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Beyond expectations: disease duration and psychological burden in psoriatic arthritis

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Abstract
This study aims to investigate the relationship between disease duration and psychological burden in PsA and to identify the risk factors associated with psychological distress. Patients with PsA who met CASPAR classification criteria enrolled by Turkish League Against Rheumatism (TLAR)-Network. Patients were categorized into three groups based on disease duration: early stage (< 5 years), middle stage (≥ 5, < 10 years), and late stage (≥ 10 years). All patients underwent clinical and laboratory assessment using standardized protocol and case report forms. The associations between psychological variables and clinical parameters were assessed by a multivariate analysis. Of the 1113 patients with PsA (63.9% female), 564 (%50.7) had high risk for depression and 263 (%23.6) for anxiety. The risk of psychological burden was similar across all PsA groups, and patients with a higher risk of depression and anxiety also experienced greater disease activity, poorer quality of life, and physical disability. Multivariate logistic regression revealed that female gender (OR = 1.52), PsAQoL (OR = 1.13), HAQ (OR = 1.99), FiRST score (OR = 1.14), unemployment/retired (OR = 1.48) and PASI head score (OR = 1.41) were factors that influenced the risk of depression, whereas the current or past enthesitis (OR = 1.45), PsAQoL (OR = 1.19), and FiRST score (OR = 1.26) were factors that influenced the risk of anxiety. PsA patients can experience a comparable level of psychological burden throughout the course of their disease. Several socio-demographic and disease-related factors may contribute to mental disorders in PsA. In the present era of personalized treatment for PsA, evaluating psychiatric distress can guide tailored interventions that improve overall well-being and reduce disease burden.

Keywords Anxiety · Arthritis · Psoriatic · Depression · Rheumatic diseases · Quality of life

Introduction

Psoriatic arthritis (PsA) is a progressive inflammatory condition characterized by immune system-mediated inflammation. It is estimated that over 30% of individuals with psoriasis will develop PsA at some point in their life [1]. PsA commonly presents with psoriasis and musculoskeletal symptoms. It can also affect other parts of the body beyond the skin and musculoskeletal system including the nails, eyes, mental health, digestive, and cardiovascular systems [2, 3]. Due to the involvement of multiple systems and diverse range of symptoms, PsA is considered a complex and heterogeneous disease that requires a multidisciplinary approach to diagnosis and management.

Studies have shown that individuals who have PsA may encounter several challenges including psychological distress, sleep disorders, fatigue, functional limitations, and a reduced quality of life [4–7]. These obstacles can have a significant impact on their ability to carry out daily tasks and fulfill work responsibilities [8]. The majority of patients with PsA suffer from one or more comorbidities during their illness [9]. Currently, mental health issues, particularly anxiety and depression, are common comorbidities that can cause physical disability, and reduced

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well-being in patients with PsA [5]. In addition, there is evidence that depression and anxiety could contribute to the onset and progression of PsA [10]. Therefore, a worldwide consensus among physicians and patients has proposed that assessing emotional well-being should be incorporated in the updated core sets for clinical studies [11].

Until now, a number of studies have assessed the prevalence of mental health disorders in patients with PsA and compared disease activity and patient-reported outcomes in those with and without these comorbidities [12–14]. However, there are insufficient data on whether the psychological burden changes over time in individuals with PsA. The primary objective of this study was to investigate whether the psychological burden increases with the disease duration of PsA, and the secondary objective was to identify the risk factors associated with psychological distress in PsA patients.

Materials and methods

Study design and participants

This cross-sectional clinical study was conducted as part of the Turkish League Against Rheumatism (TLAR)-Network, which is a nationwide multicenter registry established in Turkey in 2018. A web-based network was implemented to facilitate standardized data collection across 25 rheumatology and physical medicine and rehabilitation clinics from diverse regions of the country. The data for this study were collected from patients during their routine visits between the years 2018 and 2019. The inclusion criteria for this study comprised individuals over 18 years old, meet the Classification Criteria for Psoriatic Arthritis (CASPAR) [15] for PsA and provide their informed consent to participate. Conversely, participants with the following characteristics were excluded from the study: a history of diagnosed or treated depression or anxiety, preexisting psychiatric conditions, malignancy, other rheumatic diseases, and pregnancy or lactation [16–19]. Since this research focused on the psychological burden in PsA, patients with data available for depression and anxiety were enrolled for the present analysis. The study protocol was approved by the local ethics committee (25.01.2018/42), and written informed consent was obtained from each participant.

In this study, patients were categorized into three groups depending on the disease duration: those in the early stage (< 5 years), those in the middle stage (≥ 5, < 10 years), and those in the late stage (≥ 10 years). Standardized procedures and case report forms were used to carry out clinical assessments for all patients.

Assessments

Demographic and clinical characteristics of the patients with PsA were recorded during a single visit. Disease activity was evaluated using the Disease Activity Score-28—C-reactive protein (DAS28-CRP), minimal disease activity (MDA), Disease Activity in PSoriatic Arthritis (DAPSA), and Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) [20, 21]. DAS28-CRP is a commonly used composite index for assessment disease activity, which includes 28 tender and swollen joint counts, CRP, and the patient's general health assessment [22]. MDA is another validated outcome measure that comprises seven domains, including swollen/tender joint counts (≤ 1), VAS-pain (≤ 15), Psoriasis Area and Severity Index (PASI) (≤ 1) or body surface area (BSA) (≤ 3%), Health Assessment Questionnaire Disability (HAQ) (≤ 0.5), patient global assessment (PtGA) score (≤ 20), and tender entheseal points (≤ 1). To achieve MDA, at least five of these domains are required [20].

The level of fatigue severity was assessed by the VAS-fatigue. Psychological stress was evaluated using the Hospital Anxiety and Depression Scale (HADS), which has two subscales, anxiety and depression [23]. The validity and reliability of the HADS have been established in various rheumatic diseases, and it has also been shown to be a reliable instrument for assessing the risk of anxiety and depression in patients with PsA [24]. The validity and reliability of the Turkish version of the HADS were established in 1997. In our study, we employed a cutoff point of 10 or above to define the anxiety subgroup, while a cutoff point of 7 or above was utilized to define the depressed subgroup, consistent with the thresholds reported by Aydemir et al. [25]. The presence and extent of enthesitis was assessed using the Maastricht Ankylosing Spondylitis Enthesitis Score (MASES) [26].

The Short-Form Health Survey (SF-36) was used to assess the health related quality of life measuring seven variables including physical functioning, physical role, pain, general health, vitality, social function, emotional role, and mental health [27]. Furthermore, the Psoriatic Arthritis Quality of Life (PsAQoL) was utilized to evaluate quality of life specific to psoriatic arthritis [28]. The severity of psoriasis assessed by the Psoriasis Area Severity Index (PASI) [29]. This study also measured the functional status and symptoms of fibromyalgia using the HAQ and Fibromyalgia Rapid Screening Tool (FiRST), respectively [30, 31]. In addition, medical history and patient-reported outcome measures such as VAS-pain, VAS-fatigue, patient global assessment (PtGA), and physician global assessment (PhGA) were recorded [32].

Statistical analysis

Patients with available data for mental health and disease durations were included in this analysis. The patients were divided into 3 groups according to the disease duration of PsA. These groups: < 5 years, ≥ 5 to < 10 years and ≥ 10 years. The Kolmogorov–Smirnov test was employed to analyze the distribution of the data. Demographic and clinical variables were described as mean (standard deviations, SD) for continuous variables or frequencies for categorical variables; comparisons were made between three groups with ANOVA or Pearson's Chi-square as appropriate. Comparison between with and without higher risk of depression and anxiety were analyzed using Student's t-test. Possible factors thought to affect anxiety and depression were included as variables in the univariate logistic regression analysis. Significant variables from the univariate analysis were included as covariates in the multivariate logistic regression analysis, which was used to determine associated factors with HADS-Anxiety and HADS-Depression. Backward stepwise model was applied for binary logistic regression analysis. Statistical analyses were made using IBM SPSS Statistics for Windows, v25 (IBM Corp., N.Y., USA). *p* values less than 0.05 were considered as statistically significant.

Results

Demographic and clinical characteristics

A total of 1113 patients with PsA (early stage, $n = 410$; middle stage, $n = 262$; late stage $n = 441$) were enrolled in this study. The mean age of the patients was 46.7 (SD 12.2) years, and the mean disease duration was 8.9 (SD 7.8) years. Of the total PsA patients, 63.9% ($n = 711$) were female. Table 1 provides the demographic and clinical characteristics of each PsA group. In the early stage of PsA, hypertension (HT) and diabetes mellitus (DM) were observed less frequently compared to the middle and late stages, as expected. However, such a difference was not detected in the middle and late stages. No statistically significant differences were found among the three groups in terms of other comorbidities that were investigated (coronary artery disease, valvular disease, thyroid dysfunction, chronic kidney disease, and chronic liver disease, etc.).

Disease activity and patient-reported outcomes

A comparison of the three groups in terms of disease activity and patient-reported outcomes is presented in Table 2. Regarding the musculoskeletal disease domains, axial disease, peripheral arthritis, and enthesitis did not show any significant differences among all three groups. The only exception was dactylitis, which was statistically lower in the early-stage compared to both the middle and late stages. However, the prevalence of dactylitis was similar between the middle and late stages. The proportion of PsA patients with DAS28-CRP > 5.1, BASDAI ≥ 4, and achieving MDA were comparable between three groups ($p = 0.098$, $p = 0.059$, and $p = 0.893$, respectively). The mean PtGA [4.7 (SD 2.5)] and PhGA [4.0 (SD 2.2)] scores were numerically higher in patients with disease duration less than 5 years, but this difference was not statistically significant. This group also had higher scores for VAS-pain [4.97 (SD 2.61), $p = 0.017$] and lower TJC

Table 1 Demographic and clinical characteristics of each PsA group

Disease durations	< 5 year	≥ 5, < 10 year	≥ 10 year	*P*
Age, years, mean (SD)	43.2 (12.6)	47.1 (11.8)	49.9 (11.2)	< 0.001
Male *n* (%)	141 (34.4)	87 (33.2)	174 (39.5)	0.164
BMI kg/m^2, mean (SD)	27.9 (5.0)	29.3 (5.2)	29.3 (4.9)	< 0.001
Education level, *n* (%)				0.040
-Illiterate/primary school	181 (44.1)	115 (43.9)	227 (51.5)	
-Secondary/high school	152 (37.1)	107 (40.8)	160 (36.3)	
-University	77 (18.8)	40 (15.3)	54 (12.2)	
Disease duration, years, mean (SD)	2.2 (1.2)	6.4 (1.4)	16.5 (6.8)	< 0.001
Unemployed/retired, *n* (%)	238 (58.1)	166 (63.4)	296 (67.1)	0.023
Current use of csDMARD, *n* (%)	203 (49.5)	151 (57.6)	235 (53.3)	0.118
Current use of bDMARD, *n* (%)	69 (16.8)	82 (31.3)	159 (36.1)	< 0.001
Presence of comorbidity, *n* (%)	141 (34.1)	119 (45.2)	204 (46.3)	0.001
-Diabetes mellitus, *n* (%)	43 (10.4)	45 (17.1)	79 (17.9)	0.005
-Hypertension, *n* (%)	61 (14.8)	60 (22.8)	118 (26.8)	0.0001

BMI body mass index, *bDMARD* biologic disease-modifying antirheumatic drug, *csDMARD* Conventional synthetic disease-modifying antirheumatic drug

Table 2 Comparison of each group regarding disease activity and clinical outcomes

Disease durations	< 5 years	≥ 5, < 10 years	≥ 10 years	*P*
VAS-pain (0–10)	5.0 (2.6)	4.7 (2.7)	4.5 (2.6)	0.017
PtGA (0–10)	4.7 (2.5)	4.5 (2.6)	4.4 (2.5)	0.403
PhGA (0–10)	4.0 (2.2)	3.9 (2.2)	3.9 (2.2)	0.737
VAS-fatigue	5.0 (2.9)	5.0 (2.8)	4.9 (2.8)	0.807
TJC	4.8 (7.6)	6.2 (8.9)	6.2 (9.5)	0.045
SJC	1.3 (2.5)	1.5 (2.8)	1.5 (3.9)	0.615
DAS28-CRP (*n* = 1039)	3.3 (1.2)	3.5 (1.3)	3.4 (1.2)	0.082
-DAS28 > 5.1, *n* (%)	26 (6.7)	28 (11.6)	38 (9.3)	0.098
BASDAI (n = 1004)	4.0 (2.3)	4.2 (2.2)	3.8 (2.3)	0.092
-BASDAI ≥ 4, *n* (%)	186 (49.9)	126 (53.2)	173 (43.9)	0.059
DAPSA (n = 1017)	16.4 (11.4)	17.9 (13.0)	17.1 (13.5)	0.358
MDA positive (*n* = 1044), *n* (%)	74 (18.9)	43 (17.6)	77 (18.9)	0.893
MASES	2.4 (3.1)	2.7 (3.0)	2.8 (3.4)	0.326
PASI total score	3.2 (5.5)	3.4 (5.2)	2.5 (3.8)	0.025
Musculoskeletal PsA domains				
-Axial disease, *n* (%)	135 (32.8)	102 (38.9)	178 (40.5)	0.059
-Peripheral arthritis, *n* (%)	260 (63.4)	167 (63.7)	283 (64.3)	0.962
-Enthesitis current/past, *n* (%)	190 (46.2)	135 (51.5)	224 (50.9)	0.283
-Dactylitis current/past, *n* (%)	102 (24.8)	95 (36.3)	124 (28.2)	0.006
PsAQoL	6.5 (6.1)	7.3 (6.6)	6.8 (6.3)	0.266
SF-36 Physical component score	57.0 (23.2)	54.4 (23.1)	57.0 (23.8)	0.274
SF-36 Mental component score	56.0 (22.1)	53.4 (22.0)	56.6 (21.2)	0.164
HAQ	0.38 (0.44)	0.45 (0.44)	0.44 (0.5)	0.089
HADS-Depression score	6.4 (4.2)	6.9 (4.1)	6.9 (4.2)	0.088
-HADS-Depression score ≥ 7, *n* (%)	189 (46.1)	143 (54.6)	232 (52.6)	0.058
HADS-Anxiety score	6.5 (4.1)	6.9 (4.1)	6.8 (4.3)	0.514
-HADS-Anxiety score ≥ 10, *n* (%)	90 (22.0)	65 (24.8)	108 (24.5)	0.600
FiRST score	2.5 (2.2)	2.7 (2.2)	2.3 (2.2)	0.094
-FiRST score ≥ 5, *n* (%)	99 (24.1)	73 (27.9)	92 (20.9)	0.104

Values are expressed as mean (SD) unless indicated otherwise.

BASDAI Bath Ankylosing Spondylitis Disease Activity Index, *DAS28-CRP* Disease Activity Score-28—C-reactive protein, *FiRST* Fibromyalgia Rapid Screening Tool, *HADS* Hospital Anxiety and Depression Scale, *HAQ* Health Assessment Questionnaire, *MASES* Maastricht enthesopathy score, *MDA* minimal disease activity, *PASI* Psoriasis Area Severity Index, *PhGA* physician global assessment, *PtGA* patient global assessment, *PsAQoL* Psoriatic Arthritis Quality of Life, *SJC* swollen joint count, *SF-36* short form-36, *TJC* tender joint count, *VAS* visual analogue scale

[4.8 (SD 7.6), $p = 0.045$]. In addition, no difference was found between the three groups in terms of mean VAS-fatigue, PsAQoL, HAQ, as well as MASES scores.

Both the physical component summary (PCS) and mental component summary (MCS) scores of SF-36 were similar between the three groups. Similarly, the FiRST ≥ 5 score also did not show any significant difference between the groups. However, PsA patients in the late-stage group had a considerably lower total PASI score [2.53 (SD 3.77), $p = 0.025$)] compared to the other groups.

Psychological burden

Among the overall PsA patient population, 50.7% were found to have a high risk of depression, and 23.6% were found to have a high risk of anxiety. With regard to the psychological burden in groups, the proportion of PsA patients with a high risk of depression and anxiety ranged from 46.1% to 54.6% and 22% to 24.8%, respectively. There was no significant difference in median HADS-Depression and HADS-Anxiety scores between groups.

As presented in Table 3, patients with PsA who were at a high risk of depression (HADS-Depression score ≥ 7)

Table 3 Comparison of HADS-Depression and HADS-Anxiety positive and negative

	HADS-Depression		*P*	HADS-Anxiety		*P*
	Negative (score < 7)	Positive (score ≥ 7)		Negative (score < 10)	Positive (score ≥ 10)	
Age	45.5 (11.9)	48.0 (12.4)	0.001	46.4 (12.2)	48.0 (12.3)	0.057
Male gender, *n* (%)	220 (40.1)	182 (32.3)	0.006	332 (39.1)	70 (26.6)	< 0.001
BMI, kg/m^2	28.2 (5.0)	29.3 (5.0)	< 0.001	28.5 (4.9)	29.7 (5.3)	0.001
Disease duration, years	8.5 (7.8)	9.2 (7.8)	0.152	8.7 (7.6)	9.4 (8.4)	0.189
VAS-pain (0–10)	4.0 (2.5)	5.3 (2.5)	< 0.001	4.4 (2.6)	5.7 (2.6)	< 0.001
PtGA (0–10)	3.9 (2.4)	5.2 (2.5)	< 0.001	4.2 (2.5)	5.5 (2.5)	< 0.001
VAS-fatigue (0–10)	4.1 (2.9)	5.8 (2.6)	< 0.001	4.5 (2.8)	6.5 (2.4)	< 0.001
DAS28-CRP	3.1 (1.1)	3.6 (1.3)	< 0.001	3.3 (1.2)	3.8 (1.3)	< 0.001
BASDAI	3.2 (2.2)	4.7 (2.2)	< 0.001	3.5 (2.1)	5.2 (2.3)	< 0.001
CRP mg/L	8.1 (12.7)	8.4 (12.2)	0.725	8.3 (13.0)	8.1 (10.5)	0.767
MDA positive ($n = 1042$), *n* (%)	139 (27.7)	55 (10.2)	< 0.001	174 (21.9)	20 (8.0)	< 0.001
PsAQoL	3.9 (4.7)	9.7 (6.3)	< 0.001	5.0 (5.2)	12.6 (6.0)	< 0.001
HAQ	0.3 (0.3)	0.6 (0.5)	< 0.001	0.3 (0.4)	0.7 (0.6)	< 0.001
HADS-Anxiety ≥ 10, *n* (%)	41 (7.5)	222 (39.4)	< 0.001	–	–	
HADS-Depression ≥ 7, *n* (%)	–	–	–	342 (40.3)	222 (84.4)	< 0.001
FiRST	1.7 (2.0)	3.2 (2.1)	< 0.001	2.0 (2.0)	4.1 (2.0)	< 0.001

Values are expressed as mean (SD) unless indicated otherwise.

BASDAI Bath Ankylosing Spondylitis Disease Activity Index, *BMI* body mass index, *DAS28-CRP* Disease Activity Score-28—C-reactive protein; *FiRST*, Fibromyalgia Rapid Screening Tool; *HADS* Hospital Anxiety and Depression Scale; *HAQ* Health Assessment Questionnaire, *MASES* Maastricht enthesopathy score, MDA minimal disease activity; *PASI* Psoriasis Area Severity Index, PhGA physician global assessment, *PtGA* patient global assessment; *PsAQoL* Psoriatic Arthritis Quality of Life, *VAS* visual analogue scale

and anxiety (HADS-Anxiety score ≥ 10) exhibited higher scores in the patient-reported outcome measures (VAS-pain, VAS-fatigue, PtGA, and FiRST) as well as disease activity measures (DAS28-CRP, BASDAI). In addition, these patients also had poorer scores in PsQoL and HAQ, and a lower proportion of them achieved MDA. However, there were no significant differences in disease duration and CRP level between PsA patients with or without depression and anxiety.

Medical treatment

Regarding medical treatment, 27.9% of whole PsA patients received biological disease-modifying antirheumatic drugs (bDMARDs), while 52.9% received conventional synthetic disease-modifying antirheumatic drugs (csDMARDs). The proportion of patients receiving bDMARDs (16.8%) and csDMARDs (49.5%) was lower in the early-stage group ($p < 0.001$ and $p = 0.118$, respectively).

Factors associated with depression and anxiety

Variables including gender, education and employment status, PtGA, VAS-fatigue, DAS28-CRP, MDA, PsAQoL, HAQ, enthesitis history, PASI head, and FiRST scores and presence of a comorbidity which were considered as potential associated factors and found to be significant in univariate analysis, were included in the multivariate analysis. The results of the multivariate logistic regression analysis are presented in Table 4. Female gender, being unemployed or retired, higher PsQoL, HAQ, FiRST, and PASI head score were identified as independent risk factors for a higher risk of depression in patients with PsA. On the other hand, the presence of current or past enthesitis, higher PsQoL, and FiRST score were identified as independent risk factors for anxiety in patients with PsA.

Discussion

To the best of our knowledge, this is the first study to assess the difference in psychological burden experienced by PsA patients based on disease duration, categorizing them into early, middle, and late stages. The findings of this study demonstrated that the risk of depression and anxiety was similar across all PsA groups, and several socio-demographic variables and disease-related factors may contribute to the development of depression and anxiety in PsA. In addition, PsA patients with a higher risk of depression and anxiety also experienced greater disease activity, fatigue, pain, poorer quality of life, and physical disability.

Table 4 Multivariate regression analysis for factors associated with depression and anxiety

	HADS-Depression			HADS-Anxiety		
	OR	95% CI	*P*	OR	95% CI	*P*
Gender (female)	1.52	1.07–2.13	0.018			
PsAQoL score	1.13	1.09–1.17	< 0.001	1.19	1.15–1.23	< 0.001
HAQ score	1.99	1.29–3.06	0.002			
FIRST score	1.14	1.05–1.23	0.001	1.26	1.15–1.38	< 0.001
Entesitis current/past				1.45	1.04–2.03	0.031
PASI head score	1.41	1.07–1.85	0.015			
Unemployed/ retired	1.48	1.06–2.06	0.020			

FiRST Fibromyalgia Rapid Screening Tool, *HADS* Hospital Anxiety and Depression Scale, *HAQ* Health Assessment Questionnaire, *PASI* Psoriasis Area Severity Index, *PsAQoL* Psoriatic Arthritis Quality of Life

In addition to effects on the musculoskeletal system, PsA can also have extra-articular involvement and comorbidities that can impact various aspects of health, including physical, mental, and social well-being of patients [2, 5, 33]. Mental health issues, especially depression and anxiety, are common comorbidities that can significantly increase the psychological burden of disease in patients with PsA [12, 33].

A systematic review and meta-analysis, which included 24 studies and up to 31,000 patients with PsA, investigated the prevalence of mental health disorders. The authors found that the prevalence of depression ranged from 5 to 51%, whereas the prevalence of anxiety ranged from 4 to 61% among patients with PsA [12]. In our study, the proportion of PsA patients with a high risk of depression and anxiety were found 50.7% and 23.6%, respectively, which is consistent with the literature [12]. In terms of the psychological burden in PsA groups, we demonstrated for the first time that there were no significant differences in the risk of anxiety and depression among PsA patients with disease duration of less than 5 years, 5–10 years, and 10 years or more. These findings suggest that patients with PsA can experience a comparable level of psychological burden throughout the course of their disease. Therefore, psychological impairment should not be ignored or undervalued in any patient with PsA during routine clinic visits [33].

Comparison of PsA groups revealed that patients with disease duration of < 5 years had higher VAS-pain score, while those with disease duration of ≥ 10 years had lower total PASI scores. However, there were no statistically significant differences in fatigue, disease activity, quality of life, physical disability, or enthesitis score among all groups of PsA patients. These results suggest that the disease burden remains consistent throughout the course of the disease, regardless of its duration.

Until now, numerous studies have demonstrated a connection between immune-regulated rheumatic disease and the mental health disorders [6, 13, 34, 35]. These studies have identified potential mechanisms for neuropsychiatric disorders in rheumatological conditions, including disease-related factors (e.g., disease severity, disease activity), systemic inflammation (e.g., IL6, TNF-α), and shared genetic factors [12, 35–38]. Despite this, only a limited number of studies investigated the risk factors for mental health issues specifically in PsA. A study involving 193 patients with psoriasis from Poland demonstrated that psoriasis severity was associated with psychological impairments [39]. Similarly, we found that psoriasis, particularly head involvement, had a greater impact on depression than musculoskeletal inflammation. This result suggests that psoriasis can lead to distorted body image and increased psychological distress among patients with PsA [33].

One study, which included 306 PsA patients and 135 psoriasis patients, found that depression and/or anxiety were associated with unemployment, female sex, more actively inflamed joints, disability, pain, and fatigue [13]. Other investigations also demonstrated that psychological stress was closely associated with quality of life, disease activity, and physical function in PsA [14, 38]. Our study revealed that being female and currently unemployed or retired were socio-demographic variables linked to a higher risk of depression in PsA patients. In addition, disease-related factors such as poorer quality of life, physical disability, and FiRST score were independent risk factors for experiencing depression. In contrast, the presence of current or past enthesitis, poorer PsQoL, and FiRST score were independent risk factors for anxiety in PsA patients. Therefore, it is crucial to be aware of these risk factors associated with psychological distress to develop strategies for prevention and management of psychological burden in patients with PsA.

Minimal disease activity is common treatment goal in the management of PsA. Recent research has shown that achieving MDA can have positive effects on the course of the disease, including preventing joint damage, enhancing physical function, and improving quality of life in PsA patients [40, 41]. Despite these benefits, achieving this goal remains challenging for many patients with PsA. Lately, there has been a growing interest in examining the factors associated with the attainment of MDA in PsA. In a large observational study,

Wong et.al. examined the impact of physiologic distress on the achievement of MDA in patients with PsA. They demonstrated that patients with PsA who experienced symptoms of depression and anxiety had a lower probability of achieving MDA [42]. Similarly, in our study, patients with PsA who were at high risk for anxiety or depression had lower rates of achieving MDA than those without these comorbidities. In addition, we found that PsA patients with depression or anxiety had higher VAS-pain and PtGA, as well as poorer physical function. These factors may contribute to the failure of MDA. These findings suggest that addressing physical distress may be an important factor in achieving MDA in PsA patients. It highlights the importance of considering both physical and mental health factors in the management of PSA to optimize treatment outcomes.

Several studies have indicated that PsA patients with psychological distress may have poorer disease outcomes [33, 35, 38, 42]. A longitudinal study conducted by Gialouri et al. observed that depression and anxiety were associated with unfavorable patient-reported outcomes, particularly in terms of quality of life in patients with PsA [43]. Our study supports this observation, as it found that PsA patients with a high risk of depression or anxiety tended to have a higher disease burden. This includes more severe disease activity, increased fatigue, reduced physical function, and decreased quality of life. This can create a vicious cycle of worsening PsA symptoms and worsening depression, further impacting the patient's overall health and well-being. Taken together, these findings emphasize the detrimental effects of depression and anxiety on multiple domains of PsA, including patient-reported outcomes, disease activity, functional impairment, quality of life, and treatment outcomes. Addressing and managing psychological distress in PsA patients is crucial not only for improving mental well-being but also for optimizing disease control and overall patient outcomes.

A strength of this study is that it includes a large group of patients with PsA from a multicenter registry, which can provide a more representative picture of the PsA population, reducing selection bias. However, this study was conducted using a cross-sectional design, which provides a snapshot of the data at a single point in time. It does not allow for the investigation of causal relationships between variables. Therefore, longitudinal studies would be necessary to better understand the causal relationships between the variables over time. Furthermore, besides depression and anxiety, disorders such as cognitive impairment, anhedonia, and alexithymia should be investigated in the future studies.

In conclusion, this study provides novel insights into the psychological burden experienced by patients with PsA at different stages of the disease. Regardless of the disease duration, patients with PsA face a comparable level of psychological burden throughout the course of their disease. The risk of developing depression and anxiety in PsA may be influenced by various socio-demographic variables and disease-related factors. Moreover, PsA patients at a higher risk for depression and anxiety also experience greater disease activity, fatigue, pain, poorer quality of life, and physical disability. Therefore, healthcare professionals should be mindful of the psychological impact of PsA and address both physical and mental symptoms in their treatment approach to improve overall well-being and reduce disease burden.

Author contributions All the authors contributed to conception and design of the study. Data analysis was performed by EK and GK. The initial draft of the manuscript was written by GK and EK, and all the authors critically reviewed it for important intellectual content. The final version to be published was approved by all the authors. All the authors take full responsibility for the integrity and accuracy of all aspects of the work.

Data availability Data are available on request due to privacy or other restrictions.

Declarations

Conflict of interests The authors declare that they have no conflict of interests.

Ethical approval The protocols of this study were approved by local ethics committee (25.01.2018/42), and written informed consent was obtained from each participant.

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