Received: 18 July 2023 | Accepted: 15 September 2023

DOI: 10.1111/jdv.19530

JEADV JOURNAL OF THE EUROPEAN ACADEMY OF DERMATOLOGY & VENEREOLOGY

SYSTEMATIC REVIEW

# Health-related quality of life in patients with generalized pustular psoriasis: A systematic literature review

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**Funding information**
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**Abstract**

Generalized pustular psoriasis (GPP) is a rare, chronic, neutrophilic inflammatory skin disease characterized by episodes of widespread eruption of sterile, macroscopic pustules that can be accompanied by systemic inflammation and symptoms. A systematic literature review and narrative synthesis were conducted to determine the impact of GPP on patients' health-related quality of life (HRQoL) and patient-reported severity of symptoms and to compare its impact to patients with plaque psoriasis (plaque PsO). Searches were undertaken in Embase, MEDLINE and the Cochrane Library from 1 January 2002 to 15 September 2022. Screening was carried out by two reviewers independently. Outcome measures included generic (e.g. EQ-5D, SF-36) and dermatology-specific (e.g. DLQI) clinical outcome assessments, and other relevant patient-reported outcome measures (PROMs) (e.g. severity of pain measured by a numerical rating scale). Overall, 20 studies were found to be eligible for inclusion, of which seven also had data for plaque PsO. The DLQI was the most frequently reported outcome measure (16 out of 20 studies). When reported, mean DLQI (SD) scores varied from 5.7 (1.2) to 15.8 (9.6) across the studies, indicating a moderate to very large effect on HRQoL; the wide range of scores and large SDs were explained by the small population sizes ($n \leq 12$ for all studies except two). Similar ranges and large SDs were also observed for other measures within individual studies. However, in general, people with GPP reported a greater impact of their skin condition on HRQoL, when compared to people with plaque PsO (i.e. higher DLQI scores) and higher severity for itch, pain and fatigue. This systematic review highlighted the need for studies with a larger population size, a better understanding of the impact of cutaneous and extracutaneous symptoms and comorbidities on HRQoL during and between GPP flares, and outcome measures specifically tailored to the unique symptoms and the natural course/history of GPP.

## INTRODUCTION

Generalized pustular psoriasis (GPP) is a rare chronic, neutrophilic inflammatory skin disease characterized by episodes of widespread eruption of sterile, macroscopic pustules that can occur with or without systemic inflammation and symptoms. GPP has achieved orphan designation in many countries and is associated with a significant patient burden (Figure 1).[1] It predominantly affects adults and appears to be more common in Asian countries, although variation in the data sources and diagnostic criteria used may hinder firm conclusions about prevalence.[2,3] People with GPP experience recurrent flares of widespread erythema and extensive, macroscopically visible aseptic pustules causing pain, itching and burning.[1] Systemic symptoms of fever, malaise and fatigue

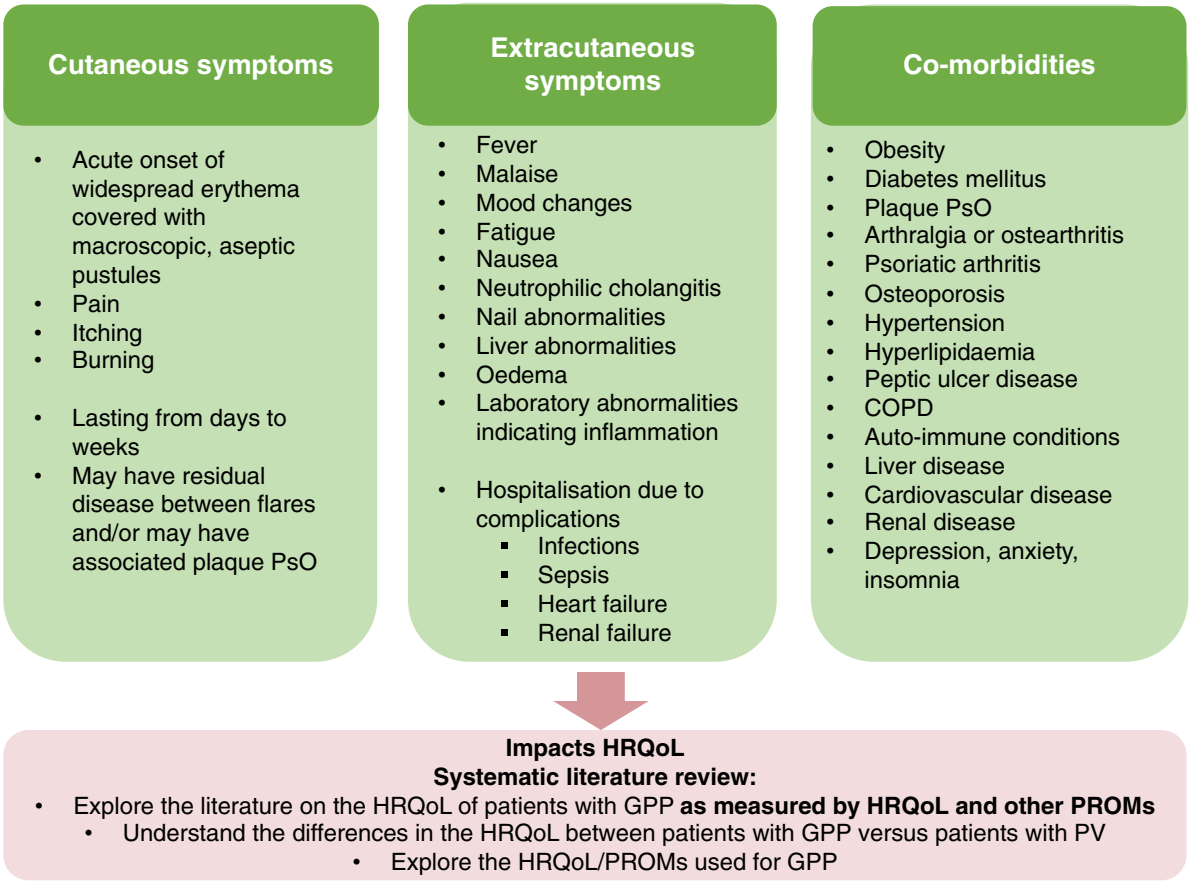


**FIGURE 1** GPP: a severe autoinflammatory disease with a high clinical burden that impacts HRQoL measures and other PROMs. Adapted from Puig 2023,[1] Prinz 2023,[3] Bachelez 2022,[17] Crowley 2021,[10] Hanna 2021,[11] Lebwohl 2022,[20] Morita 2021.[12] COPD, chronic obstructive pulmonary disease; GPP, generalized pustular psoriasis; HRQoL, health-related quality of life; plaque PsO, plaque psoriasis; PROM, patient-reported outcome measure.

typically also occur, and laboratory tests may show raised C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), indicating high levels of systemic inflammation.[1] The flares can last for weeks, during which time the pustules can merge to form a 'lake of pus'.[1]

The clinical course of GPP is highly variable: patients may experience multiple flares per year or only a flare every few years,[1,4,5] and each flare can differ in severity of cutaneous and extracutaneous symptoms.[1,4] Flares can occur de novo or be caused by different triggers including withdrawal of systemic steroids, infections, stress and pregnancy.[1,4,6,7] If left untreated, serious complications can arise such as infection and sepsis, resulting in hospitalisation and even death, most commonly due to septic shock or cardiac or renal failure.[3,8] Common comorbidities associated with GPP include arthralgia, arthritis, psoriatic arthritis, metabolic and cardiovascular conditions such as obesity, diabetes, hyperlipidaemia, hypertension and cardiovascular disease, as well as hepatic and renal abnormalities (Figure 1).[9–16]

A proportion of people with GPP (~31%–78%[4]) have a history of plaque psoriasis (plaque PsO), the most common form of psoriasis. As our understanding of the clinical course, treatment response and genetic and molecular mechanisms involved in the pathogenesis of GPP and plaque PsO has improved, it has become apparent that these two conditions are distinct clinical entities.[17] Although GPP has specific clinical and genetic characteristics, most of the treatments currently used were originally developed for plaque PsO. These treatments are often used off-label, and limited progress has been made in developing specific treatments for GPP, which can be partially explained by its low prevalence and rare disease status.[6,18]

Due to its symptom burden and severity, associated co-morbidities and scarcity of tailored treatments, GPP can have a profound impact on the person's health-related quality of life (HRQoL). Recent studies have shown that GPP can affect the physical, psychological and social functioning and well-being of patients,[19–21] and that the burden of symptoms may be greater than in patients with plaque PsO.[20] Understanding the disease burden of underlying GPP and its impact on HRQoL can help to identify unmet needs and potentially identify gaps in patient care and clinical treatments. Moreover, it is important to determine in what way the severity of symptoms and HRQoL differ from those with plaque PsO, so that care can be tailored to the patients' specific needs. Finally, it is essential to determine the best methods to measure HRQoL accurately and reliably in this

patient population. To date there have been no systematic literature reviews (SLRs) on the HRQoL of people with GPP.

An SLR was conducted to identify the available evidence on the HRQoL and patient-reported severity of symptoms (e.g. pain, itch and fatigue) in people with GPP as measured by clinical outcome assessments (COAs) such as dermatology-specific COAs (e.g. DLQI), generic COAs commonly used in dermatology (e.g. EQ-5D and SF-36) and other relevant PROMs (e.g. pain, itch or fatigue as measured by a numerical rating scale). The objectives of this SLR were (i) to investigate the HRQoL and severity of symptoms of people with GPP, (ii) to understand the differences in the HRQoL versus people with plaque PsO and (iii) to explore which measures have been used to assess HRQoL in people with GPP. Studies that assessed GPP in terms of HRQoL and patient-reported severity of symptoms, as well as studies that compared GPP to plaque PsO, were identified and synthesized.

# METHODS

## Search strategy and eligibility criteria

The SLR was conducted according to Cochrane's methods[22] and is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Appendices S2 and S3).[23] The following databases were searched from 1 January 2002 to 15 September 2022: Embase via Ovid, MEDLINE (Ovid MEDLINE and Epub Ahead of Print, In-Process, In-Data-Review and Other Non-Indexed Citations) and the Cochrane Library including the Cochrane Central Register of Controlled Trials (CENTRAL) and the Cochrane Database of Systematic Reviews (CDSR). The detailed search strategies for each database are presented in Appendix S1. In addition, conference proceedings from the following disease-specific congresses were searched for the years 2020 to September 2022 (excluding those indexed by Embase): the American Academy of Dermatology (AAD), the European Academy of Dermatology and Venereology (EADV) and the International Congress on Research of Rare and Orphan Diseases, RE(ACT).

The full eligibility criteria based on the PICOS approach (population, intervention, comparator, outcomes and study design) are presented in Table 1. Briefly, we included articles published in English from January 2002 to September 2022 reporting on the HRQoL and patient-reported severity of symptoms of people with GPP (general GPP, acute GPP/Von Zumbusch or infantile/juvenile pustular psoriasis). Studies reporting on people with pregnancy induced GPP (impetigo herpetiformis) were excluded as it may not be feasible to disentangle the impact of GPP and pregnancy on HRQoL, thus hindering generalisations to other populations. Similarly, while clinical trials of interventions were included, only baseline values were considered in order to gain information on the HRQoL of people with GPP in general, as opposed to in response to specific interventions. Case studies and in vitro/in vivo studies were excluded. Relevant literature reviews, consensus summaries and editorials were not eligible for inclusion, but their reference lists were checked to identify additional relevant publications. In addition, the bibliographies of the studies eligible for inclusion in the SLR were also checked for potential additional studies.

## Review process

The results of the electronic searches were downloaded into an EndNote library and duplicates were removed. Two independent reviewers assessed each title and abstract against the eligibility criteria shown in Table 1, and only articles that were clearly not relevant were excluded (primary screening). The full texts of potentially relevant articles were then retrieved, and the reviewers independently examined these to determine final inclusion or exclusion (secondary screening). Discrepancies between the reviewers at each stage were resolved through discussion. An additional 10% of records were randomly quality checked by a third reviewer. For any excluded studies at secondary screening, the reason for exclusion was documented.

## Data extraction and synthesis

A data extraction table was designed to summarize the findings across the studies included in the SLR in a standardized format. Details on the study design, population characteristics and outcomes of interest were extracted. If the study reported both on patients with GPP and patients with plaque PsO, baseline characteristics and outcome data were extracted separately for those two patient groups. Likewise, if the record reported on a trial, data were extracted separately for each arm, if available. Data extraction of included studies was carried out by one reviewer. To ensure consistency and accuracy, a second reviewer performed a quality assessment of all the extracted data. Any discrepancies were resolved by consensus among both reviewers. A narrative synthesis of the data was conducted using text, tables and figures, while no statistical analyses/comparisons (e.g. meta-analyses) could be performed due to the scarcity of data and heterogeneity across studies.

## Quality assessment

The methodological quality of the included studies was assessed during data extraction using the Mixed Methods Appraisal Tool (MMAT).[24,25] This tool provides specific criteria to assess study quality according to its design, with possible scores ranging from zero (no quality criterion satisfied) to five/100% (all quality criteria satisfied). Quality assessment of included studies was carried out by one reviewer. To ensure consistency and accuracy, a second reviewer checked the quality assessment.

**TABLE 1** Study eligibility criteria.

| PICOS | Criteria for inclusion | Criteria for exclusion |
|---|---|---|
| Population | Patients described as having any of the following, both reported alone and in conjunction with data for patients for plaque PsO:<br>• GPP (general GPP or any GPP subtype defined according to any criteria)<br>• Acute GPP (Von Zumbusch)<br>• GPP flare<br>• Infantile/juvenile pustular psoriasis | Subsets of psoriasis patients with:<br>• Non-pustular psoriasis<br>• Localized pustular psoriasis (including palmoplantar pustular psoriasis)<br>• Synovitis-acne-pustulosis-hyperostosis-osteitis syndrome<br>• Erythrodermic plaque psoriasis without pustules or with pustules restricted to psoriatic plaques<br>• Drug-triggered acute generalized exanthematous pustulosis<br>• Impetigo herpetiformis (IH)<br>• Annular or circinate pustular psoriasis<br>• Subcorneal pustular dermatosis (SCPD, Sneddon–Wilkinson disease) |
| Intervention | Any, including no intervention | None |
| Comparators | Any, including no comparator | None |
| Outcomes | Generic HRQoL measures<br>• EQ-5D<br>• SF-36<br>• NHP<br>• SIP<br>• WHOQOL-100<br>• Other (as reported in the eligible studies)<br>Dermatology-specific HRQoL measures<br>• DLQI<br>• Skindex-29/16<br>• Other (as reported in the eligible studies)<br>Additional PROMs of interest<br>• Pain NRS<br>• Anxiety NRS<br>• Itch NRS<br>• PSS<br>• Other (as reported)<br>Broader HRQoL concepts<br>• Patient-relevant HRQoL aspects<br>• Clinically relevant HRQoL aspects[a]<br>• Content validity of PROMs<br>• MCID values for PROMs | • Studies that do not include HRQoL evidence<br>• Studies that do not report an outcome of interest |
| Study types | • Clinical trials<br>• Registry/database/claims data analyses<br>• Observational studies | • Case studies<br>• Case reports<br>• In vitro/in vivo studies<br>• Literature reviews[b]<br>• Consensus summaries[b]<br>• Narrative reviews[b]<br>• Editorials[b] |
| Language | • Studies reported in English | • Studies reported in languages other than English |
| Time | • 2002 to current | • Published prior to 2002 |

Abbreviations: DLQI, Dermatology Life Quality Index; EQ-5D, EuroQol-5 Dimension; GPP, generalized pustular psoriasis; HRQoL, health-related quality of life; MCID, minimal clinically important difference; NHP, Nottingham Health Profile; NRS, Numeric Rating Scale; plaque PsO, plaque psoriasis; PSS, Psoriasis Symptom Scale; SF-36, 36-item short form survey; SIP, Sickness Impact Profile; WHOQOL-100, World Health Organization Quality of Life 100.

[a]Studies that only reported clinician-rated efficacy measures were not eligible for inclusion.

[b]Relevant literature and narrative reviews, consensus summaries and editorials were ordered and reviewed, to identify any additional relevant publications.

# RESULTS

## Literature search

The results of the searches are presented in the PRISMA flow diagram in Figure 2. In total, 361 records were identified through electronic searches. After the removal of duplicates, a total of 266 records were assessed for inclusion based on their titles and abstracts. Following title and abstract review, 198 records were excluded, and the remaining 68 articles were assessed for eligibility at the full-text review stage. A total of 40 full-text articles were excluded during this stage. Of the remaining 28 records, five records referred to ongoing trials with no available data when the searches were conducted. Supplementary searches of conferences, bibliographic searches and backward chaining of clinical

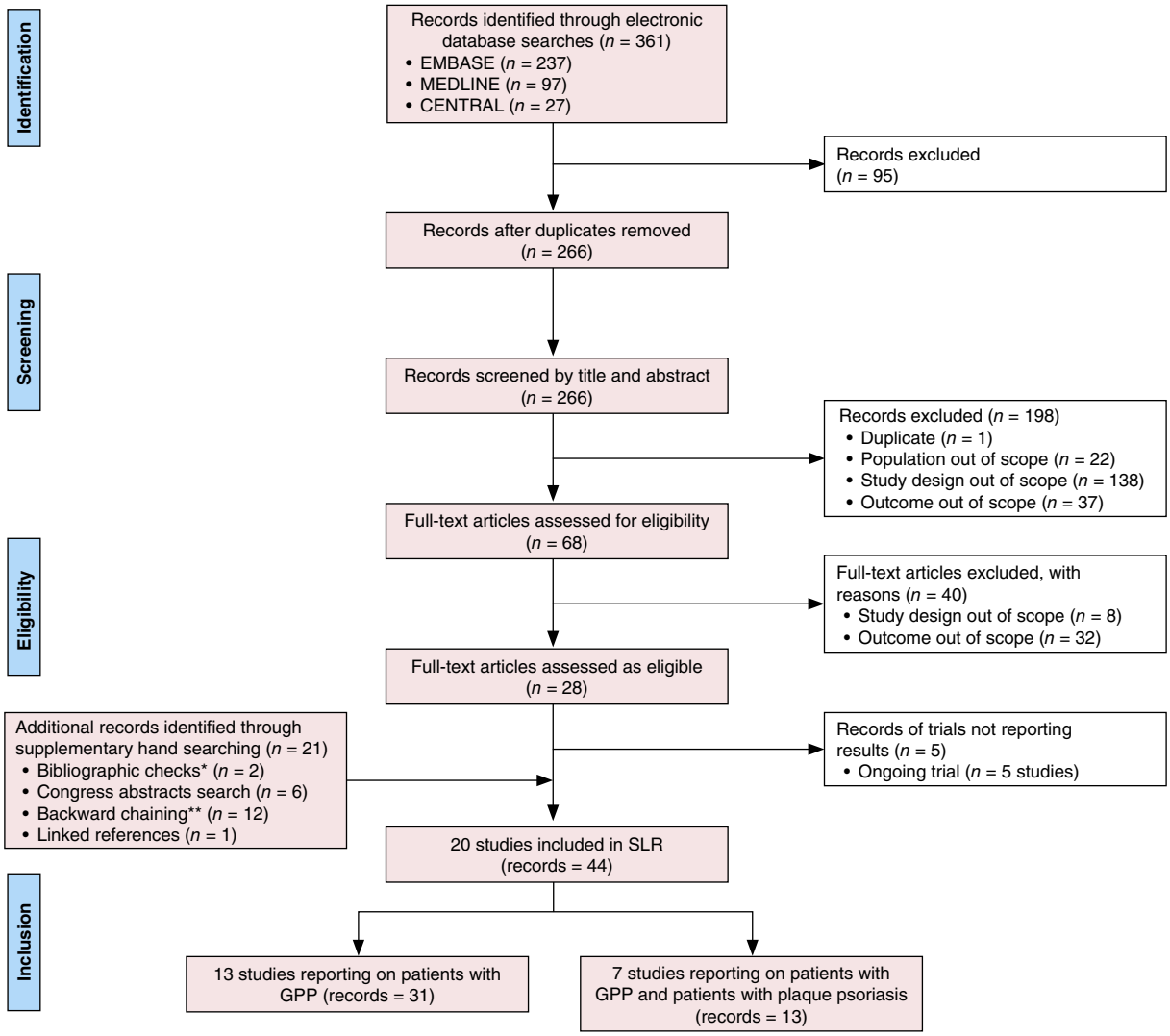


**FIGURE 2** PRISMA flow diagram. *Publications reporting SLRs and NMAs were used for bibliographic checks, then excluded. **Backward chaining involved searching provided clinical trial registry numbers, to identify trial protocols and statistical analysis plans. GPP, generalized pustular psoriasis; SLR, systematic literature review.

trial registry numbers to identify trial protocols and statistical analysis plans identified 21 additional records. In total 44 records that reported on 20 studies met the eligibility criteria and were retained for data extraction. A list of the full 44 records is provided in Appendix S1. Of those 20 studies, seven reported data for people with GPP and people with plaque PsO.

## Study and population characteristics and quality assessment

The studies varied in their study design, geographical location, population size, patient characteristics including disease duration, and the number and type of HRQoL/PROMs used (Table 2, Table S1 and Figure 3). Only four studies, which are described below, had a primary aim of evaluating HRQoL in people with GPP with data reported in sufficient detail.[19–21,26] Of the remaining studies, 11 were clinical trials which evaluated HRQoL as a secondary endpoint and included baseline data,[27–37] and the remaining were observational studies.[7,9,26,38–40] The 20 included studies reported on sample sizes ranging from 3[30,34] to 156 participants with GPP.[7] Nine studies had a population size of up to 10 patients. Over half of the studies (12 out of 20),[7,9,20,28,30–33,35–37,40] reported disease severity for patients with GPP (Table S2). The majority of the studies were clinical trials with the aim of understanding the impact of the intervention on the HRQoL of those with active flares. Many of the other studies recruited patients who were seeking treatment at dermatology clinics or hospitals.

Studies reporting HRQoL data for patients with GPP varied in the proportion of MMAT quality criteria met. Most studies (12 out of 20) met 60% of quality criteria.[9,20,26,28,31–35,37,39,40] while six studies[7,21,29,30,36,38] met 40% of quality criteria. Two study achieved 100%[19] and 80%[27] of the quality criteria,

**TABLE 2** Overview of included studies.

| Study ID | Country | Study design/setting | *N* | Study date | Dermatology- specific PROMs | Generic HRQoL/ PROMs | Other PROMs |
|---|---|---|---|---|---|---|---|
| Studies reporting on patients with GPP and plaque PsO | | | | | | | |
| Alpsoy 2017[38] | Turkey | Prospective survey study; self-report questionnaires in patients seeking treatment in training and university hospitals | 21 | NR | NR | NR | PISS |
| Duweb 2010[39] | Libya | Prospective survey study<br>Patients attending psoriasis clinic and dermatology department of s teaching hospital | NR | August 2007 to May 2008 | DLQI | NR | NR |
| Imafuku 2022[30] | Japan | Non-randomized, single-arm study: Deucravacitinib<br>Patients ≥10% of their skin area covered by pustules | 3 | April 2019 to March 2021 | DLQI | NR | NR |
| Jaworecka 2021[40] | Turkey, Poland | Prospective survey study<br>Dermatology clinics; characteristics of pruritus in various clinical variants of psoriasis in GPP | 11 | NR | DLQI | NR | Pruritus NRS<br>10-PSS |
| Lebwohl 2022[20] | USA | Prospective registry study<br>In collaboration with the National Psoriasis Foundation; patients under the care of a dermatologist | 60 | Data cut-off: January 2020 | DLQI | EQ-5D VAS; EQ-5D-3L | Itch VAS; Fatigue VAS; Pain VAS; PaGA |
| Okubo 2022[34] | Japan | Randomized control trial: Certolizumab Pegol<br>Patients with a diagnosis of GPP | 3 and 4 | February 2017 to November 2018 | DLQI | NR | Itch NRS |
| SPREAD[36] | Japan | Non-randomized, single-arm study: infliximab | 7 | July 2012 to March 2015 | DLQI | NR | NR |
| Studies reporting on patients with GPP only | | | | | | | |
| Burden 2022[19] | USA | Patient interviews; participants recruited from a dermatology clinic and patient advocacy group National Psoriasis Foundation (NPF) | 7 | NR | NR | NR | PSS |
| Choon 2014[9] | Malaysia | Retrospective chart review; Department of Dermatology; mean DLQI assessed when patient was out of acute GPP during the last follow-up | 78 | 1989 to November 2011 | DLQI | NR | NR |
| Effisayil-12021[27] | Global[a] | Randomized control trial: spesolimab vs. placebo<br>Patients who presented with a GPP flare | 35 vs. 18 | January 2019 to September 2020 | DLQI | NR | Pain VAS; PSS; FACIT-Fatigue |
| Gudjonsson 2021[28] | USA, Korea, Poland, UK | Non-randomized, single-arm study: Imsidolimab<br>Patients with active ongoing GPP disease | 8 | January 2019 to January 2021 | DLQI | NR | NR |

**TABLE 2** (Continued)

| Study ID | Country | Study design/setting | *N* | Study date | Dermatology- specific PROMs | Generic HRQoL/ PROMs | Other PROMs |
|---|---|---|---|---|---|---|---|
| Hayama 2021[26] | Japan | Prospective survey study; questionnaire-based study at dermatological training hospitals/ facilities | 83 | First cohort: 2003–2007; second cohort 2016–2019 | NR | SF-36v2 | NR |
| Ikeda 2013[29] | Japan | Non-randomized, single-arm study: depleting the myeloid lineage leukocytes<br>Patients ≥10% of their skin area covered by pustules | 15 | NR | DLQI | NR | NR |
| Kara Polat 2022[7] | Turkey | Longitudinal case series<br>Dermatology departments; Patient with GPP presenting with new attack | 156 | March 2020 to September 2020 | DLQI | NR | PSS-10 |
| Morita 2022[31] | Japan | Non-randomized, single-arm tudy: Ixekizumab<br>Patients with a diagnosis of GPP | 7 | July 2019 to July 2020 | DLQI | NR | Itch NRS |
| Morita 2018[32] | Japan | Non-randomized, single-arm study: Adalimumab<br>Patients with total skin score of 3 or more and erythema with pustules (skin score, ≥1) | 10 | September 2015 to September 2016 | DLQI | SF-36 | NR |
| Reisner 2022[21] | USA | Prospective survey study<br>Targeted recruitment of people diagnosed with GPP from an opt-in market research database | 66 | August 2020 | NR | NR | Patient- reported symptoms associated with flare |
| Sano 2018[35] | Japan | Non-randomized, single-arm study: Guselkumab<br>Patients with a diagnosis of GPP | 10 | January 2015 to December 2015 | DLQI | SF-36 | NR |
| Uncover-J[33] | Japan | Long term extension: ixekizumab<br>Subgroup analysis of patients with GPP | 5 | June 2012 to September 2013 | DLQI | NR | Itch NRS |
| Yamasaki 2017[37] | Japan | Non-randomized, single-arm study: brodalumab<br>Patients with a diagnosis of GPP | 12 | February 2013 to December 2014 | DLQI | SF-36 | PDI |

Abbreviations: 10-PSS, 10-item Pruritus Severity Scale; DLQI, Dermatology Life Quality Index; EQ-5D, EuroQol five-dimension scale questionnaire; EQ-5D-3L, EuroQol-5 Dimensions-3 Level Scores; FACIT-Fatigue, The Functional Assessment of Chronic Illness Therapy – Fatigue Scale; GPP, generalized pustular psoriasis; HRQoL, health-related quality of life; NR, not reported; NRS, Numeric Rating Scale; PaGA, Patient Global Assessment score; PASI, Psoriasis Area Severity Index; PDI, Psoriasis Disability Index; PISS, Psoriasis Internalized Stigma Scale; plaque PsO, plaque psoriasis; PROM, patient-reported outcome measure; PSS, Psoriasis Symptom Scale; PSS-10, Perceived Stress Scale-10; SF-36, 36-Item Short Form Survey; UK, United Kingdom; USA, United States of America; VAS, Visual Analogue Scale.

[a]United States of America (USA), Asia (China, Japan, Korea, Malaysia, Singapore, Tawain, Thailand) Europe (France, Germany, Switzerland), Africa (Tunisia).

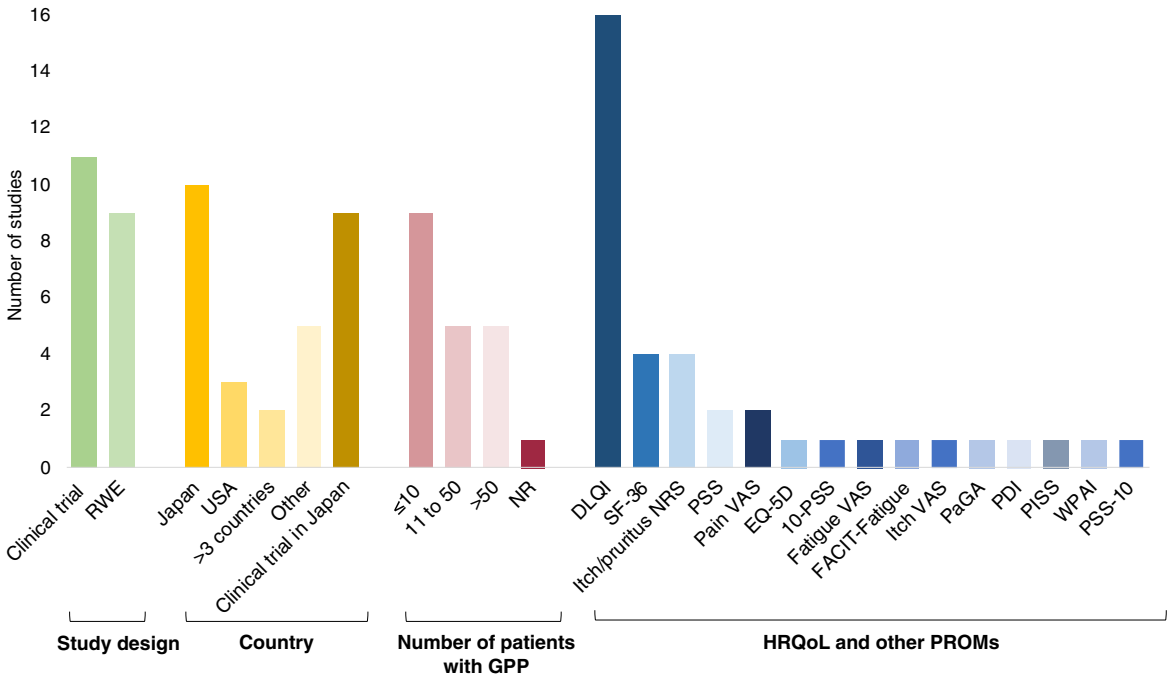


**FIGURE 3** Characteristics of the studies identified in the SLR. 10-PSS, 10-item Pruritus Severity Scale; DLQI, Dermatology Life Quality Index; EQ-5D, EuroQol five-dimension scale questionnaire; FACIT-Fatigue, The Functional Assessment of Chronic Illness Therapy – Fatigue Scale; GPP, generalized pustular psoriasis; HRQoL, health-related quality of life; NR, not reported; NRS, Numeric Rating Scale; PaGA, Patient Global Assessment score; PDI, Psoriasis Disability Index; PISS, Psoriasis Internalized Stigma Scale; PROM, patient-reported outcome measure; PSS, Psoriasis Symptom Scale; PSS-10, Perceived Stress Scale-10; RWE, real-world evidence; SF-36, 36-Item Short Form Survey; USA, United States of America; VAS, Visual Analogue Scale; WPAI, Work Productivity and Activity Impairment Questionnaire.

respectively. It was often the case that not enough information was available to make an informed judgement for the criteria that were not met. Furthermore, as the MMAT employs different criteria based on study design, it is not possible to directly compare the quality of these different studies.

## Overview of the HRQoL results

### Dermatology-specific HRQoL assessments

The Dermatology Life Quality Index (DLQI) was the most used measure of HRQoL (16 studies), and the only dermatology-specific tool used. Most of the studies reporting the DLQI were clinical trials, the majority of which were conducted in Japan, and recruited people with active flares. Overall, 13 studies[7,9,28,31–33,35,37] reported the mean (standard deviation [SD]) scores which varied from 5.7 (1.2)[34] to 15.8 (9.6)[28] (with a maximum score of 30 denoting the most severe impact), whereas three studies reported the median DLQI scores, with median scores ranging between 5.0 and 19.5 (Table 3).[27] Based on the mean DLQI score, there was a moderate to very large effect on HRQoL (in 8 out of 13 and 5 out of 13 studies, respectively). Within each study there was a wide range of scores, as shown by the large SDs and interquartile ranges (IQRs) (Table 3). Of note, most of the studies ($n = 11$) evaluated fewer than 15 people with GPP, with three studies evaluating ≤5 people per study arm; studies with small population sizes are prone to variability with large SDs.

Six studies[20,30,34,36,39,40] reported on the DLQI for both patients with GPP and patients with plaque PsO. Across the five studies[20,30,34,36,40] the mean (SD) values ranged from 5.7 (1.2)[34] to 15.5 (8.1)[40] for GPP, while within the plaque PsO population, scores ranged from 6.5 (6.1)[20] to 11.9 (8.1).[40] In four studies[20,30,36,40] patients with GPP scored higher DLQI values than patients with plaque PsO, reflecting a greater impact on HRQoL due to their skin condition. Disease severity, as measured by % body surface area (BSA) and/or Psoriasis Area Severity Index (PASI), was comparable across GPP and plaque PsO cohorts in three of these studies,[20,30,40] while in the fourth study[36] a higher % BSA, but a similar PASI, were observed in the GPP cohort compared to the plaque PsO cohort. However, due to the small population size of the GPP cohorts compared to the plaque PsO cohorts, no quantitative comparisons between the two groups could be performed.

### Generic HRQoL assessments

Four studies[26,32,35,37] reported on the 36-Item Short Form Survey (SF-36) measure, three of which reported SF-36 as a physical component summary (PCS) and mental component summary (MCS) (Table 4).[32,35,37] The studies, which were

**TABLE 3** Dermatology-specific quality of life measures: DLQI.

| Study ID | Patient population | *N* | DLQI | |
|---|---|---|---|---|
| | | | Mean (SD) | Median (IQR) |
| Studies reporting on patients with GPP and plaque PsO | | | | |
| Duweb 2010[39] | GPP | Unclear[a] | NR (NR) | NR (NR) |
| Imafuku 2022[30] | GPP | 3 | 9.7 (6.4) | NR (NR) |
| | Plaque PsO | 63 | 9.1 (4.5) | NR (NR) |
| Jaworecka 2021[40] | GPP | 11 | 15.5 (8.1) | NR (NR) |
| | Plaque PsO | 45 | 11.9 (8.1) | NR (NR) |
| Lebwohl 2022[20] | GPP | NR | 7.8 (6.8) | 5 (2.0–14.0) |
| | Plaque PsO | NR | 6.5 (6.1) | 5 (2.0–10.0) |
| Okubo 2022[34] | GPP | 3 | 5.7 (1.2) | NR (NR) |
| | GPP | 4 | 11.0 (8.0) | NR (NR) |
| | Plaque PsO | 26 | 10.5 (7.2) | NR (NR) |
| | Plaque PsO | 53 | 9.2 (7.4) | NR (NR) |
| | Plaque PsO | 48 | 10.5 (6.6) | NR (NR) |
| SPREAD[36] | GPP | 7 | 12.7 (7.4) | NR (NR) |
| | Plaque PsO | 31 | 7.7 (8.2) | NR (NR) |
| Studies reporting on patients with GPP only | | | | |
| Choon 2014[9] | GPP: Acute GPP (including IH) | 95 | 12.4 (range: 1–28) | NR (NR) |
| Effisayil-12021[27] | GPP: Spesolimab | 35 | NR (NR) | 19.5 (16.0–25.0) |
| | GPP: Placebo | 18 | NR (NR) | 19.5 (14.0–24.0) |
| Gudjonsson 2021[28] | GPP | 8 | 15.8 (9.6) | NR (NR) |
| Ikeda 2013[29] | GPP | 14 | NR (NR) | 16.0 (13.0–21.0)[b] |
| Kara Polat 2022[7c] | GPP | 156 | 11.4 (9.8) | NR (NR) |
| Morita 2022[31] | GPP | 7 | 6.9 (4.0) | NR (NR) |
| Morita 2018[32] | GPP | 10 | 10.8 (5.1) | NR (NR) |
| Sano 2018[35] | GPP | 10 | 10.1 (6.2) | NR (NR) |
| Uncover-J[33] | GPP | 5 | 9.6 (6.5) | NR (NR) |
| Yamasaki 2017[37] | GPP | 12 | 7.9 (5.5) | NR (NR) |

*Note*: The DLQI consists of 10 simple questions asking how much the skin problem has affected the person over the last week in terms of symptoms (1 question), and your daily life in terms of socialising, work, sports and sex life. It is scored out of maximum of 30 as follows: total score of 0–1 equates to no effect on a person's life; 2–5 = a small effect; 6–10 = a moderate effect; 11–20 = a very large effect; 21–30 = extremely large effect.[50]

Abbreviations: DLQI, Dermatology Quality of Life Index; GPP, generalized pustular psoriasis; IH, impetigo herpetiformis; IQR, inter-quartile range; *N*, number of patients analysed; NR, not reported; plaque PsO, plaque psoriasis; SD, standard deviation.

[a]Duweb 2010 only reported a narrative explanation of the DLQI results and stated that all the patients with GPP suffered a large impact in HRQoL because of the condition.

[b]Ikeda 2013 only reported the DLQI score in a boxplot with no numerical labels; this value was extracted using the Grafula software and estimated to be 16.0.

[c]Mixed GPP population of eligible and ineligible GPP subgroups. Acute GPP and infantile/juvenile GPP formed 70% of the overall GPP population.

all clinical trials, reported that patients with GPP achieved scores <50 for both PCS and MCS, and that on average PCS scores were lower than MCS scores. None of the studies reported comparative SF-36 data for patients with GPP and people with plaque PsO.

## Other PRO measures

The severity of the symptoms of itch, pain and fatigue were assessed using a variety of tools (Table 4). The severity of itch using PROMs was assessed in six studies (three clinical trials and three observational studies [*N* = 3–60 across studies]).[19,20,31,33,34,40] One study which used itch VAS reported a mean (SD) value of 47.7 (36.8) out of 100 (most severe itch)[20]; four studies used itch NRS/pruritus NRS (mean [SD] varied from 3.5 [3.1] to 7.2 [2.4] out of 10 [most severe])[31,33,34,40]; one study used the 10-item Pruritus Severity Scale,[40] and one study assessed itch as part of the Psoriasis Symptom Score (PSS).[19] Jaworecka 2021 reported that the intensity of pruritus was correlated with worse HRQoL in the group of all psoriatic patients, but the correlation was not observed in the group of GPP patients ($n = 11$), probably because of the small patient number.[40]

The severity of pain using PROMs was assessed in three studies (one clinical trial and two observational studies

**TABLE 4** Results of the HRQoL evaluations using generic HRQoL/PROMs and patient-reported symptom severity.

| | | | | |
|---|---|---|---|---|
| **Generic HRQoL/PROMs** | | | | |
| SF-36 | Physical component summary (PCS) and mental component summary (MCS) score (composite of 4 domains each)<br>Scored from 0 [worst HRQoL] to 100 [best HRQoL] | Morita 2018 (SF-36v2)<br>Mean (SD) ($n=10$)<br>PCS: 36.0 (12.2)<br>MCS: 43.8 (9.5) | Sano 2018 (version NR)<br>Mean (SD) ($n=10$)<br>PCS: 38.6 (18.5)<br>MCS: 40.6 (12.7) | Yamasaki 2017 (version NR)<br>Mean (SD) ($n=12$)<br>PCS: 45.2 (14.6)<br>MCS: 48.6 (10.0) |
| EQ-5D VAS | Scored from 0 [worst HRQoL] to 100 [best HRQoL] | Lebwohl 2022<br>GPP ($n=60$) vs. plaque PsO ($n=4877$)<br>Mean (SD): 63.4 (23.8) vs. 73.9 (20.9)<br>Median (IQR): 70 (50.0–85.0) vs. 80 (65.0–90.0) | | |
| EQ-5D-3L | *N* (%) of people who have experienced problems | Lebwohl 2022<br>GPP ($n=60$) vs. plaque PsO ($n=4833$)<br>Walking: 21 (35.0) vs. 1106 (22.9)<br>Self-care: 13 (21.7) vs. 289 (6.0)<br>Usual activities: 26 (43.3) vs. 1252 (25.9)<br>Pain and discomfort: 42 (70.0) vs. 2298 (47.5)<br>Anxiety and depression: 23 (38.3) vs. 1245 (25.8) | | |
| **Patient-reported symptom severity: Itch/pruritus, pain, fatigue measures and other PROMs** | | | | |
| Itch NRS/Pruritus NRS | 0 (no itch) to 10 (worst imaginable itch) | Uncover-J<br>Mean (SD) ($n=5$): 7.2 (2.4) | Jaworecka 2021<br>GPP ($n=11$) vs. plaque PsO ($n=45$)<br>Mean (SD): 3.5 (3.1) vs. 4.2 (2.9) | Morita 2022<br>Mean (SD) ($n=7$): 4.3 (2.7) |
| Itch VAS | 0 (no itch) to 100 (worst imaginable itch) or<br>0 (no itch) to 10 (worst imaginable itch) | Lebwohl 2022<br>GPP ($n=60$) vs. plaque PsO ($n=4887$)<br>Mean (SD): 47.7 (36.8) vs. 35.4 (34.3)<br>Median (IQR): 59 (10.0–85.0) vs. 22 (5.0–70.0) | | Okubo 2022<br>Mean (SD)<br>GPP CZP 400 ($n=3$): 6.3 (2.9)<br>GPP CZP 200 ($n=4$): 4.3 (3)<br>Plaque PsO Placebo ($n=26$): 6.1 (2.5)<br>Plaque PsO CZP 400 ($n=53$): 5.7 (2.6)<br>Plaque PsO CZP 200 ($n=48$): 5.6 (2.4) |
| 10-PSS | 10-item Pruritus Severity Scale (PSS)<br>0 (no itch) to 20 (worst imaginable itch) | Jaworecka 2021<br>GPP ($n=11$) vs. plaque PsO ($n=45$)<br>Mean (SD): 8.6 (5.7) vs. 9.7 (4.4) | | |
| PSS | Psoriasis Symptom Scale (PSS)<br>Patient-reported psoriasis symptoms across 4 items assessing severity of pain, itch, redness, and burning during the past 24 h using a five-point severity scale as follows:<br>0 = none, 1 = mild, 2 = moderate, 3 = severe, 4 = very severe.<br>The PSS total score is a sum of all scores from 0 to 16; higher score indicates greater severity | Burden 2022<br>Mean values ($n=7$)<br>PSS total: 4.43<br>Itch: 1.43 (*n*: none, mild, moderate, severe, very severe = 2, 2, 1, 2, 0)<br>Redness: 1.14 (*n*: none, mild, moderate, severe, very severe = 2, 3, 1, 1, 0)<br>Pain: 1 (*n*: none, mild, moderate, severe, very severe = 3, 2, 1, 1, 0)<br>Burning: 0.86 (*n*; none, mild, moderate, severe, very severe = 3, 3, 0, 1, 0) | | Effisayil-12021<br>Median baseline value for total PSS (IQR):<br>Spesolimab group ($n=35$): 11 (9–12)<br>Placebo group ($n=18$): 10.5 (9–11) |
| PSS-10 | Perceived Stress Scale (PSS)-10<br>PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way.<br>0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often.<br>The PSS total score is a sum of all scores from 0 to 40; higher score indicates higher levels of perceived stress | Kara Polat 2022<br>Mean (SD) ($n=156$): 19.3 (7.8) | | |

**TABLE 4** (Continued)

| Patient-reported symptom severity: Itch/pruritus, pain, fatigue measures and other PROMs | | | |
|---|---|---|---|
| Pain VAS | 0 (no pain) to 100 (worst imaginable pain) | Lebwohl 2022<br>GPP ($n=60$) vs. plaque PsO ($n=4883$)<br>Mean (SD): 33.1 (34.2) vs. 21.5 (29)<br>Median (IQR): 20 (2.5–62.0) vs. 5 (0.0–35.0) | Effisayil-12021<br>Median (IQR) baseline value:<br>Spesolimab group ($n=35$): 79.8 (70.5–87.8)<br>Placebo group ($n=18$): 70 (50.0–89.4) |
| Fatigue VAS | 0 (no fatigue) to 100 (worst imaginable fatigue) | Lebwohl 2022<br>GPP ($n=60$) vs. plaque PsO ($n=4885$)<br>Mean (SD): 42.6 (31.2) vs. 29.5 (28.4)<br>Median (IQR): 44 (15.0–73.0) vs. 20 (4.0–50.0) | |
| FACIT-Fatigue | A 40-item measure that assesses self-reported fatigue and its impact upon daily activities and function<br>Scores range from 0 to 52; lower scores indicate a greater effect | Effisayil 2021<br>Median (IQR) baseline value:<br>Spesolimab group ($n=35$): 14 (7–28)<br>Placebo group ($n=18$): 18 (6–33) | |
| PaGA | The Patient Global Assessment (PaGA) score measures global disease impact<br>Scores range from 0 to 100; a higher score indicates greater impact | Lebwohl 2022<br>GPP ($n=60$) vs. plaque PsO ($n=4882$)<br>Mean (SD): 45.6 (31.2) vs. 35.9 (30.1)<br>Median (IQR): 50 (15.0–74.0) vs. 30 (10.0–60.0) | |
| Psoriasis disability index (PDI) | Scores range from 0 to 45; higher scores indicate a larger level of disability<br>0 = none, 1–4 = little, 5–9 = moderate, 10–18 = large, >18 = very large | Yamasaki 2017<br>Mean (SD) ($n=12$): 11.2 (8.8) | |
| The Psoriasis Internalized Stigma Scale (PISS) | The PISS is composed of 29 items measuring the internalisation of stigma<br>Scores range from 4 to 91; high score indicates more severe internalized stigma | Alpsoy 2017<br>GPP ($n=17$) vs. plaque PsO ($n=1073$)<br>Mean: 70.6 vs. 59.9 | |
| Work Productivity and Activity Impairment (WPAI) | WPAI outcomes are expressed as impairment percentages, with higher numbers indicating greater impairment and less productivity | Lebwohl 2022<br>GPP ($n=29$–$60$) vs. plaque PsO ($n=2958$–$4849$)<br>Percent work hours missed:<br>Mean (SD): 8.3 (12.9) vs. 3.3 (13.7)<br>Median (IQR): 0.0 (0.0–10.0) vs. 0.0 (0.0–0.0)<br>Percent work impairment:<br>Mean (SD): 28.6 (26.2) vs. 12.5 (21.3)<br>Median (IQR): 24.0 (3.0–50.0) vs. 0.0 (0.0–15.0)<br>Overall percent work hours affected:<br>Mean (SD): 23.6 (23.1) vs. 11.3 (20.0)<br>Median (IQR): 20.0 (0.0–35.0) vs. 0.0 (0.0–13.0)<br>Percent daily activity impairment:<br>Mean (SD): 31.9 (32.9) vs. 17.1 (25.5)<br>Median (IQR): 20.0 (0.5–55.0) vs. 3.0 (0.0–25.0) | |

*Note*: Green = baseline values from a clinical study; blue = observational study.

Abbreviations: 10-PSS, 10-item Pruritus Severity Scale; CZP, certolizumab pegol; EQ-5D, EuroQol five-dimension scale questionnaire; EQ-5D-3L, EuroQol-5 Dimensions-3 Level Scores; FACIT-Fatigue, The Functional Assessment of Chronic Illness Therapy – Fatigue Scale; GPP, generalized pustular psoriasis; HRQoL, health-related quality of life; IQR, interquartile range; NRS, Numeric Rating Scale; PaGA, Patient Global Assessment score; PDI, Psoriasis Disability Index; PISS, Psoriasis Internalized Stigma Scale; plaque PsO, plaque psoriasis; PROM, patient-reported outcome measure; PSS, Psoriasis Symptom Scale; PSS-10, Perceived Stress Scale-10; SD, standard deviation; SF-36, 36-Item Short Form Survey; VAS, Visual Analogue Scale; WPAI, Work Productivity and Activity Impairment Questionnaire.

[$n=7$–$60$])[19,20,27]; two studies assessed pain using the pain VAS, with median values (interquartile range [IQR]) from 20 (2.5–62.0) to 79.8 (70.5–87.8) (with 100 denoting the most severe pain).[20,27]

The severity of fatigue using PROMs was assessed in two studies.[20,27] One clinical trial ($n=35$ and 18 for treatment and placebo groups at baseline, respectively) used FACIT-fatigue, with median (IQR) values of 14 (7–28) and 18 (6–33), respectively, out of a possible 52 (greatest severity).[27] One observational study ($n=60$) used the fatigue VAS, with a median (IQR) value of 44 (15.0–73.0) (100 = worst fatigue).[20]

Other PROMs, analysed in only one study for each, included a Patient Global Assessment (PaGA) that measured global disease impact,[20] the Psoriasis Internalized Stigma Scale (PISS),[38] the Perceived Stress Scale-10 (PSS-10),[7] the patient disability index (PDI)[37] and the Work Productivity and Activity Impairment (WPAI)[20] (Table 4).

Overall, there was variation in scores across studies, and also within studies, shown by the SD and the ranges of scores

across the patients. In general, when data for the same measure were available from both clinical trials and observational studies, people enrolled in the clinical trial tended to have more severe symptoms at baseline.

## Studies with HRQoL as a primary aim

In the study by Burden 2022,[19] seven people with GPP recruited from a dermatology clinic or patient advocacy organisation were interviewed about their symptoms using the PSS. All seven participants reported experiencing pain and redness, and six reported itching, burning and discomfort. 'Moderate' or 'severe' symptoms were reported by two (30%) participants for pain or redness and three (43%) for itching. The daily life of the participants was impacted by these symptoms, with employment duties, household chores, sleep and mobility being frequently affected.

Reisner 2022[21] reported the results of an online survey assessing the symptoms and impact of flares on daily activities. A targeted outreach approach was used to recruit participants with GPP ($n = 66$) via an opt-in market research database in the United States. Participants, all of whom had had at least one flare in the past 12 months, reported that flares were associated with itching (76%), an increase in the size of the affected area (74%), more crusts (67%) or pustules (62%) and/or fatigue (42%). Common symptoms were changes in mood, pain and fever, with changes in mood and pain being the most burdensome. Emotional distress, fear and anxiety and feelings of hopelessness and depression were reported by most respondents. Flares highly impacted everyday activities including the ability to exercise, be intimate, wear shoes and socialise. Up to one quarter of respondents also reported that even when under control, GPP still had an impact on their daily living, mainly concerning being intimate with their partners, exercising, attending important life events or wearing shoes.

Hayama 2021[26] compared the individual components of the SF-36v2 (physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health) for two cohorts of patients with GPP populations in Japan, with the goal of understanding whether there were temporal trends for HRQoL (2003–2007, $n = 105$; 2016–2019, $n = 83$). The most recent cohort of patients with GPP achieved higher T-scores than the past cohort, and for some subscales, namely general health and vitality, the improvement was found to be substantial. The authors reported that although these results suggest that HRQoL of patients with GPP is still impacted when compared with the general population, areas of improvement over the time interval were found.

Using data from the CorEvitas Psoriasis Registry, a US-based multicentre prospective registry which collects comprehensive real-world clinical data of people with psoriasis, Lebwohl 2022[20] compared PROM scores of people with GPP ($n = 60$) versus those with plaque PsO ($n = 4894$). As shown in Tables 3 and 4, people with GPP reported a greater impact on their HRQoL compared to plaque PsO across a range of measures. Despite presenting with comparable disease severity (as measured by % BSA and PASI, Table S2), people with GPP reported higher levels of symptom severity for itch, pain and fatigue (VAS scores), and worse global disease impact as assessed by a PaGA. People with GPP achieved lower mean values on the EQ-5D VAS, when compared to patients with plaque PsO (mean [SD]: 63.4 [23.8] vs. 73.9 [20.9], respectively; scored from 0 [worst imaginable health state] to 100 [best imaginable health state]). Similarly, a higher proportion of people with GPP reported anxiety and depression, pain and discomfort and had greater difficulty with self-care, usual activities and walking than their plaque PsO counterparts, as measured by the EQ-5D-3L individual items. Most significantly, 70% (42 out of 60) of people with GPP suffered pain and discomfort while in the plaque PsO group, 47.5% (2298 out of 4833) reported pain and discomfort. The study also reported that people with GPP had a greater comorbidity burden, with higher rates of a history of hypertension (46.7% vs. 36.8%), asthma (11.7% vs. 5.8%), clinician-reported anxiety (28.3% vs. 17.1%) and clinician-reported depression (31.7% vs. 17.1%).

# DISCUSSION

This is the first SLR to comprehensively explore the literature with the aim of investigating the HRQoL of people with GPP, comparing this with the HRQoL of people with plaque PsO, and exploring which measures have been used for GPP to date. Our findings, garnered from 20 studies including seven studies that reported data for both people with GPP and people with plaque PsO, are discussed below in relation to each objective.

## Investigating the HRQoL and severity of symptoms in people with GPP

Gathering meaningful data on the HRQoL of people with rare diseases is especially challenging,[41–43] and GPP is no exception. Many of the studies identified in this SLR had limitations, including a very small population size and reporting limited data of interest, as they had not been designed with the specific goal of measuring HRQoL in people with GPP. In fact, only four studies that had a primary aim of describing the HRQoL in GPP were identified, all of which have been published since 2021. In addition, there was a lack of tools that are specifically tailored to the unique symptoms of GPP, and the impact of extracutaneous symptoms, comorbidities and hospitalisations on HRQoL was not reported. Moreover, some studies did not mention whether patients were experiencing a flare when HRQoL was measured. Despite these limitations, the available evidence shows that people with GPP experience

burdensome symptoms that impact their daily lives and HRQoL.

Our findings add to the results from a recent narrative review which also sought to determine the HRQoL in people with GPP.[44] The review, which identified 12 studies via a PubMed keyword search, also concluded that while there is a paucity of studies, the existing evidence shows that people with GPP experience a substantial impact on their HRQoL. Overall, further studies, perhaps recruiting people with GPP globally with the help of patient advocacy groups, with a larger population and extensive clinical data might allow for more robust data on the impact of the severity of the flares, as well as looking at differences in HRQoL during and between flares and in relation to other possible confounding factors, namely gender, age and socio-economic status.

## Understanding the differences in HRQoL between people with GPP and people with plaque PsO

Compared to people with plaque PsO, people with GPP generally had higher DLQI scores indicating a worse impact on HRQoL. Moreover, Lebwohl 2022 reported that people with GPP experienced more severe pain, itch and fatigue, and a greater impact on their HRQoL.[20] In this study, disease severity measured by % BSA and PASI was comparable in GPP and plaque PsO; however, the two populations were not matched for baseline characteristics, and the results could have been further confounded by the differences in the population sizes, the fact that some people with GPP also had plaque PsO, and that HRQoL was not measured separately for GPP patients experiencing flares.[20] Moreover, PASI is a clinical measure developed for plaque PsO and may not accurately capture the symptomatologic profile of GPP. Of note, disease measures of severity for GPP are now available which consider the severity of pustules, namely the Generalized Pustular Psoriasis Physician Global Assessment (GPPGA) and Generalized Pustular Psoriasis Area and Severity Index (GPPASI).[27,28,45] Future comparisons using disease-specific tools to assess the severity of GPP and plaque PsO may be more meaningful.

Interestingly, studies in the United States and Japan (utilising claims databases) and Sweden (using the Swedish National Patient Register) that have analysed the clinical characteristics and healthcare resource utilisation (HCRU) in people with GPP (*n* ranging between 718 and 1699) compared to plaque PsO (*n* ranging between 2915 and 60,419), have reported that people with GPP had a greater comorbidity burden and greater healthcare resource utilisation, with a higher number and longer duration of hospitalisations leading to a higher economic burden.[10–12,16,46] Comorbidities that were more common in people with GPP included psoriatic arthritis, Type 2 diabetes, chronic obstructive pulmonary disease, asthma, obesity, insomnia, depression and anxiety.[10–12,16] Data from the Swedish National Patient Register indicated that even when excluding GPP cases with concurrent plaque PsO, several comorbidities were significantly more common in those with GPP, including Type 2 diabetes, Crohn's disease, coeliac disease, peptic ulcer disease and stroke.[16] While further studies are needed to confirm these results, it is becoming more evident that people with GPP need healthcare solutions tailored to their own challenges, which may differ from those with plaque PsO.

## Exploring which measures have been used to assess HRQoL

The recently developed clinician-reported outcome assessments GPPGA and GPPASI are useful tools to capture GPP severity from a clinical perspective. However, in addition to clinical measures, there remains a need for GPP-specific measures to evaluate symptoms and HRQoL from a patient perspective. Across the studies identified in this review, the most commonly used PROM was the DLQI, which is a simple questionnaire that evaluates how the skin problem has affected the person's life in terms of symptoms, socialising, work, sports and sex life. Many other HRQoL measures were seldom reported, and none of the measures used have been robustly validated for use in GPP.[19] Indeed, none of the tools were designed specifically to capture the impact of GPP symptoms.

## Implications for clinical practice

The fact that people with GPP have worse HRQoL and a more severe symptom burden than those with plaque PsO adds to the evidence that GPP and plaque PsO are different diseases and that novel treatments specifically for those with GPP are needed.[17,20] Recent analyses show that GPP flares are associated with hospitalisations amidst inadequate treatment.[6–8,12,15,47,48] Of note, a targeted treatment specific for GPP is now available (spesolimab[27]) and another is in development (imsidolimab[28,49]), both of which are interleukin-36 receptor antibodies. In future, it will be important to establish a standardized approach to measuring HRQoL and GPP-specific symptoms so that comparisons can be made across interventions, and across different studies (e.g. clinical trials, real-world studies and from different regions).[45] Furthermore, as described above, GPP-specific PROMs, including measures that consider HRQoL,[45] are required to help capture patient burden and improve patient care.

## Strengths and limitations

The strengths of this SLR are its robust and thorough methodology, which followed Cochrane's methodological expectations, namely independent screening of eligible studies and quality assurance of all data extracted, and its up-to-date

and comprehensive searches. In contrast to the recently published narrative review exploring the HRQoL in people with GPP,[44] multiple databases were systematically searched using comprehensive search terms. In addition to the limitations of the studies as described above, there are a few limitations of the SLR that may affect the generalisability of the results. First, as all search terms were in English language, it is unknown if relevant studies in other languages were missed by the searches. A further limitation is that, while most studies met at least 60% of MMAT quality criteria, only one study met 100% of criteria and this may therefore impact the reliability and generalisability of the results.

## CONCLUSIONS

People with GPP experience a significant clinical burden that negatively impacts on their daily lives and HRQoL. Indeed, the data, albeit limited, show that people with GPP have lower HRQoL levels than people with plaque PsO, further suggesting GPP and plaque PsO are different diseases requiring distinct approaches to their management and treatment. However, this SLR has revealed a paucity of HRQoL data, with several evidence gaps to be addressed in future studies. Measures specifically tailored to the unique symptoms of GPP are needed, together with a better understanding of the impact of cutaneous and extracutaneous symptoms and comorbidities during and between flares. In addition, with the advent of new treatments specifically for people with GPP, further studies will be necessary to establish the effect these have on the patients' HRQoL, especially in a real-world population.

### ACKNOWLEDGEMENTS

Tanisha Hepworth (one of the authors) and Helen Zhang conducted the primary and secondary screening under the direction of the other authors. Daniela Goncalves-Bradley acted as a third reviewer, responsible for quality control of 10% of the records. Editorial assistance in the preparation of the manuscript was provided by Anna Pagotto and Amanda Prowse (Symmetron).

### FUNDING INFORMATION

The study was funded by Boehringer Ingelheim International GmbH, which was involved in design of the literature search, analysis of the search results, manuscript preparation and publication decisions in collaboration with the authors.

### CONFLICT OF INTEREST STATEMENT

S.E.C. received consulting fees from AbbVie, Almirall, Boehringer Ingelheim, Eli Lilly, Janssen, LEO Pharma, Merck Sharp and Dohme, Novartis, Pfizer, Sanofi and UCB; honoraria from AbbVie, Boehringer Ingelheim, Janssen and Novartis; meeting attendance support from AbbVie, Boehringer Ingelheim and Novartis. C.D.C. has served as advisor and/or received speaking fees and/or participated in clinical trials sponsored by Abbvie, Amgen, Beiersdorf, Boehringer Ingelheim, Sanofi, Novartis, Bristol Myers Squibb, Pfizer, Merck Sharp and Dohme, Genentech, Eli Lilly, Coherus, UCB, Merck Healthcare KGaA, Priovant Therapeutics, Janssen and Biogen MA Inc. P.W. received consulting fees from Boehringer Ingelheim; honoraria and meeting attendance support from AbbVie, Amgen GmbH, Almirall, Boehringer-Ingelheim, Bristol Myers Squibb, Celgene, Eli Lilly, Janssen, Leo Pharma, Novartis, Merck Sharp & Dohme, Therakos/Mallinckrodt, Sandoz, Sanofi and UCB. R.K.J and K.I.F. are employees of Boehringer Ingelheim International GmbH. D.C.G and T.H. are employees of Symmetron Limited, which received funding for consulting and medical writing services related to this manuscript from Boehringer Ingelheim. S.R.M. is an employee of Boehringer Ingelheim Pharmaceuticals, Inc. A.B.G. received honoraria as an advisory board member, non-promotional speaker or consultant for: Amgen, AnaptysBio, Avotres Therapeutics, Boehringer Ingelheim, Bristol Myers Squibb, Dice Therapeutics, Eli Lilly, Janssen, Novartis, Pfizer, Sanofi, UCB Pharma, and Xbiotech (stock options for an RA project); research/educational grants from: AnaptysBio, Moonlake Immunotherapeutics, Novartis, Bristol Myers Squibb and UCB; all funds go to the Icahn School of Medicine at Mount Sinai.

### DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Choon SE, De La Cruz C., Wolf P., Jha RK, Fischer KI, Goncalves-Bradley D, et al. Health-related quality of life in patients with generalized pustular psoriasis: A systematic literature review. J Eur Acad Dermatol Venereol. 2024;38:265–280. https://doi.org/10.1111/jdv.19530