Clinical Rheumatology (2021) 40:2251–2262
https://doi.org/10.1007/s10067-020-05482-w

ORIGINAL ARTICLE

Management of psoriatic arthritis in rheumatology and dermatology settings: sub-analysis of the Italian population from the international LOOP study

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Received: 27 July 2020 / Revised: 20 October 2020 / Accepted: 26 October 2020 / Published online: 6 November 2020

Abstract

Psoriatic arthritis (PsA) patients are often treated by dermatology and rheumatology specialities and may receive different treatments. To evaluate the impact of dermatology/rheumatology specialist settings on diagnosis and therapeutic approach in PsA patients. This cross-sectional multicounty study in Italy involved twenty-eight rheumatology or dermatology clinics. Patients with suspected or confirmed PsA were examined by both a dermatologist and a rheumatologist. A total of 413 patients were enrolled and 347 (84%) were diagnosed with PsA. The majority of patients were enrolled from a rheumatology setting (N = 224, 64.6%). Patients with PsA in the dermatology settings had significantly higher disease activity, including skin involvement and musculoskeletal symptoms. Time from PsA onset to diagnosis was 22.3 ± 53.8 vs. 39.4 ± 77.5 months (p = 0.63) in rheumatology and dermatology settings; time from diagnosis to initiation of csDMARD was 7.3 ± 27.5 vs. 19.5 ± 50.6 months, respectively (p < 0.001). In contrast, time from diagnosis to bDMARD use was shorter in dermatology settings (54.9 ± 69 vs. 44.2 ± 65.6 months, p = 0.09, rheumatology vs. dermatology), similar to the time taken from first csDMARDs and bDMARDs (48.7 ± 67.9 vs. 35.3 ± 51.9 months, p = 0.34). The choice to visit a rheumatologist over a dermatologist was positively associated with female gender and swollen joints and negatively associated with delay in time from musculoskeletal symptom onset to PsA diagnosis. This study highlights a diagnostic delay emerging from both settings with significantly different therapeutic approaches. Our data reinforce the importance of implementing efficient strategies to improve early identification of PsA that can benefit from the integrated management of PsA patients.

Key Points
- *A diagnostic delay was observed from both dermatology and rheumatology settings with significantly different therapeutic approaches.*
- *Shared dermatology and rheumatology clinics offer the combined expertise to improve in the early identification and management of PsA.*

Keywords Biological drugs · Dermatology · Diagnosis · Management · Psoriatic arthritis · Rheumatology

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10067-020-05482-w.

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Introduction

Psoriatic arthritis (PsA) is a chronic and invalidating disease characterized by joint and entheseal inflammation affecting 0.05–0.25% of the general population and 6–41% of patients with psoriasis [1, 2].

Clinical patterns of PsA are heterogeneous and may change in patients over time, making recognition of the disease particularly challenging for specialists with expertise in other areas as well as for patients [3, 4].

PsA can result in impaired physical function, decreased quality of life (QoL), work disability, and it is also associated with certain comorbidities such as cardiovascular disease, diabetes, and obesity [5–7].

To improve the long-term outcome in PsA patients, early and appropriate treatment are mandatory, starting with timely diagnosis [8]. Patients with even a delay of 6 months from symptom onset to the first visit with a rheumatologist have been shown to have more structural damage and worse physical function [9]. This observation is supported by other studies showing that a delay in PsA diagnosis of > 1 year or > 2 years was associated with worse physical function [10] and more radiographic progression [11] respectively.

Effective treatment of PsA generally consists of disease-modifying anti-rheumatic drugs (DMARDs), first conventional synthetic DMARDs (csDMARDs), followed by biologic DMARDs (bDMARDs) [12–14]. Evidence that early versus delayed treatment with csDMARDs offers benefit in the long term is still missing in PsA [15]. Regarding bDMARDs, it has been shown that patients who received an anti-tumor necrosis factor agent (anti-TNF) within 2 years of PsA duration experienced greater improvement in arthritis scores and patient-reported outcomes than those with more than 2 years of PsA [16].

Ideally, the management of PsA should address joints and skin as well as extra-articular manifestations and comorbidities [6, 13, 17, 18]. PsA patients receiving a multidisciplinary care, involving both rheumatologists and dermatologists in a US clinic, were more likely to receive systemic medication (25% vs. 15%) and be treated with a biologic agent (37% vs. 16%) than in prior monodisciplinary care [19]. In a study undertaken in Italy, it was also demonstrated that the integrated dermatologic and rheumatologic management of PsA patients allowed a prompt diagnosis and best therapeutic approach, with a significant improvement in skin and articular diseases and improvement in health-related QoL [20].

Unfortunately, many patients with PsA are not diagnosed, or are undertreated or not treated systematically [17, 21, 22]. In the US-based LOOP study, including 681 PsA patients in North America, it was observed that the median time from symptom onset to diagnosis of PsA was 1.2 years and approximately 30% of patients experienced delays of > 4 years [23]; in the global study, the time from onset to diagnosis was 6.0 vs. 3.9 months in the rheumatology vs. dermatology setting, with no statistical difference between groups [24].

The aim of the present study was to evaluate the impact of dermatology/rheumatology specialist settings on diagnosis and therapeutic approach in PsA patients in Italy.

Methods

Patients and study design

LOOP (Cross-sectionaL ObservatiOnal study evaluating clinical speciality setting as determinant of management of Patients with Psoriatic Arthritis) was a large cross-sectional, observational study performed across 17 countries. The present multicenter study describes results from the sub-analysis of the Italian cohort of patients enrolled from July 2016 to May 2017 from twenty-eight centers. Findings from the larger global LOOP study and the US-based LOOP study have recently been published [23, 24]. Consecutive unselected male and female adult (≥ 18 years) patients with a suspected or established diagnosis of PsA were eligible to participate in this study. Diagnosis of PsA was clinical and all PsA patients met the CASPAR (ClASsification criteria for Psoriatic ARthritis) criteria for the classification of PsA [25]. Only patients that signed the informed consent and were able to read and understand the questionnaires were enrolled. Ethics committee approval from all participating centers and written informed consent for the use of personal data was obtained from every patient.

Assessments

All patients who participated in the present study consecutively attended a routine visit at either a dermatology or rheumatology clinic. In order to ensure the most accurate and standardized assessments of joint and skin scores as recommended in guidelines [13], the recruiting site advised a consulting visit for a routine PsA disease assessment by the other specialist within 12 weeks after the enrolment visit. The consulting visit for a patient recruited at a rheumatology site was with a dermatologist, whereas, for a patient recruited at a dermatology site, the consulting visit was with a rheumatologist. Each recruitment site documented the following patient information: socio-demographic data; PsA symptoms and diagnosis; medical history; comorbidities; and PsA treatment. The following patient questionnaires were collected: short form 12-item health survey version 2.0 (SF12v2) [26]; health assessment questionnaire-disability index (HAQ-DI) [27]; work productivity and activity impairment questionnaire PsA (WPAI-PsA) [28]; and dermatology life quality index (DLQI) [29]. Specific assessments at rheumatology sites included the following: confirmation of PsA diagnosis (yes/no) according to the CASPAR criteria; 68-joint tender (TJC-68)/66-joint swollen joint count (SJC-66); enthesitis/dactylitis count; patient global assessment of disease (PtGA); components of Ankylosing Spondylitis Disease Activity Score (ASDAS) (only for patients with back pain) [30], C-reactive protein (CRP)/erythrocyte sedimentation rate (ESR), if available. Specific assessments at dermatology sites included the following: body

surface area (BSA) of psoriasis [31]; physician global assessment of psoriasis (PGA) [32]; and psoriatic nail count. Minimal disease activity was calculated as previously described [33].

Outcome measures

This study evaluated the association between the clinical specialty setting and time from inflammatory musculoskeletal symptom onset to PsA diagnosis and different management steps in patients with a confirmed diagnosis of PsA. On this basis, the following outcome measures were evaluated: (1) time from inflammatory musculoskeletal symptom onset to PsA diagnosis; (2) time from PsA diagnosis to first csDMARD; (3) time from PsA diagnosis to first bDMARD; and (4) time from first csDMARD to first bDMARD. Other outcomes evaluated were as follows: current disease activity (TJC68, SJC66, tender entheseal joint count, dactylitis count, BSA, PGA, number of nails with psoriatic change, disease activity in psoriatic arthritis (DAPSA) score, 28-joint disease activity score (DAS28), and minimal disease activity (MDA) status) and patient-reported outcomes (HAQ-DI, SF12v2, WPAI).

Statistical analysis

Patients with a confirmed diagnosis of PsA according to CASPAR criteria were analyzed [25]. Descriptive statistics are presented for demographics and disease characteristics as mean ± SD or number and %. Comparisons between groups (variables in rheumatologist/dermatologist categories) were performed by the chi-squared test for categorical variables and the Wilcoxon test for non-parametric continuous variables. The Bonferroni procedure was used to correct for multiple testing and inflation of type I error.

Logistic regression analyses were performed to evaluate the association of explanatory variables on the decision of a patient whether they would choose to go to a rheumatologist rather than a dermatologist. A p value of ≤ 0.05 was considered statistically significant unless stated otherwise. Statistical analyses were performed using Stata statistical software, version 13.0 (TX, USA).

Results

Patient clinical characteristics

A total of 28 sites were involved in this Italian cross-sectional study. In 17 of these sites, the rheumatologist was the recruiter. Of the 413 patients enrolled in Italy in the LOOP study, 347 with a confirmed diagnosis of PsA were included in this analysis; 11 patients were excluded for missing data and 55 patients without a confirmed PsA diagnosis were included in a separate, exploratory analysis. The majority of patients were recruited by a rheumatologist ($N = 224$, 64.5%) and PsA was first diagnosed by a rheumatologist in 75.8% of patients ($N = 263$). A total of 39 new PsA diagnoses were made, 19 in the rheumatology setting and 20 in the dermatology setting. Demographic and disease characteristics for patients with PsA in rheumatology and dermatology settings are summarized in Table 1. While demographic characteristics such as age and gender were found to be similar in patients who attended rheumatology or dermatology settings, differences were observed among several disease characteristics. Patients observed in the dermatology setting had a longer disease duration (time from PsA onset to diagnosis; 39.4 ± 77.5 vs. 22.3 ± 53.8 months, $p = 0.63$), and several other disease variables such as the presence of dactylitis and enthesitis were more frequent in dermatology patients. In particular, patients attending the dermatology setting had a significantly higher number of comorbid diseases (4.3 vs. 3.5, $p < 0.001$), a higher prevalence of obesity (32.8% vs. 19.2%, $p = 0.005$), and depression/anxiety (26.8% vs. 14.3%, $p = 0.004$). Regardless of these differences in symptoms and comorbid diseases, levels of the inflammatory markers ESR and CRP were similar between patients attending either speciality.

Signs and symptoms reported by PsA patients

Patient-reported signs and symptoms of active disease are summarized in Fig. 1. Patients recruited in the dermatology setting reported a significantly higher proportion of skin symptoms, enthesitis or dactylitis compared to patients from a rheumatology setting (Fig. 1a). First symptoms reported by patients were mainly cutaneous (approximately 70% of patients) followed by swollen joints (19.6% in rheumatology vs. 8.1% in dermatology setting, $p < 0.01$; Fig. 1b). A higher frequency of patients attending a dermatology clinic were currently presenting with swollen joints and enthesitis (Fig. 1c), while those attending the rheumatologic clinic had significantly higher count of psoriatic nails.

Musculoskeletal and dermatological assessment of PsA patients

A range of arthritis measures (Fig. 2a) as well as single components of ASDAS (Fig. 2b) were significantly higher in patients from a dermatology setting compared to patients recruited in a rheumatology setting. In contrast, assessment of the cutaneous burden of disease by BSA (evaluated separately by both dermatologist and rheumatologist) or DLQI revealed no discernible difference between patients from either setting (Fig. 2c), although the BSA reported by dermatologists was higher than that reported by rheumatologists.

Table 1 Clinical and demographic characteristics of PsA patients

Clinical characteristic	Total ($N = 347$)	Rheumatologist ($N = 224$)	Dermatologist ($N = 123$)	p value
General				
Age (years)	53.6 ± 12.5	53.8 ± 13	53.2 ± 11.6	0.69
Male gender (n (%))	176 (50.7)	109 (48.7)	67 (54.5)	0.30
BMI (kg/m^2)	27.1 ± 5.4	26.6 ± 5.6	28 ± 5	*0.002**
SBP (mm Hg)	126.9 ± 11.3	128 ± 12.4	125.1 ± 11.9	*0.035*
DBP (mm Hg)	78.6 ± 9.1	78.1 ± 9.4	79.5 ± 8.5	0.17
Disease duration (months)	92.4 ± 91.1	100.3 ± 92.1	78 ± 87.6	*0.009**
ESR (mm/h)	17.4 ± 16.7	16.6 ± 16.6	19.2 ± 16.8	0.057
CRP (mg/L)	6.2 ± 19.3	6.7 ± 22.2	4.5 ± 5.7	0.34
Disease history (n (%))				
Psoriasis	323 (93.1)	203 (90.6)	120 (97.6)	*0.015*
Dactylitis	182 (52.5)	106 (47.3)	76 (61.8)	*0.01*
Enthesitis	181 (52.2)	102 (45.5)	79 (64.2)	*0.001**
Axial involvement	105 (30.4)	61 (27.2)	44 (36.1)	0.098
Osteoarthritis	89 (25.7)	60 (26.8)	29 (23.6)	0.51
Uveitits	7 (2)	7 (3.1)	0 (0)	*0.048*
IBD	6 (1.7)	3 (1.3)	3 (2.4)	0.45
Rheumatoid arthritis	10 (2.9)	6 (2.7)	4 (3.2)	0.76
Family history of psoriasis	155 (44.7)	89 (39.7)	66 (53.7)	*0.013*
Current symptoms (n (%))				
Skin symptoms	329 (94.8)	207 (92.4)	122 (99.2)	*0.006**
Enthesitis	193 (55.6)	105 (46.9)	88 (71.5)	*< 0.001**
Dactylitis	209 (60.2)	122 (54.5)	87 (70.7)	*0.003**
Swollen joints	312 (89.9)	207 (92.4)	105 (85.4)	*0.037*
Comorbidities (n (%))	240 (69.2)	148 (66.1)	92 (74.8)	0.092
Hypertension	136 (39.2)	188 (39.3)	48 (39)	0.96
Lipid disorder	96 (27.7)	63 (28.1)	33 (26.8)	0.79
Obesity	83 (24)	43 (19.2)	40 (32.8)	*0.005**
Depression and/or anxiety	65 (18.7)	32 (14.3)	33 (26.8)	*0.004**
Type II diabetes	32 (9.2)	22 (9.8)	10 (8.1)	0.6
Cardiovascular disease	39 (11.2)	27 (12.1)	12 (9.8)	0.52
Osteoporosis	33 (9.5)	16 (7.1)	17 (3.8)	*0.04*
Number of diseases	3.8 ± 1.7	3.5 ± 1.7	4.3 ± 1.7	*< 0.001**

BMI, body mass index; *CRP*, C-reactive protein; *DBP*, diastolic blood pressure; *ESR*, erythrocyte sedimentation rate; *IBD*, inflammatory bowel disease; *SBP*, systolic blood pressure

*Statistical significance after Bonferroni correction. *P*-values < 0.05 are represented by italics

Global burden of disease, HR QoL, work productivity impairment, and MDA

Similar to findings observed for arthritis measures (Fig. 2a and b), patients from a dermatology setting were also observed to have significantly higher global disease activity measures (DAPSA and PGA) than those from a rheumatology setting (Fig. 3a and b). Although no difference was observed between patients from either setting with regard to impact upon QoL, as measured by SF12v2 and HAQ-DI questionnaires (Fig. 3c and d), patients from a dermatology setting reported a significantly higher burden of their disease on activity impairment, but not on work productivity (Fig. 3e). Although the proportion of patients achieving MDA was slightly lower in patients from a dermatology setting, this difference was not statistically significant (26.1% vs. 35.7%, $p = 0.08$; Fig. 3f).

Patients were also stratified by diagnosis: those having a previous PsA diagnosis (established, $N = 308$) and those with a new diagnosis of PsA ($N = 39$) (Table 2). Patients with a new diagnosis of PsA were observed to have a significantly greater burden of disease for the following measures: TJC, DAPSA, DAS-28, PGA (rheumatologist assessment), BSA

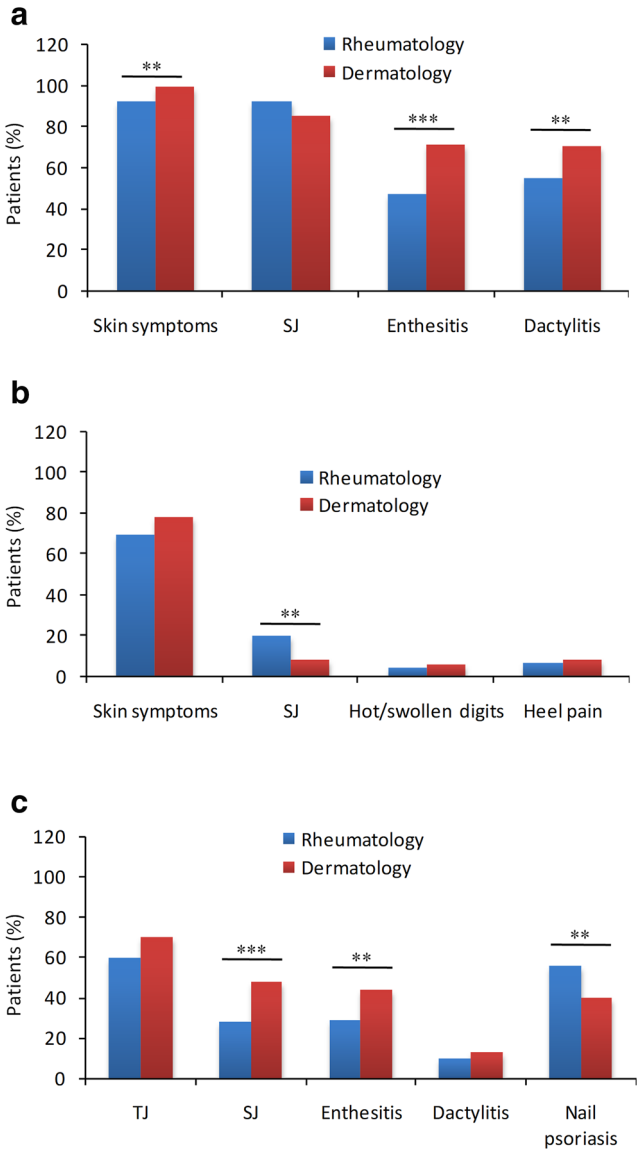

Fig. 1 Signs and symptoms reported by PsA patients. Differences between skin and arthritis measures for patients reporting "patient ever experienced these symptoms" (**a**); first symptoms reported by patients (**b**); and clinical signs/symptoms currently under evaluation were compared in patients from a dermatology and rheumatology setting (**c**). SJ, swollen joints; TJ, tender joints. Data presented as % patients. Asterisks denote statistically significant differences between patients recruited to rheumatology or dermatology settings where **< 0.01 and ***< 0.001

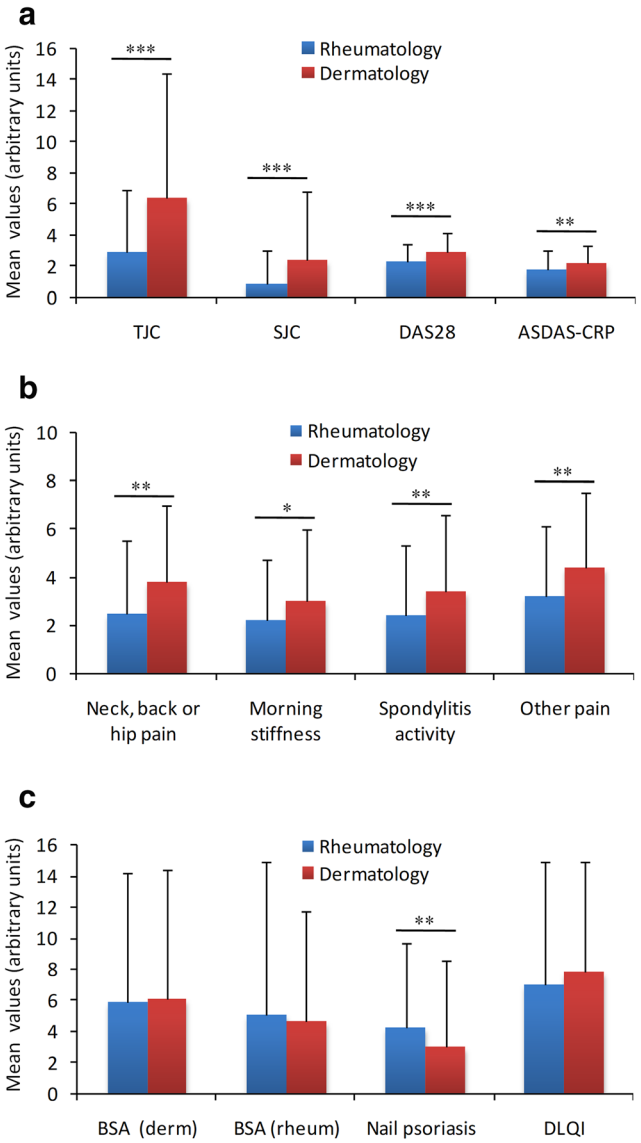

Fig. 2 Musculoskeletal and dermatological assessment of PsA patients. A range of arthritis measures (**a**), single components of ASDAS (**b**) and cutaneous burden of disease by BSA or DLQI (**c**) were compared in patients enrolled from a dermatology and rheumatology setting. BSA, body surface area; DAS28, 28-joint disease activity score; Derm, dermatologist; DLQI, dermatology life quality index; PsA, psoriatic arthritis; Rheum, rheumatologist; SD, standard deviation; SJC, swollen joint count, TJC, tender joint count. Data presented as mean ± SD. Asterisks denote statistically significant differences between patients recruited to rheumatology or dermatology settings where*< 0.05, **< 0.01, and ***< 0.001

(dermatologist assessment), WPAI-PSA TAI, ASDAS-CRP (rheumatologist) (Table 2).

Treatment status of PsA patients

We next evaluated the therapeutic profile of patients emerging from the two specialities (Table 3). The proportion of patients receiving any form of anti-inflammatory medication for PsA was generally higher in the rheumatology setting compared with dermatology setting, particularly for csDMARDS such as methotrexate, sulfasalazine, and leflunomide. The first csDMARD in both rheumatology and dermatology settings was methotrexate and the first bDMARD a TNF inhibitor (TNFi). While no difference was observed in the proportion of patients from either setting with regard to previous overall TNFi use, ongoing treatment with anti-TNF (or TNFi as monotherapy) was significantly higher in patients from the dermatology setting.

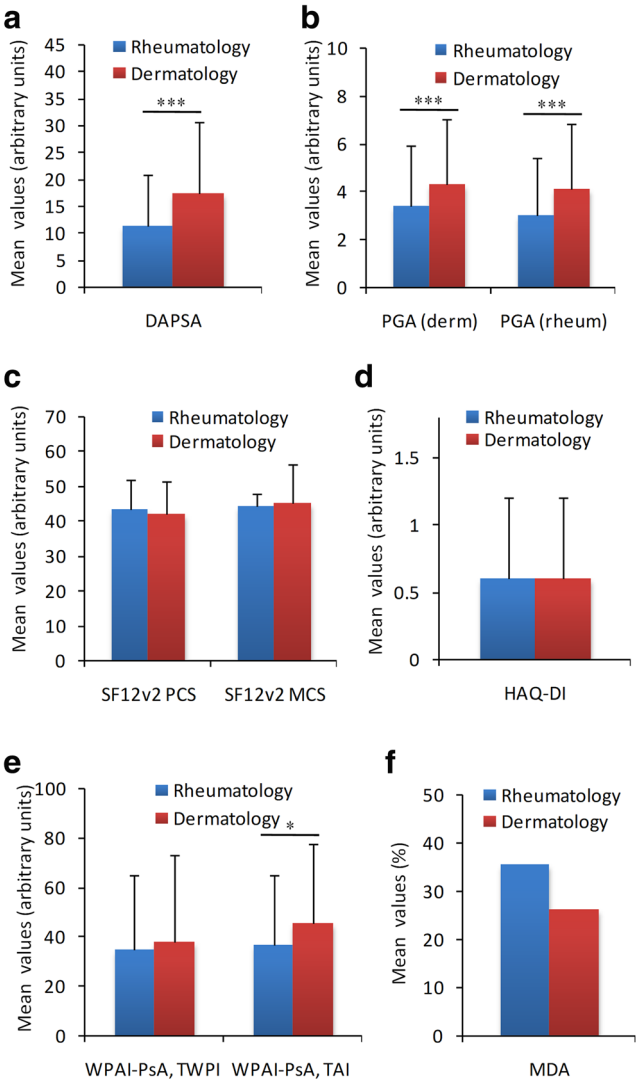

Fig. 3 Quality of life and work-related measures in PsA patients. Quality of life and work-related measures in PsA patients. Global burden of disease (**a**) and (**b**), HR QoL (**c**) and (**d**), work productivity impairment (**e**) and MDA (**f**). DAPSA, disease activity in PsA; HAQ-DI, health assessment questionnaire – disability index; MCS, mental component score; MDA, minimal disease activity; PCS, physical component score; PGA, physician global assessment (derm assessment); TAI, total activity impairment; TWPI, total work productivity impairment; WPAI-PsA, work productivity and activity impairment questionnaire PsA. Data presented as mean ± SD. Asterisks denote statistically significant differences between patients recruited to rheumatology or dermatology settings where *< 0.05 and ***< 0.001

The timing with regard to the therapeutic management of patients was also assessed. The mean time from the onset of musculoskeletal symptoms to PsA diagnosis was 22.3 ± 53.8 months in the rheumatology setting and 17 months longer in the dermatology setting (39.4 ± 77.5 months, $p = 0.63$). The mean time from PsA diagnosis to first csDMARD was significantly longer in the dermatology setting (19.5 ± 50.6 vs. 7.3 ± 27.5 months, respectively; $p < 0.001$). In contrast, the mean time from PsA diagnosis to first bDMARD was shorter by 10.7 months in the dermatology setting (44.2 ± 65.6 vs. 54.9 ± 69 months, $p = 0.09$) and the time from first csDMARD to first bDMARD was also shorter by 13.4 months in the dermatology setting (35.3 ± 51.9 vs. 48.7 ± 67.9 months, $p = 0.34$).

Factors influencing the decision of patients to attend rheumatologist over dermatologist

We next used multivariate regression analysis to evaluate the association between variables potentially influencing a patient to choose to visit a rheumatologist rather than a dermatologist (Supplementary Material Table S1). While female gender (OR: 2.05, 95% CI: 2–3.45, $p = 0.007$) and the presence of swollen joints (OR: 3.19, 95% CI: 1.44–7.07, $p = 0.004$) emerged as being strongly associated with influencing a patient to choose to go to a rheumatologist, comorbid diseases such as obesity, depression, and osteoporosis and complications including enthesitis and dactylitis were found to be negatively associated with a patients decision to visit a rheumatologist, therefore positively associated with the dermatological setting. In a second model, we replaced "skin symptoms" with "time taken from musculoskeletal onset to PsA diagnosis" with similar results emerging. Delay in time from musculoskeletal disease symptoms to PsA diagnosis was negatively associated with a patient's decision to visit a rheumatologist (OR: 0.91, 95% CI: 0.86–0.95, $p < 0.001$).

Discussion

Findings from the present study reflect the real-life *status quo* of the current routine care and management of PsA patients, from a dermatology and rheumatology setting in Italy.

Several important observations have emerged from this multicenter study. First, patients cared for in either a rheumatology or dermatology setting experienced a substantial diagnostic delay for PsA, with a clinically relevant difference of almost 1.5 years [11] between setting (22.3 months in rheumatology vs. 39.4 months in dermatology setting). These values corroborate those observed from other European registries [9, 34] as well as those observed from the US-based LOOP study involving 44 sites and 681 patients (12 months in rheumatology vs. 31.2 months in dermatology setting) [23].

Besides an increased diagnostic delay, patients in the dermatology setting presented with a significantly higher burden of disease as reflected in higher levels of disease activity, predominantly musculoskeletal symptoms, but also skin involvement, compared to patients recruited in the rheumatology setting. Second, the burden of disease, as measured by patient-reported questionnaires (DLQI, SF12v2, HAQ-DI, WPAI-PsA-TWPI), was found to be similar between patients from either setting. Third, patients with a new PsA diagnosis

Table 2 Current disease activity and disease burden by clinical specialty in patients with new/previous diagnosis

Disease measures	New diagnosis		Previous diagnosis		*p* value**
	*N**	Mean ± SD	*N**	Mean ± SD	
TJC (0–68)	39	5.5 ± 5.5	308	3.9 ± 6	*0.007*
SJC (0–66)	39	0.6 ± 4	308	1.3 ± 3	*0.01*
DAPSA	20	20.9 ± 10.2	203	11.9 ± 10.6	*< 0.001*
DAS-28	22	3 ± 1	211	2.5 ± 1.2	*0.024*
PGA (derm assessment)	39	4.3 ± 2.3	308	3.6 ± 2.7	0.082
PGA (rheuma assessment)	39	4.2 ± 1.9	308	3.3 ± 2.6	*0.004*
BSA (%) (derm assessment)	39	9 ± 10.9	305	5.6 ± 7.8	*0.021*
BSA (%) (rheum assessment)	39	7.6 ± 11.2	302	4.6 ± 8.5	0.14
Number of nails with psoriatic changes	39	4.3 ± 6	297	3.7 ± 5.4	0.48
HAQ-DI	38	0.6 ± 0.6	308	0.6 ± 0.6	0.91
SF12v2 PCS	34	40.1 ± 8.4	278	43.2 ± 8.8	0.056
SF12v2 MCS	34	42.4 ± 9.1	278	44.9 ± 9.9	0.06
WPAI-PsA, presenteeism (%)	15	32.7 ± 25.8	134	32.8 ± 30.5	0.78
WPAI-PsA, absenteeism (%)	15	18.4 ± 35.7	102	10.3 ± 24.4	0.66
WPAI-PsA, TWPI (%)	13	35.6 ± 28.5	98	35.7 ± 32.3	0.76
WPAI-PsA, TAI (%)	39	48.5 ± 27.4	305	38.6 ± 29.9	*0.043*
ASDAS-CRP (with rheum assessment)	17	2.5 ± 1.9	170	1.8 ± 1.2	*0.036*
DLQI	39	7.2 ± 5.8	308	7.3 ± 7.8	0.3

*Not all disease measures were assessed for patients receiving a new/previous diagnosis of PsA; therefore, the number of patients was varied

**p value from Wilcoxon rank sum test or χ^2 test, as appropriate: new diagnosis vs. previous diagnosis. P-values < 0.05 are represented by italics

BSA, body surface area; *DAPSA*, disease activity in PsA; *DAS28*, 28-joint disease activity score; *Derm*, dermatologist; *DLQI*, dermatology life quality index; *HAQ-DI*, health assessment questionnaire – disability index; *MCS*, mental component score; *MDA*, minimal disease activity; *PCS*, physical component score; *PGA*, physician global assessment (derm assessment); *PsA*, psoriatic arthritis; *Rheum*, rheumatologist; *SF12v2*, short form 12-item health survey version 2.0; *SD*, standard deviation; *SJC66*, swollen joint count, 66 joints; *TAI*, total activity impairment; *TJC68*, tender joint count, 68 joints; *TWPI*, total work productivity impairment; *WPAI-PsA*, work productivity and activity impairment questionnaire PsA; PtGA from rheumatological assessment has been used for ASDAS calculation

had greater disease severity compared to patients with established disease, probably due to the treatment that the latter were already receiving. Fourth, the time taken from PsA diagnosis to initiation of csDMARD was 7.3 vs. 19.5 months in rheumatology and dermatology settings, respectively ($p < 0.001$), confirming this trend in both the US-based and Global LOOP studies [23, 24]. In contrast, time taken from diagnosis to bDMARD use was shorter in dermatology compared to rheumatology setting by approximately 10 months, similar to the time taken from first csDMARDs and bDMARDs (12 months less). However, in both the US-based LOOP and Global LOOP studies [23, 24], the time taken from diagnosis to bDMARD was similar for either setting (approximately 2 years). This difference may reflect some geographical differences between the studies.

A lack of screening and late referral to rheumatologists has previously been observed in PsA patients [35]. It has been frequently reported that PsA is underdiagnosed in patients with PsO, which may be attributed to the under-recognition of musculoskeletal symptoms by dermatologists [36]. It has also been suggested that dermatologists give greater perception of the burden of cutaneous symptoms (and/or have lesser perception of musculoskeletal symptoms) and this may in part explain the observed delay in referral and diagnosis [14, 37]. Screening patients for musculoskeletal disease earlier on may help prevent joint damage and disability, as many as half of patients go on to develop erosions within the first 2 years [38]. In our study, we found a higher burden ascribable to musculoskeletal symptoms in patients recruited in the dermatological settings, as well as a higher impact of skin symptoms in those enrolled in the rheumatological centers, both probably due to lower perception of the importance of the other specialist-specific symptoms.

Indeed, the benefit of a multidisciplinary collaborative approach has been increasingly recognized in recent years [19, 39].

In combined dermatology-rheumatology clinics, 46% of patients were given a revised diagnosis and patients were

Table 3 Treatment of PsA patients enrolled by clinical speciality

Treatment (*n* (%))*	Total (*N* = 347)	Rheumatologist (*N* = 224)	Dermatologist (*N* = 123)	*p* value
Any PsA treatment	347 (100)	224 (100)	123 (100)	-
All treatments**				
Methotrexate	242 (69.7)	182 (81.3)	60 (48.8)	*0.006*
TNFi	277 (79.8)	179 (79.9)	98 (79.7)	0.16
Sulfasalazine	70 (20.2)	59 (26.3)	11 (8.9)	*0.002*
Systemic steroids	63 (18.2)	47 (21.0)	16 (13.0)	0.25
Leflunomide	35 (10.1)	32 (14.3)	3 (2.4)	*0.003*
Anti-IL 12/23-other bDMARDs	41 (11.8)	31 (13.8)	10 (8.1)	0.29
Cyclosporine	49 (14.1)	31 (13.8)	18 (14.6)	0.47
Apremilast	12 (3.5)	6 (2.7)	6 (4.9)	0.44
First csDMARD***				
Methotrexate	184 (53.0)	138 (61.6)	46 (37.4)	*< 0.001*
Sulfasalazine	47 (13.5)	38 (17.0)	9 (7.3)	
Currently still on First csDMARD				
Methotrexate	87 (25.1)	72 (32.1)	15 (12.2)	0.92
Sulfasalazine	15 (4.3)	11 (4.9)	4 (3.3)	
First bDMARD				
TNFi	208 (59.9)	137 (61.2)	71 (57.7)	0.53
Other bDMARDs	12 (3.5)	8 (3.6)	4 (3.3)	
Currently still on first bDMARD				
TNFi	118 (34.0)	78 (34.8)	40 (32.5)	0.66
Other bDMARDs	11 (3.2)	8 (3.6)	3 (2.4)	
Ongoing treatment				
TNFi	157 (51.8)	99 (47.1)	58 (62.4)	*0.018*
Other bDMARDs	31 (10.2)	23 (10.9)	8 (8.6)	
TNFi monotherapy	107 (30.8)	56 (25)	51 (41.5)	*< 0.001*
TNFi + methotrexate	35 (10.1)	28 (12.5)	7 (5.7)	
Previous treatment				
TNFi overall	120 (37.2)	80 (39.4)	40 (33.3)	0.45
Other bDMARDs	10 (3.1)	8 (3.9)	2 (1.7)	

*Percentages calculated on non-missing values

**Ongoing or anamnestic; $n > 10\%$ patients

***$n > 10\%$ patients

Other bDMARDs include anti-IL12/23 and anti-IL17; *bDMARD*, biologic disease-modifying anti-rheumatic drug; *csDMARD*, conventional synthetic disease-modifying anti-rheumatic drugs; *Derm*, dermatologist; *PsA*, psoriatic arthritis; *Rheum*, rheumatologist; *SD*, standard deviation; *TNFi*, tumor necrosis factor inhibitor. *P*-values < 0.05 are represented by italics

more likely to receive systemic medications such as methotrexate or biologics rather than topical or no treatment [19]. A more recent study confirmed these findings, with 56% of patients having their diagnosis revised when seen in a combined clinic [40].

In the present study, we observed interdisciplinary variation in therapeutic preference between subspecialties. Rheumatologists started treatment earlier and maintained treatment longer with csDMARDs, whereas dermatologists started bDMARD use earlier.

However, a delay in administering bDMARDs was observed in rheumatologists compared to dermatologists. Recent guidelines have updated their recommendations on the management of PsA with pharmacologic therapies [13, 18]. In the presence of skin and/or polyarticular active disease, early treatment with csDMARDs should be considered, with the exception of patients with symptomatic poly-enthesitis or patients with axial disease, where bDMARDs should be considered as a first-line treatment [41].TNF inhibitors are effective on the different clinical subsets of PsA including

synovitis, enthesitis, dactylitis, and axial disease. Moreover, they are also effective on the skin and nails psoriatic lesions [42]. Patients managed in a dermatology setting in our study were observed to have a greater burden of these disease subsets (peripheral manifestations) on top of skin involvement which may have prompted greater use of anti-TNF compared to rheumatologists. In current treatment of PsA patients, we also observed that anti-TNF monotherapy was administered more frequently by dermatologists (41.5% vs. 25% respectively) while rheumatologists preferred combination therapy with csDMARDs and bDMARDs, reflecting their different attitudes to therapies. This is in agreement with previous reports documenting greater emphasis on systemic and aggressive treatment by rheumatologists compared to dermatologists [43].

When we evaluated potential reasons why a patient would "choose to go to a rheumatologist rather than a dermatologist," female gender and the presence of swollen joints were observed to be strong drivers influencing their decision. Indeed gender specific differences in different features of PsA have already been documented, which may in part explain our observations [44]. Furthermore, the presence of enthesitis and dactylitis (observed in higher frequency in patients seen by dermatologists) was considered features that would not encourage them to see a rheumatologist, so it is possible that patients may have had a misperception of the burden of their PsA and the symptoms they experienced, such as nail involvement or the more complicated enthesitis and dactylitis. This observation was unexpected and may be attributed to a potential lack of specialist experience from dermatologists in the assessment of enthesitis/dactylitis (analogous for PASI by rheumatologists [45]). The prevalence of obesity and depression in patients followed by the dermatologists could also be explained as a characteristic of psoriasis patients [46, 47]. An awareness of comorbidities associated with PsA is critical since they can impact disease activity scores and increase burden of disease. Moreover, the appropriate screening and management of comorbidities can improve clinical outcomes [7].

While a multidisciplinary approach may indeed be the best option for the care of patients with PsA [20], differences in the available numbers of rheumatologists and dermatologists may result in logistical problems in the development of European recommendations for the referral and management of these patients [5].

Limitations

While the strengths of the present study lie in the real-life, multicenter, cross-sectional design where patients were consecutively followed during routine clinical care, some weaknesses of this study need to be highlighted. Selection bias may have been a potential problem in the present study since dermatologists mainly identified patients with both conditions (arthritis and psoriasis, as well as enthesitis and dactylitis). The proportion of PsA patients enrolled in this study was not equally distributed among rheumatology and dermatology sites, limiting sub-analysis of some outcome measures (with low sample size). The overall sample size of 347 patients was derived from 28 sites (17 rheumatology centers and 11 dermatology centers) across the country, therefore representative of the Italian territory and not limited to a specific region or hospital. It is recognized that gender-specific differences in patients with PsA exist [44]. While our preliminary analysis did not reveal any notable differences between gender among disease activity or QoL variables, further studies with larger sample size may yield additional information.

Conclusion

The LOOP study showed diagnostic delay in both settings and emphasized the need to implement efficient strategies to improve the early detection of PsA. Patients followed in rheumatology centers compared to those of dermatology show a different clinical profile that may be linked to a shorter delay in diagnosis as well as differences in the therapeutic management by rheumatologists and dermatologists.

PsA is a chronic inflammatory disease often accompanied with comorbidities that can complicate diagnosis and management. The appropriate screening and management of comorbidities can improve clinical outcomes. Patients frequently complain of both skin musculoskeletal complications, which can be challenging for the single specialist. Differences identified in the management of PsA patients in the dermatology or rheumatology setting need to be explored further in a shared dermatology and rheumatology clinic. The combined expertise and experience shared by this approach may allow comprehensive care for these high-risk patients. In the absence of a shared dermatology and rheumatology clinic, patients with PsA would benefit from a clinical evaluation by both specialists.

Acknowledgments Medical writing support and editorial assistance were provided by Colin Gerard Egan, PhD (CE Medical Writing, Pisa, Italy).

Author contributions All authors contributed to data acquisition and interpretation of results. All authors were involved in drafting the article or revising it critically for important intellectual content. All authors approved the final version to be submitted for publication.

Funding AbbVie Srl, Italy, sponsored this study and editorial assistance for the writing of the manuscript. AbbVie participated in the study design, interpretation of data, and writing of the publication.

Compliance with ethical standards

Conflict of interest G Gualberti and F Marando are AbbVie employees and may own AbbVie stocks and options.

A Delle Sedie received honoraria for invited talks, board, and meetings from Abbvie, Celgene, Lilly, Novartis; Sanofi. D Santilli declares fees for Advisory Boards or Talks from Abbvie, Abiogen, GSK, Novartis; Roche. F Cusano declares fees for Advisory Boards or Talks from Abbvie. F Prignano has been consultant, adviser, and clinical study investigator for Eli-Lilly, Abbvie, Novartis, Leo-Pharma, Abiogen-Pharma, Celgene, Janssen-Cilag, Biogen, Admirall. S Piaserico declares fees for Advisory Boards or Talks from Almirall, Lilly, Abbvie, UCB, Janssen, and Novartis. The following authors declare no conflicts of interests: R Ramonda, L Bianchi, E Baldissera, S Di Nuzzo, S. Parisi, F Lumetti, L Bigi, S Curatolo, F Caso, C Franchi, C Arcuri, RG Angileri, C De Felice, F Bandinelli, S Dastoli, G Italiano, M Romanelli, G Scotto di Luzio, A Patrì, MA Montesu, E Stroppiana, G Passiu, RD Grembiale, I De Andres, MG Ferrucci, E Lubrano, MS Chimenti, D Graceffa, P Agnusdei, SR Mercuri, M Longhi.

Ethical approval and consent to participate Ethics committee approval from all participating centers and written informed consent for the use of personal data was obtained from every patient.

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