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Adherence, satisfaction and preferences for treatment in patients with psoriasis in the European Union: a systematic review of the literature

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Background and objective: Adherence to treatment in patients with psoriasis is often poor. An investigation of patient preferences and satisfaction with treatment may be important, based on the expected correlation with therapy compliance. This paper aims to examine and describe the current literature on patient preferences, satisfaction and adherence to treatment for psoriasis in the European Union (EU).

Methods: Electronic searches were conducted using PubMed, ISI Web of Knowledge, Scopus, Spanish databases and Google Scholar. European studies published in English or Spanish between January 1, 2009 and December 31, 2014 regarding patient-reported outcomes in psoriatic patients were included. Studies conducted in non-EU countries, letters to the editor, editorials, experts' opinions, case studies, congress proceedings, publications that did not differentiate between patients with psoriasis and psoriatic arthritis or studies related to specific treatment were excluded.

Results: A total of 1,769 titles were identified, of which 1,636 were excluded as they were duplicates or did not provide any relevant information. After a full-text reading and application of the inclusion/exclusion criteria, 46 publications were included. This paper will describe publications on adherence (n=4), preferences (n=5) and satisfaction with treatment (n=7). Results related to health-related quality of life articles (n=30) have been published elsewhere. Adherence rates are generally low in psoriasis patients regardless of the type of treatment, severity of disease or methods used to measure adherence. Biologic therapy is associated with greater clinical improvement. There is a direct association between physician recommendations, patient preferences and several domains of treatment satisfaction.

Conclusion: The results of this review support the conclusion that adherence rates in patients with psoriasis are suboptimal and highlight the need to improve patient compliance and satisfaction with treatment. Patients' preferences should be taken into account in the treatment decision-making process in order to improve patients' clinical outcomes by ensuring satisfaction and adherence.

Keywords: psoriasis, patient preference, adherence, satisfaction, systematic review, patient-reported outcomes, European Union

Introduction

Psoriasis is a common chronic inflammatory disease of the skin and joints that is typically characterized by erythematous papules and plaques.[1–3] Estimates of the worldwide prevalence of psoriasis range from 1% to 3%[4–6] and it affects ~2% of the

population in Europe.[7,8] The disease can present at any age, but the mean age of onset for the first presentation of psoriasis ranges from 15 to 20 years, with a second peak occurring at 55–60 years.[9] Although psoriasis is not a life-threatening disease, it has a negative effect on patients' health-related quality of life (HRQoL), similar to that of other major medical conditions.[9–12]

The severity of disease is related to the extension of the cutaneous manifestations and is defined by the Psoriasis Area and Severity Index (PASI) or as a percentage of the total body surface area (BSA).[13] The majority of psoriasis patients suffer from mild disease (PASI ≤ 10), which can often be managed with topical agents, while phototherapy or systemic therapies are usually used for patients with moderate-to-severe psoriasis (PASI > 10). In the last decade, significant advances in the management and treatment of psoriasis have been made with the introduction of biologic agents,[14,15] which have shown greater clinical benefit than traditional systemic therapies.[16–22]

With more than 90% of psoriasis patients having a chronic condition, adherence to treatment is crucial for successful disease management and reduction in clinical severity.[23] However, it is estimated that nearly 40% of patients with psoriasis do not use medication as prescribed.[4,24,25] In addition to non-adherence, psoriasis is consistently associated with treatment dissatisfaction.[3,26–28] As satisfaction is closely associated with patient preferences and compliance with treatment,[29] taking patients' opinions about available treatment options into consideration may be crucial to improving satisfaction and adherence, thereby increasing the effectiveness of the treatment and HRQoL.

The introduction of biologic therapies over the past 10 years has further increased the therapeutic options for moderate-to-severe psoriasis. Although all of these biologic agents are highly effective and show a favorable risk–benefit profile, differences in efficacy, rapidity of action and sustainability do exist. This makes the decision-making process regarding the most suitable therapeutic strategy more complex for both patients and physicians, underlining the need to elucidate patients' treatment preferences. This review aims to examine and describe the current literature on patient preferences, satisfaction and adherence to treatment for psoriasis in the European Union (EU).

Methods

We performed a systematic review of the literature on adherence to treatment, satisfaction with therapy, patient preferences for treatment and HRQoL in psoriatic patients in the EU. In order to obtain an accurate insight into how novel treatment options (available in European countries since 2005) have influenced patient-reported outcomes (PROs), studies from January 1, 2009 to December 31, 2014 were included. International (Medline/pubMed, cochrane Ligrary, ISI Web of knowledge [ISI WOK], SCOPUS) and Spanish electronic databases (Medicina en Español [MEDES], Índice Bibliográfico Español en Ciencias de la Salud [IBECS]) and Google Scholar were used to search the literature. The English and Spanish search terms used are summarized in Table S1.

Original articles, reviews and systematic reviews in English or Spanish that evaluated treatment adherence and satisfaction, patient preferences for treatment and HRQoL in psoriatic patients from a European perspective were included in the review. Publications about all of the treatments available for psoriasis (topical, systemic and biologic agents) were included. On the other hand, studies conducted in non-EU countries, original letters to the editor, editorials, experts' opinions, case studies, congress proceedings, studies with mixed populations including patients with psoriasis (with or without psoriatic arthritis) and patients with psoriatic arthritis alone or studies related to specific treatments were excluded. The selection of publications was performed by two independent researchers and discrepancies were resolved by consensus.

The methodological quality of the studies was assessed by assigning a level of evidence and recommendation based on criteria developed by the Centre for Evidence-Based Medicine (CEBM).[30]

Results

A total of 1,769 titles were identified, of which 587 (33.2%) were duplicates and therefore excluded. The other 1,182 (66.8%) were excluded because they did not provide any relevant information. After full-text reading and application of the inclusion/exclusion criteria, 46 of the remaining 133 publications were included in the review (Figure 1). Twenty-seven (58.7%) articles were related to HRQoL, seven (15.2%) evaluated treatment satisfaction, five (10.9%) examined treatment preferences, four (8.7%) explored treatment adherence and three (6.5%) described cumulative life course impairment (CLCI). Results related to HRQoL (n=27) and CLCI articles (n=3) have been published elsewhere.[31]

The present article examines and describes the 16 studies, published in the EU between January 1, 2009 and December 31, 2014, that were selected and which related to psoriasis patients' preferences for treatment, adherence and satisfaction.
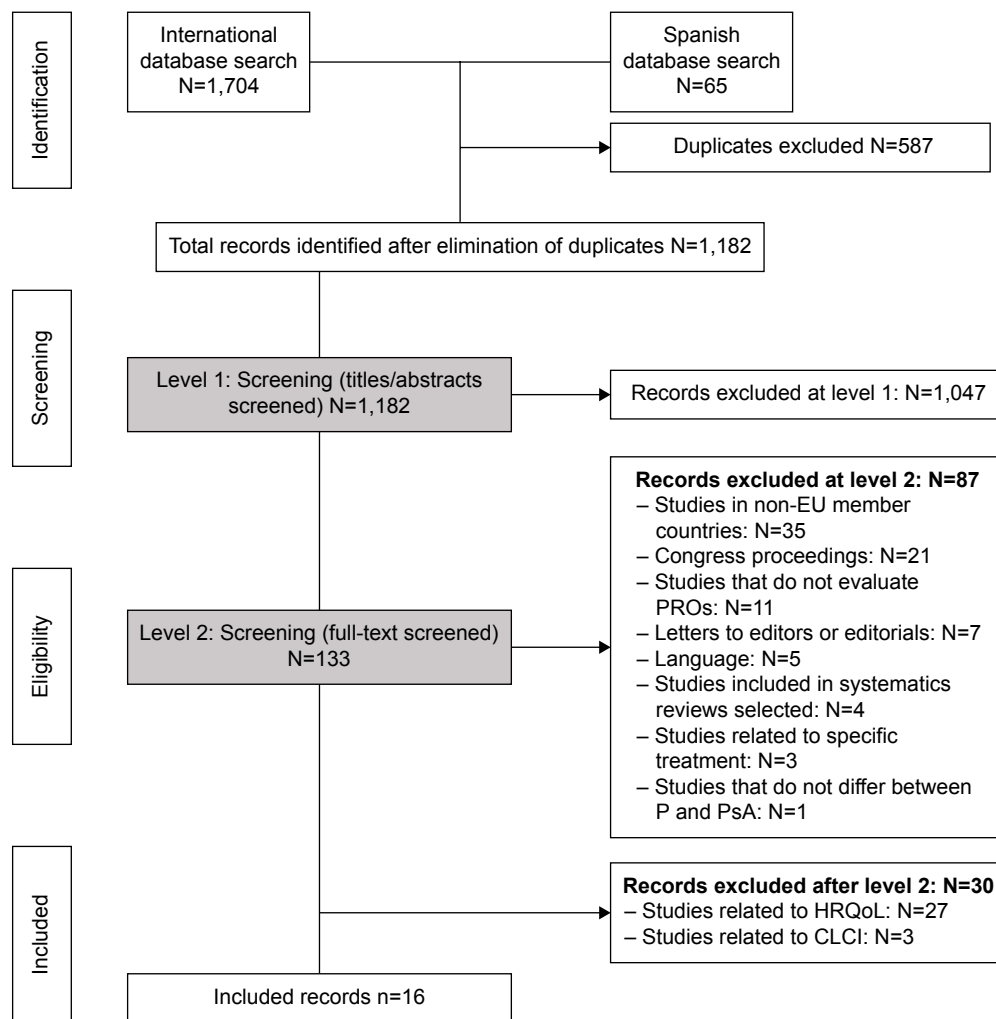
Figure 1 PRISMA diagram of systematic review process.
Abbreviations: PRISMA, preferred reporting items for systematic reviews and meta-analyses; EU, European Union; PROs, patient reported outcomes; P, psoriasis; PsA, psoriatic arthritis; HRQoL, health related quality of life; CLCI, cumulative life course impairment.

Characteristics of selected studies

These 16 studies included the following designs: 4 conjoint analyses, 2 reviews, 1 systematic review, 4 prospective studies, 3 cross-sectional studies and 1 retrospective study. Nearly half were conducted in Germany (n=7), two in the UK, two in Spain, two in the Netherlands, one in Italy and two were multicenter studies across different European countries. The level of evidence in the majority of the studies (n=12) was grade 2c and their CEBM recommendation was grade B, which indicates moderate evidence.

Treatment adherence in patients with psoriasis

Of the 16 studies, 4 (25%) examined adherence to medical therapies. Three of them were reviews, which evaluated rates and determinants of adherence, while the fourth article selected was a Delphi consensus study conducted in Spain.

The systematic review undertaken by Thorneloe et al[32] consistently reported low rates of treatment adherence, regardless of the type of treatment, disease severity or type of adherence measurement used (Table 1). Even though there were inconsistent findings with regard to the predictive factors of adherence, studies investigating the role of psychological factors revealed that increased psychological distress and low patient satisfaction with care or therapy were associated with lower levels of adherence. In line with these results, Bewley and Page[24] confirmed that rates of adherence to topical medications were low, with 39%–73% of psoriasis patients not using medications as prescribed and revealed that effectiveness and the characteristics of the treatment (cosmetic acceptability) were the main contributors for increasing adherence to psoriasis medication. Moreover, they identified that prescribing therapy in line with patient preferences or improving patient education may

Table 1 Adherence rates

Instrument used to determine adherence	Adherence definition	Adherence rates (% of adherent patients)
Patient self-reported measures	Adhering to the therapy regimen or advice provided by doctors	27%–61%
	Adhering to the application	33%–97%
	Never or rarely missed a dose of their biological treatment	66.6%
	Adhering to the duration of therapy	71% (topical), 80% (phototherapy), 83% (systemic)
	Using a continuous scale	75%–92%
Pharmacy prescription refill records Medication possession ratio (MPR)	Proportion of days' supply obtained during the study period divided by the number of days in the study period	14%–66%
Medication weights and counting	Ratio of doses taken to doses prescribed	60.6%–117.8%
	Median of expected dose of topical therapy	35%
Medication event monitoring systems (MEMS)	Electronically records the opening and closing of medication bottle cap	54.6%–67% (topical), 55%–75% (systemic and phototherapy)

Note: Data from Thorneloe et al.[32]

result in increased adherence. Similarly, Zschocke et al[33] established that the reasons for non-adherence to treatment amongst psoriasis patients revolve mainly around treatment vehicle, patient–physician relationship or patient motivation. These authors propose that given that the barriers to medication adherence are complex and varied, solutions to improve adherence should be multifaceted and allow tailoring according to each patient's individual needs.

Finally, the Delphi study conducted by Puig et al[34] with a panel of experts from the Psoriasis Group of the Spanish Academy of Dermatology and Venereology reached a consensus that in order to improve adherence to topical treatment, it was necessary 1) to improve communication between patients and health care staff, 2) to provide written instructions and 3) to simplify treatment with easy-to-use and pleasant products that were preferably applied only once a day. In addition, the panelists agreed that treatment satisfaction increased adherence and tended to improve the HRQoL of psoriasis patients, highlighting the relationship between treatment satisfaction and treatment adherence.

Taken together, these studies draw attention to the low rates of adherence to psoriasis treatments and highlight the importance of involving patients in treatment decision-making, in order to improve their adherence to treatment.

Treatment satisfaction in patients with psoriasis

The following section summarizes seven articles related to treatment satisfaction of patients with psoriasis and to variations depending on type of treatment, demography and clinical factors. Five articles used study-specific questionnaires, while the other two studies assessed patient's satisfaction using the Treatment Satisfaction Questionnaire for Medication (TSQM) (Table 2).

Schaarschmidt et al[35] revealed the high impact of the type of treatment on satisfaction scores. Participants receiving biologicals (TSQM: 323.3) and traditional systemic treatments (TSQM: 288.0) were more satisfied than those receiving phototherapy (TSQM: 260.6) or topical agents (TSQM: 266.8; $P<0.001$). These authors also observed that high disease-related HRQoL impairment, as measured by the Dermatology Life Quality Index (DLQI), and psoriatic arthritis were associated with decreased treatment satisfaction. In line with these results, van Cranenburgh et al[36] indicated that, overall, patients with psoriasis were moderately satisfied with their current treatment, with patients receiving biologic treatments being the most satisfied, compared to other groups (total satisfaction score [range from 5= not satisfied to 25= very satisfied]: topical [16.5], phototherapy [18.3], systemic [19.5], biologics [0.9]). These authors identified age (t[1182] =2.9; P=0.004) and disease severity (t[1882] =−18.6; $P<0.001$) as predictive factors of satisfaction. Similarly, Ragnarson Tennvall et al[37] described the highest treatment satisfaction, that is, 8.2 (scale of 0 not at all satisfied to 10 very satisfied) in patients who had been treated with biological drugs for 12 months, followed by patients who received systemic treatment for less than 12 months (6.5) and patients receiving topical treatment (5.7). Van den Reek et al[38] confirmed the high satisfaction rates achieved with biologic treatment, with statistically significant ($P<0.05$) improvements in the "efficacy", "convenience" and "global satisfaction" domains of TSQM after 3 and 6 months initiation of biologic therapy.

Two studies assessed the relationship between psoriasis severity (PASI) and satisfaction. Schäfer et al[39] showed that, while most patients who achieved PASI 75 (92.3%) indicated that their expectations with the treatment were met, this applied to only half (53.1%) of patients with PASI 50 and

Table 2 Characteristics of treatment satisfaction studies reviewed

Study	Objective	Design	Demographic and clinical characteristics of sample	Sample treatment	Satisfaction questionnaire used
Schaarschmidt et al[35] (Germany)	To compare satisfaction of patients with moderate-to-severe psoriasis with all systemic psoriasis treatments currently approved for treatment of psoriasis in Germany, using TSQM	Cross-sectional	n=200 patients 57.5% male; mean age 50.8 years (SD: 14.1); mean PASI 3.4 (SD: 4.1); mean disease duration: 19.9 years (SD: 13.1); 22.5% had psoriatic arthritis	18% topical 10% phototherapy 37.5% systemic 43.5% biological	Treatment satisfaction questionnaire for medication (TSQM) (5-point Likert-type scale: 1= very dissatisfied; 5= very satisfied; 4 subscales (efficacy, adverse events, convenience, overall satisfaction, each range: 0–100; total score with a maximum of 400 points)
van den Reek et al[38] (the Netherlands)	To investigate satisfaction with medication, as measured by the TSQM, for biological therapies in daily practice psoriasis care in the first 6 months of treatment	Prospective	n=106 patients 58.5% male; mean age 48.2 (SD: 12.3) years 54% of them were biologics-naïve; 46% without biological treatment in the past	46% adalimumab 32% etanercept 22% ustekinumab	TSQM version II: 11 items: 7-point Likert-type scale: 1= extremely dissatisfied; 7= extremely satisfied; range: 0–100)
Christophers et al[40] (France, Germany, Italy, Spain and UK)	To compare clinical improvement and treatment satisfaction with biologic versus other therapies	Cross-sectional	n=379 dermatologists and 2,151 patients with current therapy for at least 12 weeks	21% topical 31% phototherapy 32% conventional systemic 16% biologic	Ad hoc question (not applicable, completely dissatisfied, moderately dissatisfied, slightly satisfied, highly satisfied, completely satisfied)
Ragnarson Tennvall et al[37] (Sweden, Denmark, Finland)	To examine HRQoL and treatment satisfaction	Retrospective	n=404 patients 64% male; mean age 51 years (range: 19–77); mean time since diagnosis: 20 years (range 1–71)	46% topical 36% systemic 18% biological	Ad hoc question (0= not at all satisfied; 10= very satisfied)
Van Cranenburgh et al[36] (the Netherlands)	To determine patient satisfaction with their current treatment and its predictors To establish the importance of specific domains of satisfaction	Cross-sectional	n=1,200 patients 53.7% male; mean age 55.9 years (SD: 12.3); mean disease severity (1–5): 2.5 (SD: 1.1); mean time since diagnosis: 28.8 years (SD: 15.4): 55.6% patients with visible psoriasis; 56.5% treatment-naïve patients	46.4% topical 5.9% phototherapy 31.3% conventional systemic 16.3% biologic	Study-specific questionnaire (5 items: global satisfaction, effectiveness, safety, convenience, information; 5-point Likert-type scale: 1= not satisfied at all; 5= very satisfied; range: 5–25)
Ribera et al[41] (Spain)	To design and assess the validity, reliability, and sensibility to change of the SSWTPQ for use in patients with moderate-to-severe psoriasis	Prospective	n=423 patients 61.9% male; mean age 45.9 years (SD: 13.9, mean PASI 21.4 (SD: 9.2)	57% topical 20.3% systemic + topic	SSWTPQ: 12 items scored on 5-point Likert scale with scores from 0 (very satisfied) to 5 (very unsatisfied) with a total score of 0 to 48
Schäfer et al[39] (Germany)	To analyze correlation between PROs and PASI	Prospective	n=93 patients 62.4% male; mean age 49.3 years (SD: 14.1); mean PASI 13.7 (SD: 9.5) The mean period of treatment and observation was 42.5 days (SD: 17)	NS	Study-specific questionnaire (8 items; 1= completely; 4= not at all)

Abbreviations: PASI, Psoriasis Area and Severity Index; PROs, patient-reported outcomes; TSQM, Treatment Satisfaction Questionnaire for Medication; SSWTPQ, Spanish Satisfaction with Treatment of Psoriasis Questionnaire; NS, not specified; HRQoL, health-related quality of life; SD, standard deviation.

to 36.4% of patients with lower clinical treatment success (PASI <50). In relation to satisfaction with the condition of their skin after therapy, 84.6% of patients who achieved PASI 75 were completely or predominantly satisfied; this proportion was reduced to 43.7% and 36.4% in the PASI

50 and PASI <50 groups, respectively. Christophers et al[40] observed that the percent of PASI reduction in patients with severe psoriasis who received biologic therapy was significantly greater than in patients who received topical therapy, phototherapy or traditional systemic therapy (79% vs 55%,

47%, 69%, $P<0.001$). Thus, a reduction in PASI contributed to an increase in treatment satisfaction. More patients receiving biologic therapy were satisfied (highly or completely) with their current treatment than patients receiving any other therapy (59% patients receiving biologic therapy vs 50% patients receiving traditional systemic therapy vs 34% patients receiving phototherapy vs 45% patients receiving topical agents only; $P<0.001$).

In line with these results, in a study published by Ribera et al,[41] with the aim of developing a satisfaction questionnaire (Spanish Satisfaction with Treatment of Psoriasis Questionnaire) and assess its validity, reliability and sensitivity to change, patients with severe psoriasis scored higher [(0= highest satisfaction; 48= highest dissatisfaction), 27; SD: 2.6] than patients with moderate psoriasis (22.6; SD: 9.5). These authors described a weak correlation between reduction in PASI score during a 12-month study period and improvement in satisfaction.

In summary, satisfaction studies indicated that patients receiving biologic therapy were more satisfied and their satisfaction was correlated to improvements in clinical features (mainly measured by PASI score).

Patient preferences for therapies in psoriasis

Five publications examined patient preferences for treatment; four of them described the results of a conjoint analysis based on a discrete choice experiment that aimed to analyze the preferences of individuals with moderate or severe psoriasis for outcome and process attributes[42–45] (Table 3). In a study published by Schaarschmidt et al,[42] the attribute regarded as most important was treatment location (where the treatment takes place) (relative importance score [RIS]: 26.76), followed by probability of benefit (RIS: 23.77) and method of delivery (RIS: 23.49). The RISs for all process attributes were higher than for adverse effect (AE)-related attributes, indicating that participants were willing to trade an increased risk of AEs for increased probability and magnitude of therapeutic benefit. Age, disease severity (PASI score) and household income were the only factors that affected preferences. Older participants (≥65 years) found the probability of benefit less important than younger participants ($P=0.005$); patients with intermediate incomes (€1,000–€2,000 per month) granted less importance to treatment delivery method compared with patients with lower income; patients with higher PASI score considered the probability of benefit as less important ($P=0.02$) but the frequency of treatment more important compared with participants

with a lower PASI score ($P=0.04$). Schaarschmidt et al[43] described the impact of treatment experience (satisfaction with current treatment, number of prior visits, disease duration, number of preceding therapies and currently prescribed treatment modalities) on treatment preferences. With regard to disease and treatment duration, participants with longer disease duration attached greater importance to the duration of benefit ($\beta=0.206$, $P=0.018$), whereas participants on oral therapy were more concerned about magnitude of benefit by trend ($\beta=0.218$, $P=0.058$). Participants receiving injectable therapy not only set higher value to probability of benefit (RIS =32.80 vs 21.89, $P=0.025$) but also to treatment location (RIS =44.74 vs 23.03, $P=0.011$), delivery method and treatment frequency (RIS =31.24 vs 16.89, $P=0.005$) and duration (RIS =32.54 vs 16.57, $P=0.003$) compared to others.[43] These results suggest that treatment preferences change over the course of time and with treatment experience. Participants on injectable therapy attached great importance to the effectiveness and convenience of treatment and were highly satisfied with it. As reported by Umar et al,[44] prolonged treatments in the inpatient setting (Mean Preference Score [MPS]: −13.48) and those with a lower probability of benefit (MPS: −12.28) were the least preferred while treatments with a high probability of benefit (MPS: 10.51) were most preferred. Patients were more concerned about improvement of their skin condition than about the reversibility or the severity of treatment side effects. Using data from the conjoint analysis, Umar et al[45] published a prospective cohort study which assessed the extent to which matching physicians' treatment recommendations to patients' treatment preferences was associated with improvement in treatment. The results of the study suggested that a closer match between physicians' recommendations and patients' preferences was associated with greater improvement in treatment satisfaction over time in each of the four subscales: effectiveness ($\beta=0.53$, $P<0.001$), side effects ($\beta=0.25$, $P=0.009$), convenience ($\beta=0.78$, $P<0.001$) and global satisfaction ($\beta=0.49$, $P<0.001$).

Finally, Torbica et al[46] conducted a discrete choice experiment on 244 Italian psoriatic patients. Overall, patients preferred the subcutaneous or intravenous route of administration (vs oral administration) and treatments that took less time to show improvement, ensured a longer time free of symptoms, involved a lesser reduction in life expectancy and had lower costs. In general, older patients placed significantly greater importance on reduced life expectancy, whereas time free of symptoms was less important to them than to patients under 60 years of age. Patients with high

Table 3 Characteristics of preferences related studies reviewed

Study	Objective	Design	Demographic and clinical characteristics of sample	Sample treatment	Attributes/levels
Schaarschmidt et al[42] (Germany)	To analyze the preferences of individuals with moderate or severe psoriasis for outcome attributes (treatment location, frequency, duration, delivery method and individual cost) of psoriasis treatment	Conjoint analysis based on a discrete choice experiment	n=163 patients 58.9% male; mean age 49.3 years (SD: 14.1); mean PASI 5.6 (SD: 5.6), PASI 0–5 (61.3%), PASI 5.1–10 (23.9%), PASI <10 (14.7%)	37.4% topical 14.1% phototherapy 27.6% oral systemic therapy 17.2% injected systemic therapy	Outcome attribute: Probability of benefit (almost 100%; about 80%, about 60%, about 40% reduction); magnitude of benefit (almost 100%, about 75%, about 50%, about 25% reduction in size); duration of benefit (≥1 year, 6–8 months, 3–5 months, 2 weeks after completing treatment); Probability of AEs (almost 100%, about 50%, about 10%, <1%); Reversibility of AEs (almost 100%, about 80%, about 60%, about 40%); AE severity (minor discomfort, moderate discomfort, moderate AEs, severe AEs) Process attribute: location (home, home with follow-up, outpatient, hospital), frequency (1/3 months, 1/2 weeks, 2/week, 2/day); delivery method (topical, oral, injection, UV), duration (5 min, 15–30 min, 1 h, 2 h); cost (€0, additional €50/month; €100/month; €200/month)
Schaarschmidt et al[43] (Germany) Umar et al[44] (Germany)	To assess the impact of treatment experience on treatment preferences To examine the features of psoriasis treatment that are most and least preferred by patients and to identify correlates of these preferences				
Umar et al[45] (Germany)	To assess the extent to which matching physician's treatment recommendations to patient's treatment preferences is associated with improvement in treatment satisfaction	Prospective cohort study based on data from conjoint analysis	n=132 patients, 38.6% women; mean age 50.2 years (SD; 14.2); mean disease duration: 18.3 year (SD: 14.2)	–	TSQM questionnaire
Torbica et al[46] (Italy)	To assess patient preferences for psoriasis treatment features and to investigate the heterogeneity of preferences among patients with different sociodemographic and disease-related characteristics	Conjoint analysis based on a discrete choice experiment	n=243 patients 62.1% male; mean age 48.8 years (SD: 13.9); PASI Grade 0 (0.4%), PASI Grade 1 (4.1%), PASI Grade 2 (86.9%), PASI Grade 3 (8.6%)	84.7% topical 37.5% systemic 38.5% biological	Mode and frequency of therapy administration (oral daily; intravenous monthly; subcutaneous quarterly), time to improvement (1, 3, 6 months); time free of symptoms (2, 4, 6 months); reduced life expectancy (1, 2, 3 months); monthly treatment cost not covered by the NHS (€0, €100, €500)

Abbreviations: PASI, Psoriasis Area and Severity Index; SD, standard deviation; AE, adverse event; UV, ultraviolet; TSQM, Treatment Satisfaction Questionnaire for Medication; NHS, national health system.

DLQI scores placed higher value on time free of symptoms than those with lower DLQI scores.

Data from these studies offer a focus on patients' preferences for psoriasis treatment and suggest that when making decisions about treatment, the heterogeneity of patient's expectations and preferences should be considered in order to identify individualized treatments that would aid in optimizing patient satisfaction and well-being, as well as overall treatment effectiveness.

Discussion

Despite the heterogeneity of the articles selected in terms of patients, treatment and methodology features, the information obtained from the studies included in this review provides an assessment of the challenge of non-adherence in psoriasis, together with an identification of patients' preferences and levels of satisfaction regarding the medications currently approved for the treatment of psoriasis in the EU.

According to the results reported, adherence rates in patients with psoriasis were generally low and were influenced by multiple factors, such as the characteristics of patients and the treatments, treatment effectiveness, patient–physician relationship or patient motivation. However, findings were inconsistent with regard to predictive factors of adherence.

In addition to treatment adherence, this review investigated current knowledge regarding patient preferences and satisfaction with available treatment options for psoriasis. The results highlight that patients receiving biologic treatment were consistently more satisfied compared to those receiving traditional systemic therapies, while patients receiving topical therapies were the least satisfied. Moreover, the positive association between clinical treatment success and satisfaction suggested that the use of effective drugs that provide greater reduction in disease severity (PASI score) may contribute to higher rates of satisfaction.

Several studies conducted outside the EU support these results. Overall satisfaction scores, as measured by the TSQM, obtained in a cross-sectional study of 1,182 moderate-to-severe psoriasis patients conducted by Callis Duffin et al[47] in the US, were highest for patients receiving biologic monotherapies, biologic combinations or phototherapy (83.3), while scores were lowest for those receiving topical therapies only (66.7). Significant correlations were found between overall survival and both PASI ($\rho=-0.36$, $P<0.001$) and DLQI ($\rho=-0.47$, $P<0.001$). Similarly, Finch et al[48] reported that levels of satisfaction with phototherapy and systemic treatments were high; conversely, there were higher levels of dissatisfaction with topical treatments.

Regarding patients' preferences, psoriasis patients attach greater importance to process attributes (treatment location, method of delivery, frequency, duration and cost) than to outcome attributes (probability, magnitude or duration of benefit and AE probability, reversibility or severity) when selecting treatment. Although the probability of benefit was also highly considered, psoriasis patients appear to be willing to accept treatment-related AEs if the process characteristics of psoriasis treatment provide a better fit with their personal and professional life. Treatment preferences may change over time and with treatment experience. Recently, in a study conducted by Kromer et al,[49] the most important attributes in relation to biologic agents for patients with moderate-to severe psoriasis were safety (probability of severe AE) and efficacy (probability of 90% improvement). With regard to efficacy, although a 75% improvement in PASI score (PASI 75) is generally considered the gold standard of treatment efficacy

in the clinical setting in patients with psoriasis,[50] when the advances obtained with biologic therapy are considered, PASI 90 may represent the best meaningful clinical response, particularly in patients with very severe psoriasis.[51]

Additionally, these authors have revealed that preferences vary with sociodemographic characteristics and working status. Of note, men were more concerned about the probability of symptom improvement than women, and women attached greater value to treatment frequency than men. Older participants judged the probability of improvement less important than younger patients but they worried more about severe side effects. Finally, patients with a full-time job gave more value to time until response, treatment location and treatment frequency than non-working patients.[49]

In line with these data, a review that aimed to examine the published evidence regarding patient preferences and satisfaction in rheumatoid arthritis,[52] process attributes, such as vehicle, and treatment location attributes were also very important for patients with rheumatoid arthritis. In addition, when given a choice among various therapeutic options, these patients chose a biologic or combination therapy that included a biologic agent.

The overall results suggested that incorporating patient preferences into treatment decision-making may contribute to improve treatment satisfaction, adherence and thus, clinical outcome.

Possible limitations of this review included the small number of papers retrieved. This may be due to the exclusion of studies published before the introduction of biologic treatments. In addition, there may be relevant papers in languages other than English or Spanish or that are indexed in databases other than those searched, which we did not identify. Nevertheless, as all the studies included European populations, this review reflects the disease characteristics of homogeneous populations in industrialized countries.

Finally, it is important to point out that, although there were differences between study designs, populations, outcome parameters and the treatments compared among the publications included, the information with regard to adherence and PROs in psoriasis that was obtained from our comprehensive search was very robust and valuable in terms of facilitating shared decision-making during the clinical encounter.

Conclusion

The results of this review support the conclusion that adherence rates in patients with psoriasis are suboptimal, highlight the need to improve treatment compliance and

add satisfaction with treatment to enhance the HRQoL for patients with psoriasis. To this end, a better understanding of the factors that motivate and discourage patient participation in treatment is necessary. Patient preferences should be taken into account in the treatment decision-making process in order to improve patients' clinical outcomes by ensuring satisfaction and adherence.

Disclosure

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Supplementary material

Table S1 Search terms and research strategies used in international and Spanish databases

International databases

(psoriasis [MeSH term] NOT psoriatic arthritis) AND (quality of life [MeSH term] OR qol OR health related quality of life OR hrqol OR adherence OR persistence OR compliance OR satisfaction OR preferences OR utility OR cumulative life course impairment OR CLCI)

Spanish databases

(psoriasis) AND (calidad de vida OR calidad de vida relacionada con la salud OR adherencia OR persistencia OR cumplimiento OR satisfacción OR preferencias OR utilidad OR discapacidad acumulada)