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ORIGINAL ARTICLE

Metabolic syndrome and psoriatic arthritis among patients with psoriasis vulgaris: Quality of life and prevalence

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ABSTRACT

Interest has increased in comorbidities associated with psoriasis and their effects on health-related quality of life (HRQoL). This study aimed to evaluate the prevalence of metabolic syndrome (MetS) and psoriatic arthritis (PsA) and to investigate HRQoL and the prevalence of hypertension, type 2 diabetes mellitus (T2DM), obesity and dyslipidemia. In a cross-sectional design, patients diagnosed with plaque psoriasis answered an interview and standardized questionnaires (Dermatology Life Quality Index questionnaire [DLQI], 36-Item Short Form Health Survey [SF-36] and EuroQol Five-Dimension Questionnaire Three-Level version [EQ-5D-3L]). Physical examination and several tests to assess desired outcomes were performed by a dermatologist and a rheumatologist during three visits. The prevalence of MetS and PsA was 50.0% and 41.8%, respectively. Dyslipidemia was the most prevalent (74.5%) secondary comorbidity, followed by hypertension (61.8%), obesity (52.5%) and T2DM (30.9%). The mean (standard deviation) DLQI score was 6.5 (6.9), and mean physical and mental SF-36 measures were 45.2 (10.4) and 45.5 (12.3), respectively, and for EQ-5D-3L, mean utility index and EQ-VAS scores were 0.68 (0.27) and 72.7 (19.7), respectively. PsA and MetS are important comorbidities; a reduced HRQoL is noted among plaque psoriasis patients with these comorbidities, emphasizing the relevance of diagnosis and treatment beyond the care of skin lesions.

Key words: metabolic syndrome, psoriasis, psoriatic arthritis, quality of life, systemic disease.

INTRODUCTION

Psoriasis (PsO) can be defined as a chronic, systemic inflammatory disease that can affect the skin, semi-mucosa, joints, and additional organs and tissues. Clinical manifestations can be presented as plaques on elbows, knees or scalp and/or superficial pustules on palms, soles or diffused over the body.[1] There are several clinical variations of PsO; psoriasis vulgaris (also known as plaque psoriasis) is the most common (75–90%).[2] Disease prevalence is as high as 11.8% in several reports from different countries.[1,3–5] A recent telephone survey estimates a prevalence of 1.3% in Brazil.[6]

The pathophysiology of PsO involves an interaction between inflammatory components, elements of the innate and adaptive immune response, and abnormal proliferation and differentiation of keratinocytes.[3] The immune-mediated feature characterizes PsO as a systemic illness that contributes to a greater frequency of comorbidities among affected subjects.[7,8]

Common comorbidities associated with PsO include metabolic syndrome (MetS), psoriatic arthritis (PsA), diabetes, obesity, hypertension and dyslipidemia. The estimated prevalence of MetS described in the general population varies from 0.2% to 43.9%; however, its association with PsO may be approximately fivefold higher, depending on the characteristics of the population studied.[2,9–16] The prevalence of PsA among patients with plaque psoriasis ranges 5.9–48%, depending on the patient characteristics and criteria used.[17,18] The presence of MetS and/or PsA differs according to disease severity.[19–21] Additionally, according to the published work, 8.3%, 18.4%, 19.6% and 20.0% of patients with plaque psoriasis had comorbid diabetes, obesity, hypertension and dyslipidemia, respectively.[22]

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There is an increasing interest within the Brazilian research community to identify the comorbidities associated with PsO and understand the effect of the disease on quality of life. However, this subject is still scarcely researched. Thus, the primary objectives of this study were to evaluate the prevalence of MetS and PsA; secondary objectives were to evaluate patient health-related quality of life (HRQoL) and the prevalence of hypertension, type 2 diabetes mellitus (T2DM), obesity and dyslipidemia among patients with plaque psoriasis.

METHODS

Study design and eligibility criteria

This was a cross-sectional observational study conducted in nine tertiary centers, located in southeastern, southern and northern Brazilian regions, specializing in PsO treatment, in the following Brazilian cities (with respective states): São Paulo, Santo André and Ribeirão Preto (state of São Paulo); Rio de Janeiro and Niterói (state of Rio de Janeiro); Curitiba (state of Paraná); Porto Alegre (state of Rio Grande do Sul); and Belém (state of Pará). Eligible patients were those diagnosed with plaque psoriasis reported by medical records and aged 18 years and older. Patients unable to provide informed consent and/or answer the interview, with confirmed/suspected pregnancy and/or enrolled in a drug-interventional study in the past 12 months were excluded.

Data collection

Data collection was performed between April 2014 and May 2015 over three study visits within a 30-day interval between each visit (±10 days).

During visit 1, patients answered a structured interview, which included questions about sociodemographic and disease characteristics, comorbidities and PsO treatment. Additionally, three standardized questionnaires were used to assess HRQoL: Dermatological Life Quality Index (DLQI), 36-Item Short Form Health Survey (SF-36) and EuroQol Five-Dimension Questionnaire Three-Level version (EQ-5D-3L). Dermatologists performed a physical examination of patients, including blood pressure measurements, radiograph of hands, wrists and feet, and laboratory tests. A pregnancy test was required for all women with child-bearing potential. Disease severity was classified according to Finlay's Rule of Tens; patients with a Psoriasis Area and Severity Index (PASI) score of more than 10 and/or DLQI score of more than 10 or body surface area involvement of more than 10% were considered to have severe PsO.[23] Patients not fulfilling this criterion were considered to have mild to moderate PsO.

At visit 2, a rheumatologist performed a physical examination, including blood pressure measurements. According to the rheumatologist evaluation, 24-h non-invasive ambulatory blood pressure monitoring (ABPM) was also required. During this visit, specific imaging and laboratory tests were available for rheumatology assessment and a medical diagnosis of PsA was defined during this visit by the study physician.

At visit 3, patients were informed about all tests results and the need for medical follow up. Medical diagnosis of MetS, hypertension, T2DM, dyslipidemia and obesity were defined during this visit by the study physician.

Prevalence of PsA and MetS

For this study, the diagnosis of new cases of MetS was defined as the presence of three or more characteristics of the modified version of the criteria proposed by the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) and described in the first Brazilian Guidelines for Diagnosis and Treatment of Metabolic Syndrome (Table S1).[24] Individuals currently using antihypertensive, lipid-lowering or antidiabetic drugs were considered to meet the related diagnosis criterion. The new cases diagnosis of PsA was defined as the presence of 3 points or more in the Classification Criteria for Psoriatic Arthritis (CASPAR).[25] The self-reported diagnosis of MetS and PsA by patients was also considered to identify the presence of these comorbidities.

Prevalence of hypertension, T2DM, obesity and dyslipidemia

Hypertension was diagnosed/defined as any of the following: presence of disease and/or use of antihypertensive medications according to the patient's history or medical records; blood pressure of 180 × 110 mmHg or more at visit 1 and/or visit 2; or ABPM results (24-h, >125/75 mmHg; awake, >130/85 mmHg; asleep, >110/70 mmHg).[26] The diagnosis of T2DM was defined as a confirmed diagnosis of diabetes and/or use of hypoglycemic drugs, according to patient history or medical records or fasting plasma glucose of 126 mg/dL or more, or glycated hemoglobin A1c of 6.5% or more.[27] Obesity was defined as a body mass index of 30 kg/m^2 or more.[28] Dyslipidemia was identified as the presence of already diagnosed disease and/or the use of lipid-lowering medications, according to the patient history or medical records, considering the Brazilian Guidelines for Dyslipidemia (low-density lipoprotein [LDL] of ≥160 mg/dL and/or triglycerides of ≥150 mg/dL and/or high-density lipoprotein [HDL] of <40 mg/dL in men/<50 mg/dL in women or in association with LDL or triglyceride increase).[24]

Health-related quality of life

The DLQI is a quality-of-life questionnaire specifically for patients with dermatological conditions, consisting of 10 questions concerning symptoms and feelings, daily activities, leisure, work, school, personal relationships and treatment. The total score is calculated by summing the score of each question, resulting in a maximum score of 30 and a minimum score of 0, with higher scores representing a worsening quality of life.[29]

The SF-36 is a generic measure of HRQoL, composed of 36 questions grouped into eight health domains (physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health) that contribute to the calculation of the physical component summary (PCS) and mental component summary (MCS) scores. The raw score of each dimension was derived by summing the item scores and converting the score to a value from 0 (worst possible health state) to 100 (best possible health state).[30]

The EQ-5D-3L is a generic instrument that assesses health status through five domains (mobility, self-care, usual activities, pain/discomfort and anxiety/depression) with three response levels (no problems, some problems and extreme problems). It also includes a visual analog scale, which records respondents' self-rated health, according to end-points labeled from best imaginable health state(100 points) to worst imaginable health state (0 points). A utility score is also calculated based on the dimensions scores, using the UK value set, ranging between 0 (representing death) and 1 (representing perfect health).[31,32]

All HRQoL instruments applied in this study were previously translated and validated to Brazilian Portuguese.[33–35]

Sample size calculation

Sample size was calculated according to the study's primary objective, considering a PsA prevalence of 20.6%[36] and a MetS prevalence of 17.8%.[37] Samples of 238 and 225 subjects were necessary to estimate the prevalence of PsA and MetS, respectively, with a precision of 0.05 (error, ±0.05). Including a 20% dropout rate, the largest sample size estimation was a total of 298 subjects with plaque psoriasis.

Statistical analysis

Descriptive analysis was performed by estimation of measures of central tendency and dispersion for quantitative variables and frequency for qualitative variables. Logistic regression was used to build a multivariate model to assess factors associated with PsA/MetS, controlled for possible confounders and interactions. Confounders/interactions were identified from inclusion and exclusion of each covariate in the models. In this process, significant changes in respective coefficients were observed, and the possibilities of confounding or interactions were verified. All potential covariates were selected according to their importance as described in the published work. Final model variates were selected from univariate model, according to a significance level of 0.250. A significance level of $\alpha = 0.05$ was used for confidence interval (CI) calculations and significance testing. Analyses were performed using Stata version MP11 (StataCorp, College Station, TX, USA) and R Project version 2.13.1 (R Foundation, Vienna, Austria).

Ethical approval

This study was approved by the independent ethics committees of each participating site: Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo – HCFMRP-USP (no. 532.679); Hospital das Clinicas da Faculdade de Medicina da Universidade de São Paulo–HCFMUSP (no. 706.903); Faculdade de Medicina do ABC–FMABC (no. 676.619); Instituto de Dermatologia e Estética do Brasil Ltda–IDERJ (no. 694.166); Universidade Federal Fluminense – UFF (no. 783.956); Hospital Universitário Evangélico de Curitiba – HUEC (no. 725.735); Irmandade da Santa Casa de Misericórdia de Curitiba (no. 680.066); Hospital de Clínicas de Porto Alegre–HCPA (no. 692.687); and Universidade do Estado do Pará – UEPA (no. 753.414). Written approval was obtained from all respondents before participation in the research.

RESULTS

Sociodemographic characteristics

In Table 1, several characteristics of the patient population are described. The study enrolled 293 individuals, 51.9% male, with a mean age of 52.0 (standard deviation [SD] = 12.8) years. Most patients were Caucasian/white (67.9%). Regarding employment status and education levels, 31.4% of subjects were employed and 28.3% completed high school. Of the total sample, 16.7% were current smokers, 35.8% reported alcohol consumption (of drinkers, 54.3% reported ingesting alcohol <1/week) and 33.4% were sedentary. According to the Rule of Tens, 83.3% of patients were classified as having severe PsO. In the past 12 months, 97.2% of patients reported the use of one or more drug for PsO treatment and 20.1% used phototherapy. Among patients who reported medication use, 90.2% received topical drugs, 42.1% received conventional systemic drugs and 31.6% received biologic drugs. Only 4.4% of patients had a family history of PsA and 15.7% had a family history of MetS.

Prevalence of PsA, MetS and related comorbidities

The prevalence of PsA was 41.8% (95% CI, 36.0–47.6) in patients who fulfilled CASPAR (35.7%) and/or had reported a medical history of PsA (23.1%). Of the total number of patients with a PsA diagnosis, new cases accounted for 44.9% (53/118). Considering only CASPAR ($n = 100$), the estimated proportion of newly diagnosed cases represented 53.0% of patients diagnosed using these criteria (Table 2), and all of these patients presented with a current/personal history/family history of PsO and inflammatory articular disease. For the other CASPAR items, 86.0% had a negative test for rheumatoid factor, 79.0% had radiological evidence of juxta-articular new bone formation, 61.0% had psoriatic nail dystrophy and 22.0% had dactylitis (current or history).

The prevalence of MetS was 50.0%; 75.9% were newly diagnosed in the study. Considering the modified version of NCEP ATP III criteria ($n = 138$), 88.4% had a fasting blood glucose level of 110 mg/dL or more, and/or history of T2DM and/or use of antidiabetic drugs; 81.2% had HDL of less than 40 mg/dL (males) or less than 50 mg/dL (females); 77.5% had a waist circumference of more than 102 cm (males) or more than 88 cm (females); 63.8% had triglycerides of 150 mg/dL or more; and 56.5% had blood pressure of 130 × 85 mmHg or more, and/or a history of systemic arterial hypertension and/or use of antihypertensive drugs.

As assessed by secondary outcomes, the estimated prevalence of comorbidities is shown in Figure 1. Dyslipidemia was the most prevalent comorbidity (74.5%), followed by hypertension (61.8%), obesity (52.5%) and T2DM (30.9%).

Health-related quality of life

Data regarding HRQoL are shown in Table 3. The DLQI mean score was 6.5 (SD = 6.9). According to questionnaire's dimensions, the greatest impact was noted in symptoms and feelings (mean = 2.1; SD = 1.7). Nevertheless, all dimensions presented less than half of the maximum value for each dimension,

Table 1. Sociodemographic and clinical characteristics of patients with plaque-type psoriasis in a Brazilian population (n = 293)

Characteristics	*n*	%
Age		
Mean ± SD	52.0 ± 12.8	–
Sex		
Male	152	51.9
Female	141	48.1
Race		
Caucasian/white	199	67.9
Brown	79	27.0
Black	13	4.4
Asian	1	0.3
Indigenous	1	0.3
Educational level		
No education	3	1.0
Incomplete elementary school	75	25.6
Complete elementary school	33	11.3
Incomplete high school	31	10.6
Complete high school	83	28.3
Incomplete college and/or university degree	21	7.2
Complete college and/or university degree	36	12.3
Post-graduate	11	3.7
Family history		
MetS	46	15.7
PsA	13	4.4
Employment status		
Employed	92	31.4
Retired	87	29.7
Autonomous worker	66	22.5
Unemployed	22	7.5
Housewife	13	4.4
Student	9	3.1
Other[†]	4	1.4
Monthly household income ($US)		
Mean ± SD	774.29 ± 687.85	–
PASI		
PASI score, mean ± SD	7.3 ± 8.4	–
PASI score >10	219	74.7
BSA		
BSA involvement %, mean ±SD	12.7 ± 15.8	–
BSA involvement >10	212	72.4
DLQI score		
DLQI score, mean ± SD	6.5 ± 6.9	–
DLQI score >10	65	22.2
Severity of psoriasis (defined as Finlay's Rule of Tens)		
Severe psoriasis (PASI score >10 and/or DLQI score >10 or BSA involved >10%)	244	83.3
Mild to moderate psoriasis	49	16.7
Treatment pattern		
Phototherapy	59	20.1
Medicines	285	97.2
Biologic	90	31.6
Conventional systemic	120	42.1
Topical	257	90.2
Smoking		
Non-smokers	131	44.7
Current	49	16.7
Past	113	38.6
Length of abstinence in years (n = 113), mean ± SD	15 ± 10.4	–
No. of cigarettes per day (n = 162), mean ± SD	19.3 ± 18.5	–
"How long have you been smoking?", years (n = 162), mean ± SD	22.3 ± 13.9	–
Alcoholism		
Non-drinkers	188	64.2
Drinkers	105	35.8
Frequency of alcohol consumption (n = 105)		
<1 per week	57	54.3
Once per week	20	19
Twice per week	16	15.2
3 times a week	5	4.8
4 times a week	1	1.0
5 times a week	1	1.0
6 times a week	1	1.0
7 times a week	3	2.9
No information	1	1.0
"How long have you been drinking?", years (n = 105), mean ± SD	28.6 ± 14	–
Physical activity		
Sedentary	98	33.4
Currently physically active	101	34.5
Physically active in the past	94	32.1
Time (years) without practicing (n = 94), mean ± SD	7.2 ± 7.8	–
Frequency of physical activity (n = 195)		
Once per week	26	13.3
Twice per week	39	20
3 times a week	47	24.1
4 times a week	15	7.7
5 times a week	40	20.5
6 times a week	5	2.6
7 times a week	23	11.8
"How long have you been practicing physical activity?", years, mean ± SD	10 ± 12.5	–

[†]Off work (n = 2) and pensioner (n = 2). BSA, body surface area; DLQI, Dermatology Life Quality Index; MetS, metabolic syndrome; PASI, Psoriasis Area and Severity Index; PsA, psoriatic arthritis; SD, standard deviation.

indicating impairment of patients' HRQoL. Regarding DLQI categories, the quality of life of a majority of patients (70.2%) was affected, considering the summation of the answers that represents some effect on the patient's life (whether small, moderate, very or extreme; Fig. 2).

Table 2. Prevalence of PsA and MetS among patients with plaque-type psoriasis in a Brazilian population (n = 282)

Comorbidity	Diagnostic categories	n	%	95% CI
Psoriatic arthritis	History of PsA reported by the patient (n = 282)	65	23.1	30.1–41.3
	PsA diagnosed by the study physician, CASPAR (n = 282)	100	35.7	37.2–56.8
	Previous diagnosis among CASPAR-positive patients (n = 100)	47	47.0	43.2–62.8
	Newly diagnosed among CASPAR-positive patients (n = 100)	53	53.0	18.2–28.0
	Final prevalence of PsA (CASPAR or history) (n = 282)	118	41.8	36.0–47.6
Metabolic syndrome	History of MetS reported by the patient (n = 282)	17	6.0	3.2–8.8
	Diagnosis confirmed by the physician (n = 282)	137	48.6	42.8–54.4
	Patients newly diagnosed in the study (n = 141)	107	75.9	68.8–83.0
	Final prevalence of MetS (physician diagnosis or history) (n = 282)	141	50.0	44.2–55.8

CASPAR, Classification Criteria for Psoriatic Arthritis; CI, confidence interval; MetS, metabolic syndrome; PsA, psoriatic arthritis.

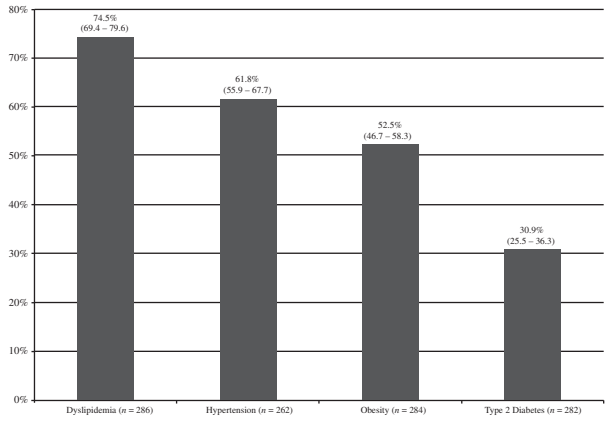

Figure 1. Prevalence of comorbidities assessed as secondary outcomes among patients with plaque-type psoriasis.

According to SF-36 results, the most impaired scales were role-emotional (mean = 43.5; SD = 12.6) and bodily pain (mean = 43.9; SD = 11.6). For the EQ-5D-3L instrument, the mean utility index was 0.68 (SD = 0.27); the mean EQ-5D-3L visual analog scale was 72.7 (SD = 19.7). Among the five dimensions, self-care was the least affected, with 84.6% of the responders reporting an absence of problems. The highest impairment was observed for the dimension of pain and discomfort (66.4% of patients reported to have problems, some problems or extreme). Extreme problems were more frequently reported in the dimension of anxiety and depression (9.4%; Fig. 3).

Logistic regression models

In the present study, multivariate models were used to assess factors associated with the presence of PsA and MetS among plaque psoriasis patients (Tables S2,S3). A multivariate model for PsA (adjusted by use of topical drugs and phototherapy and frequency of alcohol consumption) showed that a greater odds of PsA diagnosis was associated with treatment with biologic drugs (odds ratio [OR] = 3.49; 95% CI, 1.91–6.38; $P < 0.001$) and conventional systemic medicines (OR = 2.41; 95% CI, 1.4–4.16; $P = 0.002$); conversely, a higher SF-36 PCS was associated with a decreased odds of PsA diagnosis (OR = 0.96; 95% CI = 0.93–0.99; $P = 0.002$).

Table 3. Quality-of-life scores on each scale, using DLQI, SF-36 and EQ-5D-3L questionnaires among patients with plaque-type psoriasis in a Brazilian population

HRQoL measure	Dimension	Mean	SD
DLQI (n = 292)	Symptoms and feelings (maximum = 6)	2.1	1.7
	Daily activities (maximum = 6)	1.5	1.8
	Leisure (maximum = 6)	1.3	1.7
	Personal relationships (maximum = 6)	0.8	1.5
	Work and school (maximum = 3)	0.4	0.8
	Treatment (maximum = 3)	0.4	0.7
	Total (maximum = 30)	6.5	6.9
SF-36 (n = 292)	Vitality (0–100)	50.6	11.2
	General health (0–100)	45.1	11.0
	Role-physical (0–100)	44.8	11.8
	Social functioning (0–100)	44.4	12.3
	Mental health (0–100)	44.1	12.8
	Physical functioning (0–100)	44.0	11.4
	Bodily pain (0–100)	43.9	11.6
	Role-emotional (0–100)	43.5	12.6
	Physical component summary score (0–100)	45.2	10.4
	Mental component summary score (0–100)	45.5	12.3
EQ-5D-3L (n = 286)	Utility score (0–1)	0.68	0.27
	Overall value (0–100)	72.7	19.7

DLQI, Dermatology Life Quality Index; EQ-5D-3L, EuroQol Five-Dimension Questionnaire Three-Level version; SD, standard deviation; SF-36, 36-Item Short Form Health Survey.

For MetS, the final model (adjusted by severe PsO, PsA, use of conventional systemic drugs, alcohol consumption, frequency of smoking and EQ-5D-3L) indicated that patients with a family history of MetS had a greater odds of having MetS compared with those without a family history (OR = 2.28; 95% CI, 1.35–3.87; $P = 0.002$); the use of phototherapy (OR = 0.51; 95% CI, 0.26–0.98; $P = 0.045$) and an increase in SF-36 PCS (OR = 0.96; 95% CI, 0.93–0.99; $P = 0.015$) were negatively associated.

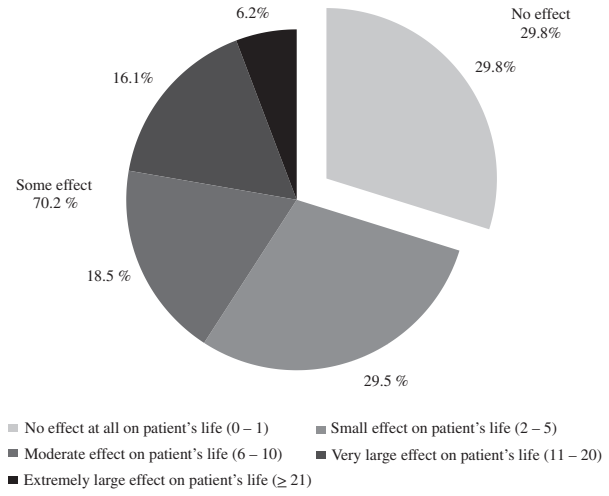

Figure 2. Impairment in health status according to the Dermatology Life Quality Index classification among patients with plaque psoriasis (n = 292).

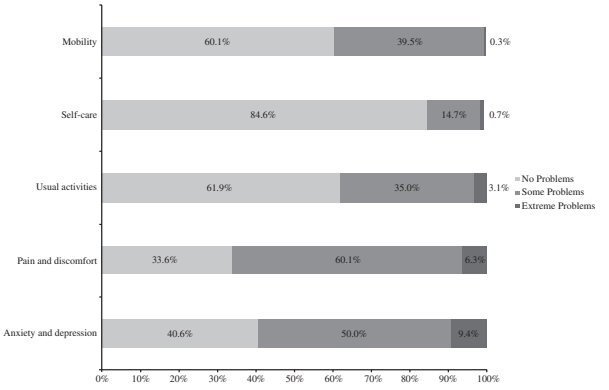

Figure 3. Limitations in health-related quality of life in each dimension of the EuroQol Five-Dimension Questionnaire Three-Level version questionnaire among patients with plaque-type psoriasis (n = 286).

DISCUSSION

Psoriatic arthritis and MetS are common comorbidities of patients with PsO; however, their frequency present a great variation across subpopulations. Thus, there is a need to understand the prevalence of these conditions in patients with plaque psoriasis to establish proper therapeutic management and reinforce the need for comprehensive guidelines addressing comorbidities.

This study demonstrated that the prevalence of PsA findings among Brazilian patients with PsO is in agreement with other investigations performed in Brazilian cohorts. Carneiro *et al.*[38] and Ranza *et al.*[39] reported PsA prevalence of 35.0% and 33.3%, respectively, using CASPAR. The aforementioned studies included patients with all types of PsO and both studies reported a high prevalence of plaque-type psoriasis (66.9–78.8%). Therefore, these analyses had populations similar to the sample of the present study.

The results of our study also showed that of 118 prevalent cases of PsA, 44.9% were newly diagnosed by the study rheumatologist. This is consistent with the results reported in Ranza *et al.* (49.0%)[39] that highlighted the frequency of undiagnosed cases. Some authors feel that the diagnosis of PsA should be facilitated by dermatologists, as underdiagnosis may lead to potentially avoidable joint damage that permanently disables and deforms some individuals.[40]

To our knowledge, to date, this is the first multicenter study conducted in Brazil that reports the prevalence of MetS in a population of patients with PsO. The prevalence of MetS in the present study was 50.0%. A single center study carried out by Baeta *et al.*[41] in the southeastern region of Brazil (n = 190 patients with PsO) observed a 44.9% prevalence of MetS, similar to our study. A case–control Brazilian study investigated research questions similar to ours regarding PsO comorbidities, specifically, the frequency of hypertension and MetS. Our findings were similar to the ones described by Menegon *et al.*[42] regarding both the proportion of patients with MetS (47.1%) and the frequency of hypertension (57.7%). The prevalence of MetS in Brazilian patients with PsO reported in the present study was far higher than in the general Brazilian population (29.6%, ranging 14.9–65.3%).[43] This finding is probably indicative of the mean age of our sample (52.0 years; SD = 12.8), as older age contributes to the higher prevalence of diabetes and hypertension.

Regarding HRQoL, DLQI values are slightly lower than those reported in previous research.[44–46] This may be because a significant percentage of our sample received systemic and biologic drugs, treatments that are associated with a positive impact on HRQoL. Tejada *et al.*[47] have pointed out that PsO is the skin disease with the highest DLQI scores and, therefore, one of the most damaging dermatological illnesses, which highlights the importance of effective treatment options. The SF-36 PCS (mean = 45.2; SD = 10.4) and MCS (mean = 45.5; SD = 12.3) central tendency measures for our cohort were worse than in the general Brazilian population (mean PCS = 49.3; 95% CI, 49.1–49.5; mean MCS = 51.1; 95% CI, 50.9–51.3).[48] However, considering the high SD, the central tendency measures may vary between better and worse than measures of the general Brazilian population. The multivariate analysis showed that a high PCS is inversely associated with the presence of MetS and PsA, indicating that patients that do not have these comorbidities likely have better HRQoL related to physical aspects. The EQ-5D-3L utility index among our sample was 0.68 (SD = 0.27), which is in consonance with other investigations performed in patients with PsO, ranging 0.52 to 0.90.[44,49]

Results from the DLQI, SF-36 and EQ-5D-3L showed the impact of the disease on patients' emotional aspects. The most affected DLQI domain in this PsO cohort was symptoms and feelings. This pattern was similarly seen in other studies performed in patients with dermatological conditions.[47,50] Similarly, role-emotional was the most impaired SF-36 domain in the study participants, followed by bodily pain. The mean SF-

36 scores for role-emotional and bodily pain in our sample were 43.5 (SD = 12.6) and 43.9 (SD = 11.6), which were much lower than the mean scores for these domains in the general Brazilian population (81.7 and 76.7, respectively).[48] The results of the EQ-5D-3L showed that the most affected dimensions of patients' well-being were those referring to pain and discomfort and anxiety/depression. Our results emphasize the role played by emotional aspects in the quality of life of patients with PsO, endorsing the argument that skin diseases frequently invoke strong negative emotions such as frustration and embarrassment as a reflection that the skin is responsible in large part for an individual's appearance.

The study's main limitation is the impossibility of establishing a temporal relationship between exposure and outcome due to its cross-sectional nature; nonetheless, it still provides useful information worthy of exploring in further prospective studies. A certain degree of caution is required concerning the transferability of the results for the whole country, because Brazil is a continent-sized country marked by considerable environmental and genetic differences, and the northeastern and mid-west regions were not included. Furthermore, it is important to underscore that the study patients are from tertiary care centers; consequently, those subjects tend to have more severe cases, contributing to a higher prevalence of comorbidities. There are also limitations regarding the understanding of the disease scenario in other levels of care, particularly for patients presenting with milder forms of PsO.

The results of this study firmly establish that MetS and PsA are extremely prevalent among patients with plaque psoriasis. These findings emphasize the relevance of diagnosis and treatment of patients with PsO beyond the care of skin lesions. Cooperation between rheumatologists and dermatologists for the early detection of these comorbidities is crucial.

Patients with plaque psoriasis have a reduced quality of life mainly in terms of emotional aspects, which reinforces the existing data regarding feelings of stigmatization in patients with PsO. It also indicates the relevance of HRQoL measures for patients with plaque psoriasis, already incorporated in Brazilian clinical practise. Physicians should routinely use HRQoL scores to assess patient response to treatment in a more comprehensive way.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Table S1. Components of metabolic syndrome according to National Cholesterol Education Program Adult Treatment Panel III criteria[22]

Table S2. Logistic regression model for psoriatic arthritis (first model, $n = 275$)

Table S3. Logistic regression model for metabolic syndrome (first model, $n = 261$)

