systemic agent	Others = 14 (specify)

Treatment – Systemic (current)	Duration	<1 year = 1
Treatment – Systemic (current)	Duration	1–2 years = 2
Treatment – Systemic (current)	Duration	>2 years = 3
Treatment – Systemic (current)	Side effects	Yes = 1
Treatment – Systemic (current)	Side effects	No = 2
Treatment – Systemic (current)	Discontinued	Yes
Treatment – Systemic (current)	Discontinued	No
Treatment – Systemic (current)	Discontinued – reason (if yes)	Failed treatment = 11
Treatment – Systemic (current)	Discontinued – reason (if yes)	Medication side effects = 12
Treatment – Systemic (current)	Discontinued – reason (if yes)	Others = 13
Treatment – Systemic (past, if any)	Past systemic agent	Same agent coding as above
Treatment – Systemic (past, if any)	Duration	<1 year = 1
Treatment – Systemic (past, if any)	Duration	1–2 years = 2
Treatment – Systemic (past, if any)	Duration	>2 years = 3
Treatment – Systemic (past, if any)	Side effects	Yes = 1
Treatment – Systemic (past, if any)	Side effects	No = 2
Treatment – Systemic (past, if any)	Discontinued	Yes
Treatment – Systemic (past, if any)	Discontinued	No
Treatment – Systemic (past, if any)	Discontinued – reason (if yes)	Failed treatment = 11
Treatment – Systemic (past, if any)	Discontinued – reason (if yes)	Medication side effects = 12
Treatment – Systemic (past, if any)	Discontinued – reason (if yes)	Others = 13
Associated comorbidities	Diabetes mellitus (DM)	Yes = 1
Associated comorbidities	Diabetes mellitus (DM)	No = 2
Associated comorbidities	Hypertension (HTN)	Yes = 1
Associated comorbidities	Hypertension (HTN)	No = 2
Associated comorbidities	Dyslipidemia (DLP)	Yes = 1
Associated comorbidities	Dyslipidemia (DLP)	No = 2
Associated comorbidities	Vitamin D deficiency	Normal
Associated comorbidities	Vitamin D deficiency	Deficient <20 ng/mL
Associated comorbidities	Vitamin D deficiency	Severe <10 ng/mL
Associated comorbidities	Vitamin D deficiency	Very severe <5 ng/mL
Associated comorbidities	Chronic kidney disease (CKD)	Yes = 1
Associated comorbidities	Chronic kidney disease (CKD)	No = 2
Associated comorbidities	Uveitis	Yes = 1 (specify in 'Others' if yes)
Associated comorbidities	Uveitis	No = 2
Associated comorbidities	Inflammatory bowel disease (IBD)	Yes = 1 (specify in 'Others' if yes)
Associated comorbidities	Inflammatory bowel disease (IBD)	No = 2
Associated comorbidities	Cardiovascular disease (CVS)	Yes = 1 (specify in 'Others' if yes)
Associated comorbidities	Cardiovascular disease (CVS)	No = 2
Associated comorbidities	Smoking history	Current = 1

Associated comorbidities	Smoking history	Past = 2
Associated comorbidities	Smoking history	Nonsmoker = 3
Associated comorbidities	Smoking history	Not applicable = 4
Associated comorbidities	Autoimmune disease	Yes = 1 (specify in 'Others' if yes)
Associated comorbidities	Autoimmune disease	No = 2
Associated comorbidities	Others	Free text (specify comorbidity)

TABLE 6: Structured data collection form

Appendix B

Factor	MTX (n=38)	UST (n=19)	RIS (n=21)	ADA (n=17)	IXE (n=12)	ETN (n=10)	Others (n=15)	P
Axial: Yes	3 (7.9%)	3 (15.8%)	0	4 (23.5%)	1 (8.3%)	3 (30.0%)	2 (13.3%)	0.108
Peripheral: Yes	17 (44.7%)	4 (21.1%)	5 (23.8%)	7 (41.2%)	6 (50.0%)	4 (40.0%)	7 (46.7%)	0.394
Side effects: Yes	2 (5.3%)	0	0	2 (11.8%)	0	0	0	0.405
Discontinued: Yes	7 (18.4%)	0	1 (4.8%)	4 (23.5%)	1 (8.3%)	1 (10.0%)	1 (6.7%)	0.220
BSA, median (IQR)	3 (0.5–8)	8 (1–15)	18 (10–27.5)	2.5 (0–10)	1.5 (0–4.5)	0 (0–3.5)	1 (0–12.8)	<0.001**
PASI, median (IQR)	4 (0.5–8)	8 (1–15)	18 (10–31)	2.5 (0–8.25)	2 (0–5)	0 (0–2.5)	1 (0–6.5)	<0.001**
NAPSI, median (IQR)	0 (0–0)	0 (0–0)	0 (0–3)	0 (0–0)	0 (0–2.75)	0 (0–0)	0 (0–0)	0.293

TABLE 7: Univariate analysis of factors influencing choice of systemic agent (n=132).

MTX: methotrexate; UST: ustekinumab; RIS: risankizumab; ADA: adalimumab; IXE: ixekizumab; ETN: etanercept; BSA: body surface area; PASI: Psoriasis Area and Severity Index; NAPSI: Nail Psoriasis Severity Index. P-value by Kruskal-Wallis test for continuous variables (BSA, PASI, NAPSI) or Fisher's exact test for categorical variables (axial, peripheral, side effects, discontinued). ** Significant at p<0.05.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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