

# Associations of Polypharmacy With Clinical Parameters, Function, and Health-Related Quality of Life in Psoriatic Arthritis

Didem Erdem Gürsoy, MD,\* Halise Hande Gezer, MD,†  
Sevtap Acer Kasman, MD,‡ and Mehmet Tuncay Duruöz, MD§

**Objective:** The aim of this study was to assess predictors of polypharmacy and its effect on health-related quality of life in patients with psoriatic arthritis (PsA).

**Methods:** This cross-sectional study was performed between February and December 2019. The number of medications was grouped into minor (2–4) and major ( $\geq 5$ ) polypharmacy. Functional status and quality of life were assessed using the Health Assessment Questionnaire and Short-Form 36, respectively. Clinical and demographic characteristics, physical function, and quality of life of the polypharmacy group were compared. Predictive factors for major polypharmacy were evaluated using a logistic regression analysis.

**Results:** The mean age of the 100 patients (70 females and 30 males) with PsA was  $48.43 \pm 12.94$  years. The proportion of patients with major polypharmacy was 19%. The physical function subscale of Short-Form 36 was lower in the major polypharmacy group ( $p = 0.009$ ). Univariable analysis revealed that sex, body mass index, disease duration, disease activity, psoriasis severity, dactylitis, enthesitis, PsA subtypes, smoking, and Health Assessment Questionnaire were not associated with major polypharmacy ( $p > 0.10$ ). In the multivariable model, the number of comorbidities (odds ratio, 3.151; 95% confidence interval, 1.828–5.429;  $p < 0.001$ ) and age  $\geq 60$  years (odds ratio, 4.864; 95% confidence interval, 1.159–20.418;  $p = 0.031$ ) were significantly associated with major polypharmacy.

**Conclusions:** The number of comorbid diseases and age  $\geq 60$  years were the factors associated with major polypharmacy in patients with PsA. Although physical function was not associated with polypharmacy, patients with major polypharmacy had poorer quality of life.

**Key Words:** psoriatic arthritis, polypharmacy, comorbidity, quality of life, physical function

(*J Clin Rheumatol* 2023;29: 1–6)

Psoriatic arthritis (PsA) is a chronic inflammatory disease associated with psoriasis that presents with inflammation of the joints and entheses.<sup>1</sup> Psoriatic arthritis has a very heterogeneous clinical presentation. Peripheral and axial manifestations are the 2 main groups of musculoskeletal features of PsA, including polyarthritis, mono/oligoarthritis, distal interphalangeal joint

disease, arthritis mutilans, and psoriatic spondylitis.<sup>2,3</sup> The periarticular manifestations of PsA include dactylitis and enthesitis, and extramusculoskeletal manifestations include uveitis and inflammatory bowel disease (IBD).<sup>2–4</sup> Some comorbid conditions have also been associated with PsA. Hypertension, cardiovascular diseases, hyperlipidemia, metabolic syndrome, and obesity are the most common comorbidities in patients with PsA.<sup>5</sup> All major disease domains and comorbidities should be considered when evaluating patients with PsA,<sup>6</sup> and all these factors are important in determining treatment choice.<sup>7</sup> Treatment options for PsA include conventional synthetic disease-modifying antirheumatic drugs (DMARDs), biological DMARDs, targeted synthetic DMARDs,<sup>8</sup> and symptomatic therapies, such as glucocorticoids and nonsteroidal anti-inflammatory drugs (NSAIDs). Combination therapies may be needed in some patients, depending on the domain that is predominantly affected.

Adults with arthritis may take more than 1 medication for rheumatic disease and may have polypharmacy if there is concomitant ingestion of medications for their comorbid diseases.<sup>9</sup> The definition of polypharmacy is very heterogeneous. The most commonly reported definition is numerical. Therefore, only the number of drugs was used to assess polypharmacy. These numerical definitions range from 2 or more medications to 11 or more medications with wide variability. The use of 5 or more medications is the most commonly used term for polypharmacy.<sup>10,11</sup>

As a result of the variation in the definitions, it is difficult to determine the prevalence of polypharmacy.<sup>11</sup> The prevalence of polypharmacy was reported to be between 10% and 90% in different populations. Demographics, socioeconomic characteristics, and chronic conditions were determined to be predictive factors of polypharmacy.<sup>12</sup> Evidence of the relationship between polypharmacy and adverse outcomes such as adverse drug reactions and events is contradictory. Hospitalization and inappropriate prescription have the most consistent evidence.<sup>13</sup> On the other hand, polypharmacy can be considered a predictor of clinical outcomes in rheumatoid arthritis (RA) because of its relationships with treatment response and serious adverse events.<sup>14</sup> However, its effect on clinical outcomes in PsA is unknown.

From the \*Rheumatology Clinic, Prof. Dr Cemil Taşcıoğlu City Hospital; †Rheumatology Clinic, Ümraniye Research and Training Hospital; ‡Rheumatology Clinic, Dr. Lütfi Kırdar Research and Training Hospital; and §Rheumatology Division, Department of Physical Medicine and Rehabilitation, Marmara University Faculty of Medicine, Istanbul, Turkey.

Didem Erdem Gürsoy ORCID ID: 0000-0003-4962-0385

Halise Hande Gezer ORCID ID: 0000-0001-8790-304X.

Sevtap Acer Kasman ORCID ID: 0000-0002-4805-0555.

Mehmet Tuncay Duruöz ORCID ID: 0000-0003-3584-2788.

The Ethical Committee of Marmara University Faculty of Medicine approved the study (insert number: 09.2019.153).

Informed consent was obtained from all participants included in the study.

The authors declare that they have no affiliations with or involvement in any organization or entity with any financial interest in the subject matter or materials discussed in this manuscript.

No funding was received for this study.

All authors contributed to the conception and design of the study. Material preparation, data collection, and analysis were performed by all authors. D.E.G. wrote the first draft of the manuscript, and all authors commented on the previous versions of the manuscript. All the authors have read and approved the final manuscript.

The data sets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Correspondence: Didem Erdem Gürsoy, MD, Rheumatology Division, Department of Physical Medicine and Rehabilitation, Marmara University Faculty of Medicine, Prof. Dr Cemil Taşcıoğlu City Hospital, Rheumatology Clinic, Darülaceze Cd. No:27, 34384 Şişli/Istanbul, Turkey. E-mail: didem\_blue86@hotmail.com; didem.erdem86@gmail.com.

Copyright © 2022 Wolters Kluwer Health, Inc. All rights reserved.

ISSN: 1076-1608

DOI: 10.1097/RHU.0000000000001889

Evaluation of polypharmacy in patients with PsA is essential because of potential adverse effects such as adverse drug events, drug-drug interactions, decreased adherence or response to treatment, and effects on treatment choices. To the best of our knowledge, the prevalence and predictive factors of major polypharmacy have not been evaluated in PsA patients. The study objectives were to (1) determine the frequency of polypharmacy, (2) identify the factors associated with major polypharmacy, and (3) assess the effects of major polypharmacy on physical function and health-related quality of life in patients with PsA.

## METHODS

### Study Design and Patients

This was a cross-sectional study that included 100 participants who were diagnosed as having PsA, according to the Classification Criteria for Psoriatic Arthritis.<sup>15</sup> The PsA patients aged  $\geq 18$  years who presented to the outpatient clinic of the Rheumatology Division, Marmara University Faculty of Medicine were consecutively included in the study between February and December 2019. The exclusion criterion for the study was severe psychiatric or neurological diseases that prevented understanding of the questions.

This study was approved by the Ethics Committee of Marmara University Faculty of Medicine (insert number: 09.2019.153). Informed consent was obtained from all the patients.

### Demographic and Clinical Variables

Data on age, sex, smoking status, body mass index (BMI), obesity (BMI  $\geq 30$  kg/m<sup>2</sup>), disease duration (months), and disease activity were also collected. Disease Activity in PsA (DAPSA) and Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) were used to evaluate disease activity in peripheral and axial PsA, respectively. Consecutive patients with PsA were classified according to the musculoskeletal involvement that dominated the clinical picture as peripheral (arthritis, enthesitis, and dactylitis) and axial dominant diseases (sacroiliitis and spondylitis), based on clinical assessment and imaging. Predominant axial disease was defined according to the physician's report based on clinical features, including inflammatory back pain, spinal pain, spinal mobility, BASDAI, and magnetic resonance imaging or radiography findings of the sacroiliac joints and spine. The Psoriasis Area and Severity Index (PASI) was used to determine the severity of psoriasis.<sup>16</sup> We also noted the numbers of dactylitis. The Leeds Enthesitis Index was used to evaluate enthesitis.<sup>17</sup> Extra-articular manifestations, including uveitis and IBD, were noted.

Data regarding the type and number of comorbidities were collected for each patient. Comorbidities were defined by patients' self-reports and systematically checked and confirmed by physicians using electronic medical records and hospital medical files. Comorbidities were classified as cardiovascular diseases (coronary heart disease, stroke, and peripheral vascular disease), hyperlipidemia, diabetes mellitus, hypertension, pulmonary disease, gastrointestinal disease, liver disease, thyroid disorders, renal disease, osteoporosis, depression, malignancy, and other conditions, reflecting the current literature on comorbidities in PsA.<sup>5</sup>

A list of the medications was recorded for each patient. The total number of medications was determined using concurrently prescribed medications. Physician-prescribed vitamins and dietary supplements were included in the medication list. Topical and nonprescribed medications (such as herbal supplements) were not included in the medication list. The use of at least 5 different medications was defined as poly-

pharmacy, which was grouped into no (0–1 drug), minor (2–4 drugs), and major ( $\geq 5$  drugs) polypharmacy.<sup>10</sup>

### Patient-Reported Outcome Measures

Functional status was assessed using the Health Assessment Questionnaire (HAQ), and health-related quality of life was assessed using the Short-Form 36 (SF-36) questionnaire.<sup>18,19</sup>

### Statistical Analysis

Descriptive data were analyzed using frequency, median, min-max, mean, and standard deviation. Continuous variables were compared using the Mann-Whitney *U* and Kruskal-Wallis tests (with a post hoc test) because the variables had a nonnormal distribution, according to the normality tests. The  $\chi^2$  and Fisher exact tests were used to assess the differences among categorical variables. Logistic regression analysis was used to determine factors associated with major polypharmacy (dependent variable). Age, sex, BMI, disease duration, number of comorbid diseases, DAPSA, BASDAI, PASI scores, presence of dactylitis, Leeds Enthesitis Index, clinical subtypes of PsA, smoking status, and HAQ score were the independent variables. Initially, a univariable analysis was performed. Statistically significant independent variables ( $p < 0.10$ ) were included in the multivariable analysis. Statistical significance was set at  $p < 0.05$ . Statistical analyses were performed using SPSS Statistics for Windows (version 25.0; IBM).

## RESULTS

The mean age of the 100 PsA patients (70 females and 30 males) was  $48.43 \pm 12.94$  years. The proportion of patients aged  $\geq 60$  years was 20%. There was no significant difference in age between the women and men ( $p = 0.769$ ). The mean BMI was  $29.46 \pm 5.58$  kg/m<sup>2</sup>, and the percentage of obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) was 43.0%. The mean number of comorbid diseases was  $1.8 \pm 1.65$  (min-max = 0–6). The median (min-max) disease duration was 36 months (range, 1–384 months). At least 1 comorbid disease was detected in 72% of the patients. Hypertension was the most common comorbidity (26%). Five patients had uveitis, and 1 patient had IBD. The clinical features of the patients are presented in Table 1.

The mean number of medications was  $3.12 \pm 2.27$ . The percentages of patients in the no, minor, and major polypharmacy groups were 23%, 58%, and 19%, respectively. Nine patients were not using any medication at the time of the evaluation. These were on-demand users of drugs or those whose medications had been discontinued at that time due to adverse effects. In the minor polypharmacy group, the number of PsA-related drugs was between 2 and 4 in 60.3% of the patients, and 39.7% of the patients were using drugs only for PsA treatment. None of the patients in the major polypharmacy group was using medications only for treating PsA, and the number of PsA-related drugs ranged from 1 to 4. Conventional DMARDs, NSAIDs, and dietary supplements (including calcium and vitamins) were the most common groups of drugs used by patients. Twenty-nine percent of the patients used methotrexate, the most common drug among DMARDs (Table 2).

We compared the clinical features, functional status, and health-related quality of life of the patients with PsA among the polypharmacy groups (Table 3). Age and number of comorbid diseases were significantly higher in the major polypharmacy group ( $p < 0.001$ ). Body mass index was significantly lower in PsA patients with no polypharmacy ( $p = 0.006$ ). There were no differences in sex, disease duration, disease activity scores, dactylitis, enthesitis, or PASI scores among groups ( $p > 0.05$ ). Furthermore, no significant differences in the smoking status ( $p = 0.159$ ) or clinical

**TABLE 1.** Clinical and Demographic Data of the Patients With PsA

Variable	
Sex, %	
Female	70.0
Male	30.0
Age, mean ± SD, y	48.43 ± 12.94
BMI, mean ± SD, kg/m <sup>2</sup>	29.46 ± 5.58
Obesity, %	43.0
Smoking status, %	
Current smoker	19.0
Never smoker	74.0
Quitter	7.0
Disease duration, median (min-max), mo	36 (1–384)
Subgroups of PsA, %	
Peripheral predominant involvement	61
Axial predominant involvement	39
No. comorbid diseases, mean ± SD	1.8 ± 1.65
Types of comorbidities, %	
Cardiovascular diseases	8.0
Hypertension	26.0
Diabetes mellitus	18.0
Hyperlipidemia	15.0
Gastrointestinal disease	3.0
Liver disease	3.0
Renal disease	4.0
Pulmonary disease	18.0
Thyroid disorders	16.0
Depression	4.0
Malignancy	3.0

subtypes of PsA ( $p = 0.390$ ) were observed among the polypharmacy groups. Health Assessment Questionnaire and SF-36 subscales did not differ significantly among the polypharmacy groups ( $p > 0.05$ ). As an exception, the physical function subscale of SF-36 was significantly lower in the major polypharmacy group ( $p = 0.009$ ).

Univariable analysis showed that the factors associated with major polypharmacy were age (odds ratio [OR], 1.154; 95% confidence interval [CI], 1.073–1.241;  $p < 0.001$ ) and the number of comorbid diseases (OR, 3.248; 95% CI, 1.947–5.416;  $p < 0.001$ ). Sex, BMI, disease duration, DAPSA, BASDAI, PASI scores, presence of dactylitis, Leeds Enthesitis Index, clinical subtypes of PsA, smoking status, and HAQ were not associated with major polypharmacy ( $p > 0.10$ ). The multivariable model showed that the number of comorbid diseases was associated with major polypharmacy (OR, 2.542; 95% CI, 1.466–4.408;  $p = 0.001$ ), but age was not (OR, 1.095; 95% CI, 1.000–1.199;  $p = 0.0501$ ).

When patients were grouped into ≤39, 40–50, 51–59, and ≥60 years of age using quartiles, no significant associations with major polypharmacy were found in the univariable regression analysis ( $p > 0.05$ ). Then, univariable analysis was performed by dividing the patients into 2 groups according to age (<60 or ≥60 years). The univariable model showed that age ≥60 years was significantly associated with major polypharmacy (OR, 7.889; 95% CI, 2.580–24.122;  $p < 0.001$ ). When “age ≥60 years” was included in the multivariable model instead of “age” as the independent variable, multivariable analysis showed that the factors associated with major polypharmacy were being ≥60 years of age

(OR, 4.864; 95% CI, 1.159–20.418;  $p = 0.031$ ) and the number of comorbid diseases (OR, 3.151; 95% CI, 1.828–5.429;  $p < 0.001$ ) (Table 4).

## DISCUSSION

This study established the frequency of polypharmacy, its associated factors, and its effects on physical function and health-related quality of life in patients with PsA. To our knowledge, the present study is the first to reveal the features of polypharmacy in PsA patients.

In this study, the mean number of drugs taken was 3.12. The percentages of minor (2–4 drugs) and major (≥5 drugs) polypharmacy were 58% and 19%, respectively. The polypharmacy rates in rheumatic diseases are not clearly known. Viktil et al<sup>20</sup> reported that the percentage of major polypharmacy was 60% among patients with rheumatic diseases. A previous study reported the mean number of drugs in RA patients as 5.39.<sup>21</sup> Another study found polypharmacy in 28% of its cohort among adults with arthritis.<sup>9</sup> Stouten et al<sup>22</sup> reported that during the first 3 years after disease onset, 59% of patients with PsA have been prescribed 5 or more different drugs. Differences in the study populations, such

**TABLE 2.** The Polypharmacy and Distribution of Medications

Variable	
No. total medications, mean ± SD	3.12 ± 2.27
No. medications, %	
0–4	81.0
5–9	17.0
≥10	2.0
Polypharmacy, %	
Minor polypharmacy (2–4 drugs)	58.0
Major polypharmacy (≥ 5 drugs)	19.0
Groups of medications	
Medications for PsA, %	
csDMARDs	55.0
Methotrexate	29.0
Leflunomide	7.0
Sulfasalazine	17.0
Hydroxychloroquine	4.0
bDMARDs	11.0
csDMARDs combination	4.0
bDMARDs and csDMARDs combination	3.0
NSAIDs	36.0
Corticosteroids	10.0
No. drugs for PsA, median (min-max)	2 (1–4)
Medications for comorbid conditions, %	
Proton pump inhibitors	7.0
Treatment of diabetes mellitus	16.0
Cardiovascular drugs	27.0
Lipid/cholesterol-lowering drugs	8.0
Dietary supplements (including calcium supplements and vitamins)	39.0
Treatment for thyroid disease	12.0
Antidepressant drugs	8.0
Others	18.0

csDMARDs, conventional synthetic DMARDs; bDMARDs, biological DMARDs.

**TABLE 3.** Comparisons of Patient Features Between Polypharmacy Groups

	No Polypharmacy n = 23, Median (Range)/n (%)	Minor Polypharmacy n = 58, Median (Range)/n (%)	Major Polypharmacy n = 19, Median (Range)/n (%)	p value
Age	36 (30–45)	51.5 (40–57.2)	61 (54–66)	<b>&lt;0.001</b>
Sex				0.605
Female	15 (65.2)	40 (69.0)	15 (78.9)	
Male	8 (34.8)	18 (31.0)	4 (21.1)	
BMI	26.3 (23.1–29.3)	29.4 (26.5–32.5)	30.4 (28.4–33.2)	<b>0.006</b>
Disease duration, mo	24 (8–66)	36 (12–72)	36 (12–144)	0.537
DAPSA	11.8 (6.5–16.0)	14.3 (7.8–19.2)	15.9 (6.8–22.1)	0.365
BASDAI	4.8 (2.4–6.6)	4.6 (2.5–6.2)	4.8 (3.6–6.4)	0.913
PASI	0.3 (0–1.8)	0.3 (0–2.1)	0 (0–0.4)	0.184
Leeds Enthesitis Index	1 (0–4)	0 (0–2.2)	1 (0–3)	0.302
Dactylitis	3 (13.0)	5 (8.6)	0 (0.0)	0.290
Comorbid diseases	0 (0–1)	1 (0–3)	4 (3–5)	<b>&lt;0.001</b>
HAQ	0.2 (0.15–0.40)	0.3 (0.08–0.75)	0.3 (0.15–1.20)	0.249
SF-36				
Physical function	75 (40–90)	67.5 (30–86.2)	35 (15–60)	<b>0.009</b>
Physical role	50 (0–100)	75 (0–100)	0 (0–100)	0.253
Bodily pain	47.5 (22.5–60)	46.2 (30–68.1)	45 (22.5–67.5)	0.964
General health	55 (35–65)	45 (30–55)	30 (20–50)	0.127
Vitality	55 (35–65)	45 (35–61.2)	50 (25–70)	0.763
Mental health	68 (48–80)	58 (51–72)	60 (44–80)	0.768
Role emotional	66.7 (0–100)	66.7 (0–100)	100 (0–100)	0.707
Social function	62.5 (62.5–87.5)	62.5 (50–87.5)	62.5 (50–87.5)	0.669

The numbers of drugs were grouped into no (0–1 drugs), minor (2–4 drugs), and major ( $\geq 5$  drugs) polypharmacy. Continuous variables were given as median (25%–75%) values. Categorical variables were presented as frequency (n) and percentage. Significant *p* values were presented in bold.

as mean age and female/male ratio, may affect the frequency of polypharmacy in rheumatic diseases.<sup>20</sup> In our study cohort, the total number of medications and percentage of major polypharmacy were lower than in these studies. The low proportion of elderly PsA patients in our study may be related to this result.

Data on the relationship between polypharmacy and age, sex, and index disease-related clinical parameters were heterogeneous. A previous study identified the relationship between the number of medications and age, comorbid diseases, disease duration, and disease activity but not with sex in RA patients.<sup>21</sup> However,

**TABLE 4.** Associated Factors With Major Polypharmacy in Patients With PsA by Logistic Regression

	Univariable Analysis		Multivariable Analysis 1		Multivariable Analysis 2	
	OR (95% CI)	p value	OR (95% CI)	p value	OR (95% CI)	p value
Age	1.154 (1.073–1.241)	<b>&lt;0.001</b>	1.095 (1.000–1.199)	0.0501	—	—
Age $\geq 60$ y	7.889 (2.580–24.122)	<b>&lt;0.001</b>	—	—	4.864 (1.159–20.418)	<b>0.031</b>
Female sex	0.564 (0.170–1.868)	0.349				
BMI	1.055 (0.970–1.147)	0.214				
Current smoker	0.443 (0.093–2.107)	0.306				
Disease duration	1.004 (0.999–1.010)	0.107				
DAPSA	1.035 (0.963–1.113)	0.345				
BASDAI	1.042 (0.840–1.292)	0.710				
PASI	0.742 (0.495–1.112)	0.148				
Leeds Enthesitis Index	1.060 (0.816–1.376)	0.665				
Dactylitis	0	0.999				
Peripheral involvement	0.671 (0.232–1.946)	0.463				
Comorbid diseases	3.248 (1.947–5.416)	<b>&lt;0.001</b>	2.542 (1.466–4.408)	<b>0.001</b>	3.151 (1.828–5.429)	<b>&lt;0.001</b>
HAQ	1.820 (0.775–4.271)	0.169				

Significant *p* values were presented in bold.

in another study, among patients with RA, polypharmacy was observed in the elderly, women, those with longer disease duration, and higher disease activity.<sup>23</sup> Similarly, female sex, increasing age, disease activity, and duration of disease were associated with major polypharmacy in Crohn disease.<sup>24</sup> However, it was associated with the number of comorbidities but not with disease activity parameters in another study among patients with RA.<sup>25</sup> A recent review also reported that the number of drugs was correlated with age and number of comorbidities but not with disease activity and duration in patients with RA.<sup>26</sup> Corresponding to the literature in general, we found that major polypharmacy was associated with the number of comorbid diseases and age in patients with PsA. However, no associations were found between major polypharmacy and sex, disease activity, or disease duration. In addition, the clinical subtypes of PsA, psoriasis severity, and presence of enthesitis or dactylitis were not found to be associated with major polypharmacy. On the other hand, previous studies have reported smoking and obesity as additional risk factors for polypharmacy.<sup>27,28</sup> However, major polypharmacy was not associated with smoking status or BMI in the present study. These differences in study results may be due to the inclusion of patients with different diseases and the highly variable definitions of polypharmacy.

As expected, we found that the number of comorbid diseases and age  $\geq 60$  years were associated with major polypharmacy in patients with PsA. Approximately 40% of patients with PsA have at least 3 comorbid diseases, and the high burden of comorbid conditions affects their therapeutic choices.<sup>29,30</sup> These comorbid conditions may also be treated with drugs that can cause polypharmacy. Moreover, age directly increases the risk of comorbidity.<sup>31</sup> In almost all studies, it was found that the prevalence of polypharmacy was directly correlated with age.<sup>11</sup>

Although the HAQ scores did not differ among the polypharmacy groups, only the physical function subscale of the SF-36 was significantly lower in the major polypharmacy group in our study. Previous studies found polypharmacy to be an independent predictor of a negative perception of quality of life in patients with RA,<sup>32</sup> which significantly correlated with the physical component summary score of SF-36 among adults with arthritis.<sup>9</sup> On the other hand, unlike our results, the number of medications in patients with RA was significantly correlated with HAQ.<sup>21,23</sup> A systematic review also provided evidence on the relationship between polypharmacy and physical function in older adults.<sup>33</sup> However, our study demonstrated that polypharmacy was not associated with physical disability in PsA patients.

The important limitations of our study may be the unequal ratio of women to men, low proportion of elderly patients, and small sample size. This is due to the fact that the present study included the PsA patients who presented to the outpatient clinic and met the inclusion criteria with a simple consecutive sampling throughout the study duration. Furthermore, the proportion of patients with predominantly axial involvement was high in the present study. However, it is a problem that there is currently no standard definition for predominantly axial PsA disease that we defined based on the clinical assessment and imaging. On the other hand, the proportion of patients receiving DMARDs therapy was found to be low. This may be due to the short disease duration and high rate of patients with predominantly axial disease. In addition, newly diagnosed monoarthritis or oligoarthritis may be treated with NSAIDs. Another limitation of this study is its cross-sectional design. Therefore, some newly added or modified drugs may not yet affect quality of life or disease activity.

In conclusion, polypharmacy is common in PsA patients. The number of comorbid diseases and age  $\geq 60$  years were associated with major polypharmacy. Although major polypharmacy in

patients with PsA was not significantly associated with sex, disease activity, disease duration, or physical disability, patients with major polypharmacy had poorer health-related quality of life according to the physical function subscale of SF-36. Further studies are required to identify the effects of polypharmacy on clinical outcomes of PsA.

## KEY POINTS

- Major polypharmacy was not associated with the demographic and clinical features of the patients with PsA.
- Comorbidity and age  $\geq 60$  years are the factors associated with major polypharmacy in PsA patients.
- Polypharmacy may affect health-related quality of life in patients with PsA.

## REFERENCES

1. Veale DJ, Fearon U. The pathogenesis of psoriatic arthritis. *Lancet*. 2018; 391:2273–2284.
2. Kishimoto M, Deshpande GA, Fukuoka K, et al. Clinical features of psoriatic arthritis. *Best Pract Res Clin Rheumatol*. 2021;35:101670.
3. Ogdie A, Weiss P. The epidemiology of psoriatic arthritis. *Rheum Dis Clin North Am*. 2015;41:545–568.
4. Ritchlin CT, Colbert RA, Gladman DD. Psoriatic arthritis. *N Engl J Med*. 2017;376:957–970.
5. Gupta S, Syrimi Z, Hughes DM, et al. Comorbidities in psoriatic arthritis: a systematic review and meta-analysis. *Rheumatol Int*. 2021;41:275–284.
6. Coates LC, Kavanaugh A, Mease PJ, et al. Group for research and assessment of psoriasis and psoriatic arthritis 2015 treatment recommendations for psoriatic arthritis. *Arthritis Rheumatol*. 2016;68: 1060–1071.
7. Singh JA, Guyatt G, Ogdie A, et al. Special article: 2018 American College of Rheumatology/National Psoriasis Foundation guideline for the treatment of psoriatic arthritis. *Arthritis Rheumatol*. 2019;71:5–32.
8. Gossec L, Baraliakos X, Kerschbaumer A, et al. EULAR recommendations for the management of psoriatic arthritis with pharmacological therapies: 2019 update. *Ann Rheum Dis*. 2020;79:700–712.
9. Meraya AM, Dwibedi N, Sambamoorthi U. Polypharmacy and health-related quality of life among US adults with arthritis, medical expenditure panel survey, 2010–2012. *Prev Chronic Dis*. 2016;13:E132.
10. Masnoon N, Shakib S, Kalisch-Ellett L, et al. What is polypharmacy? A systematic review of definitions. *BMC Geriatr*. 2017;17:230.
11. Pazan F, Wehling M. Polypharmacy in older adults: a narrative review of definitions, epidemiology and consequences. *Eur Geriatr Med*. 2021;12: 443–452.
12. Khezrian M, McNeil CJ, Murray AD, et al. An overview of prevalence, determinants and health outcomes of polypharmacy. *Ther Adv Drug Saf*. 2020;11:2042098620933741.
13. Davies LE, Spiers G, Kingston A, et al. Adverse outcomes of polypharmacy in older people: systematic review of reviews. *J Am Med Dir Assoc*. 2020;21:181–187.
14. Bechman K, Clarke BD, Rutherford AI, et al. Polypharmacy is associated with treatment response and serious adverse events: results from the British Society for Rheumatology Biologics Register for Rheumatoid Arthritis. *Rheumatology (Oxford)*. 2019;58:1767–1776.
15. Taylor W, Gladman D, Helliwell P, et al. Classification criteria for psoriatic arthritis: development of new criteria from a large international study. *Arthritis Rheum*. 2006;54:2665–2673.

16. Feldman SR, Fleischer AB Jr, Reboussin DM, et al. The self-administered psoriasis area and severity index is valid and reliable. *J Invest Dermatol.* 1996;106:183–186.
17. Healy PJ, Helliwell PS. Measuring clinical enthesitis in psoriatic arthritis: assessment of existing measures and development of an instrument specific to psoriatic arthritis. *Arthritis Rheum.* 2008;59:686–691.
18. Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care.* 1992;30:473–483.
19. Fries JF, Spitz P, Kraines RG, et al. Measurement of patient outcome in arthritis. *Arthritis Rheum.* 1980;23:137–145.
20. Viktil KK, Enstad M, Kutschera J, et al. Polypharmacy among patients admitted to hospital with rheumatic diseases. *Pharm World Sci.* 2001;23:153–158.
21. Treharne GJ, Douglas KM, Iwaszko J, et al. Polypharmacy among people with rheumatoid arthritis: the role of age, disease duration and comorbidity. *Musculoskeletal Care.* 2007;5:175–190.
22. Stouten V, Pazmino S, Verschuere P, et al. Comorbidity burden in the first three years after diagnosis in patients with rheumatoid arthritis, psoriatic arthritis or spondyloarthritis: a general practice registry-based study. *RMD Open.* 2021;7:e001671.
23. Filkova M, Carvalho J, Norton S, et al. Polypharmacy and unplanned hospitalizations in patients with rheumatoid arthritis. *J Rheumatol.* 2017;44:1786–1793.
24. Cross RK, Wilson KT, Binion DG. Polypharmacy and Crohn's disease. *Aliment Pharmacol Ther.* 2005;21:1211–1216.
25. Gomides APM, Albuquerque CP, Santos ABV, et al. High levels of polypharmacy in rheumatoid arthritis—a challenge not covered by current management recommendations: data from a large real-life study. *J Pharm Pract.* 2021;34:365–371.
26. Jack JD, McCutchan R, Maier S, et al. Polypharmacy in Middle-European rheumatoid arthritis-patients: a retrospective longitudinal cohort analysis with systematic literature review. *Front Med (Lausanne).* 2020;7:573542.
27. Thomas HF, Sweetnam PM, Janchawee B, et al. Polypharmacy among older men in South Wales. *Eur J Clin Pharmacol.* 1999;55:411–415.
28. Castioni J, Marques-Vidal P, Abolhassani N, et al. Prevalence and determinants of polypharmacy in Switzerland: data from the CoLaus study. *BMC Health Serv Res.* 2017;17:840.
29. Husted JA, Thavaneswaran A, Chandran V, et al. Incremental effects of comorbidity on quality of life in patients with psoriatic arthritis. *J Rheumatol.* 2013;40:1349–1356.
30. Patel S, Kumthekar A. Psoriatic arthritis: the influence of co-morbidities on drug choice. *Rheumatol Ther.* 2022;9:49–71.
31. Fragoulis GE, Nikiphorou E, McInnes IB, et al. Does age matter in psoriatic arthritis? A narrative review. *J Rheumatol.* 2021;jrheum.210349.
32. González-Gamboa LM, Barocio-Ramírez AK, Rocha-Muñoz AD, et al. Disease activity score on 28 joints and polypharmacy are independent predictors for health-related quality of life evaluated by INCAVISA in patients with rheumatoid arthritis. *J Clin Rheumatol.* 2016;22:399–404.
33. Katsimpris A, Linseisen J, Meisinger C, et al. The association between polypharmacy and physical function in older adults: a systematic review. *J Gen Intern Med.* 2019;34:1865–1873.

### H. Ralph Schumacher's MD / JCR / PANLAR Award for PANLAR Projects

The H. Ralph Schumacher's MD / JCR / PANLAR Award for PANLAR Projects, aims to stimulate valuable research of a working group that has demonstrated success in research studies.

The Editorial Board of JCR and PANLAR Board of Directors have chosen to name this award after

Dr. Schumacher in recognition of his many accomplishments and of his dedication to the betterment of Rheumatology in Latin America.

The awardee for 2018 was Dr. Manuel Ugarte-Gil from Lima, Peru.

The 2020 award was presented in the context of the 2020 PANLAR Congress to Dr. Mauricio Restrepo from Colombia. See: 2020 Awardee: <http://en.panlar.org/noticias/ganador-del-premio-h-ralph-schumacher-md-panlar>.

The 2021 award was presented in the context of the 2021 PANLAR Congress to Dr. Fernando Figueroa from Santiago, Chile. See: <http://en.panlar.org/noticias/ganador-del-premio-h-ralph-schumacher-2021>.

The 2022 award was presented to Dr. Victor Pimentel-Quiroz from Lima, Peru at the 2022 PANLAR Congress in Miami, Florida. See: <https://en.panlar.org/noticias/ganador-del-premio-h-ralph-schumacher-2022>.