Systematic Review of Health-Related Quality of Life in Adolescents with Psoriasis

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Key Words

Psoriasis · Adolescents · Quality of life · Children's Dermatology Life Quality Index · Skindex-Teen

Abstract

Background: Many cases of psoriasis begin in adolescence. The affected adolescents face the combined physical and psychosocial challenges of their disease-free peers with the added complexity of a visible disease. **Objective:** To review the impact of psoriasis on the health-related quality of life (HRQL) in adolescents as compared to their peers with other chronic diseases and to determine the best tools to measure HRQL in this population. **Methods:** A systematic literature review was completed using PubMed. **Results:** 256 publications were screened for inclusion, 37 were relevant to objectives and included in the systematic review. Most studies are pediatric psoriasis studies with an adolescent subgroup, very few are dedicated to solely addressing HRQL in adolescents with psoriasis. Adolescents with psoriasis face both the challenges similar to an adult psoriasis population in addition to the complexities inherent to healthy adolescents. Studies often use a general pediatric HRQL measure, PedsQL 4.0, or a dermatology-specific measure adapted from an adult questionnaire. Only one psoriasis-specific measure-

ment tool exists, and it is specifically for scalp psoriasis. **Conclusion:** Both dermatologists and primary care physicians should treat the visible cutaneous lesions and disease comorbidities and address the psychosocial impact of psoriasis in their adolescent patients. Use of both a general and dermatology-specific HRQL questionnaire may allow physicians to better identify the impact of the disease and recognize improvement or impairment over time.

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Background

Psoriasis is a chronic inflammatory cutaneous disorder that affects 2–3.5% of the overall population [1, 2]. Psoriasis and its treatments have been well studied in adults; however, less is known about the pediatric population. Yet, the pediatric subset of the psoriasis population is important to consider since one third of psoriasis patients have disease onset in childhood [2, 3]. Even fewer studies specifically focus on the adolescent population, defined by the World Health Organization (WHO) as ages 10–19 years, despite the fact that it is a time of increasing prevalence of disease [4]. Studies have found that a majority of psoriasis onset occurs during adolescence

Fig. 1. PRISMA flow diagram for a systematic literature review on HRQL in adolescents with psoriasis.

described as a linear increase throughout childhood or as a peak of onset in the 16- to 22-year-olds [1, 5].

Psoriasis, both chronic and disabling, greatly affects the health-related quality of life (HRQL), which is an assessment of how the role of health affects dimensions of life, usually with a focus on physical, social, psychological, and cognitive functioning. To understand the impact of HRQL on adolescents with psoriasis, one must first understand the challenges of understanding the HRQL of adolescents overall. There are fewer studies looking at this specific population, adolescents are most often grouped in with either children or adults. However, the studies that have subanalyses of adolescents or focus exclusively on adolescents have noted an overall decline in HRQL among adolescents along with a more negative perspective of their HRQL [6–8]. Compared to all other age groups, adolescents have been found to have notable differences in physical maturation, body image, peer relationships, intimacy, sexuality, and autonomy [9].

Examining the impact of psoriasis on the HRQL in adolescents is important since this population may be more affected by the visible nature of their disease based on the combination with their stage of development, which em-

phasizes appearance and peer approval. This systematic review will examine the key differences between the HRQL concerns in the adolescent population with chronic diseases compared to those with psoriasis and the measurement tools commonly utilized to measure HRQL in adolescents with psoriasis.

Methods

For further details, see the supplementary materials (for all online suppl. material, see www.karger.com/doi/10.1159/000450826) (fig. 1).

Results

As described in figure 1, we identified 270 publications from our online database search and 27 studies from references of publications and discussion with other authors. After removing duplicates, 256 studies were screened; of these 176 were excluded due to not addressing psoriasis, including only an adult population or only

addressing the treatment and management of psoriasis. Eighty full-text publications were assessed for eligibility, and 37 were included in the review.

HRQL in Adolescents with Chronic Illness and Psoriasis

Since even healthy adolescents struggle with the psychosocial barriers presented by adolescence alone, it is not surprising that patients with chronic illness may feel an even greater burden and decrease in HRQL. Frisen [9] found that adolescents with chronic illness have an increased risk of academic, social and behavioral difficulties along with adverse effects on family function compared to their healthy peers. Narrowing the scope to chronic skin conditions, Beattie and Lewis-Jones [11] found that psoriasis decreased HRQL (as measured with the Children's Dermatology Life Quality Index, CDLQI) in patients aged 5–16 years. Psoriasis impacted HRQL less than cerebral palsy, renal disease, cystic fibrosis and asthma, but more than epilepsy, enuresis, and diabetes. Psoriasis (30.6% decrease in HRQL) and atopic dermatitis (30.5% decrease in HRQL) were nearly identical for the most detrimental impact on HRQL out of the skin conditions measured (others included urticaria, alopecia, acne and localized eczema) [11]. Manzoni et al. [12] found similar results when sampling 118 children aged 5–16 years using the CDLQI, in that psoriasis and atopic dermatitis had a greater impact on HRQL compared to other chronic skin diseases, such as vitiligo.

Adolescents with psoriasis have even more pronounced effects on self-esteem, sexual intimacy, stigmatization and bullying, family and social relationships compared to their disease-free peers [13–16]. In particular, psoriasis negatively impacts physical activities [13]. This is especially detrimental to an adolescent with psoriasis since they are already at a twofold risk for comorbidities including obesity, diabetes mellitus, hypertension and psychiatric disorders where all patients benefit from increased physical activities [1]. Most of these effects tend to originate from the cutaneous nature of the disease which leads to decreased exercise both to avoid lesions being visible to peers and due to increased pruritus with diaphoresis [13, 16]. The theme of visibility ties in to the effects on self-esteem as well because appearance plays an important role in adolescence with a social and cultural emphasis and pressure for homogeneity. In online focus groups hosted by Fox et al. [16], 48% of adolescent participants ($n = 8$) stated that appearance was the ‘worst’

aspect of psoriasis. The participants felt the ‘most frustrating part’ was the loss of control since psoriatic lesions are unpredictable and episodic in nature. Not surprisingly, the characteristics of the disease impact patients’ willingness to be intimate with significant others and have experiences similar to their healthy peers [16].

Due to the visibility of skin lesions, psoriasis patients risk feeling stigmatized and bullied, especially since bullying during adolescence is commonly related to physical appearance. Unfortunately, there has been little research on its relationship to skin disease, and there are no validated bullying or victimization scales in this population. Most of the data is based on either qualitative studies, such as those from Fox et al. [16] and de Jager et al. [14], or extracted from one question on the validated CDLQI [15, 17]. In the aforementioned online focus group by Fox, one participant expressed that they felt others viewed them as ‘dirty’ due to the lesions [16]. De Jager et al. [14] interviewed 15 pediatric psoriasis patients (mean age 12.8 ± 4.25 years), 65% of whom felt stigmatized due to bullying or name calling. The stigmatization and bullying lead to a decreased perception of social connectivity that impacts family and social relationships [18]. Adolescents with psoriasis have expressed feelings of isolation and being ‘different than others’, with some families even planning vacations that revolved around the adolescent’s comfort and ability to keep lesions concealed [16].

Another unique aspect of the HRQL in adolescents with psoriasis is the increased risk of mental illness, especially depression and anxiety [19]. This is particularly important since depressive episodes at a young age increase the risk of subsequent recurrences and long-term psychiatric disorders [20]. Bilgic et al. [21] performed a case-control study of 48 psoriatic patients and healthy controls aged 8–18 years and found no differences in depression and anxiety in the adolescent group (13–18 years old). This unexpected finding may be explained by a small sample size ($n = 26$) in combination with the fact that patients had only mild psoriasis (average Psoriasis Area and Severity Index, PASI, of 9.75 ± 10.52). Additionally, the scales may not have been sensitive enough or have addressed issues relevant for an adolescent population since all patients were examined by the same questionnaire, the PedsQL (the limitations of which will be described below). In an adult population, studies have shown that pain, itching and visibility of psoriatic plaques may lead to embarrassment, social discomfort and anxiety that ultimately places patients at a higher risk for depression and anxiety with rates of depression and anxiety reported up to 60% in the literature [13, 22, 23].

Table 1. Comparison of the strengths and weaknesses of measurement tools for the HRQL measurement tools of adolescents with psoriasis

HRQL tool	Background	Strengths	Weaknesses
PedsQL 4.0 [24–26]	Current version validated in 2001, modified from 3 previous versions General pediatric HRQL measure Validated in ages 2–18 years 4 core scales: physical, emotional, social, and school function assessed	Different formats for age groups, has a 13- to 18-year-old version Known MID	Not specific to concerns for psoriasis patients Does not address psychosocial factors or pruritus
Children’s Dermatology Life Quality Index [11, 14, 24, 29–39]	Developed in 1995, modified from adult Dermatology Life Quality Index First dermatology-specific HRQL tool in children Validated in ages 4–16 years, 10-item questionnaire	Used in numerous studies Shows consistent and significant improvement in scores with treatment of psoriasis	May not be accurate in ages 16–17 years
Skindex-Teen [31, 40]	Developed in 2008, modified from adult Skindex series First dermatology-specific HRQL tool focused on adolescents Validated in ages 12–17 years 22-item questionnaire broken down to 2 subscales (physical and psychosocial function)	Specific and focused on adolescents Validation study showed strong face validity and test-retest reliability	Not frequently used in the literature
Children’s Scalpdex in Psoriasis [41, 42]	Developed in 2014, modified from adult Scalpdex Tool specific for scalp psoriasis Validated in ages 6–18 years 22-item questionnaire focused on the last 4 weeks in 3 major areas (symptoms, functioning, emotions)	Specific for psoriasis subtype	Only applicable for scalp psoriasis patients Pediatric focus with no adolescent subgrouping Not frequently used in the literature

HRQL = Health-related quality of life; MID = minimal important difference, a measurement of the smallest change in questionnaire points that a patient would identify as clinically important.

HRQL Measurements Used in Adolescents with Psoriasis

General HRQL Measurement Tool: PedsQL

The PedsQL is a general pediatric HRQL measurement tool that has been implemented in pediatric dermatologic studies [24, 25]. The PedsQL has 4 versions; the original version PedsQL 1.0 was designed using a cancer database with the intention to be used generally across pediatric populations. PedsQL 2.0 and 3.0 added extra constructs and items to better measure HRQL and also broadened the age range studied. The current version, PedsQL 4.0 (table 1), was validated in 2001 to include a section to address school function in order to fully address the core health dimensions defined by the WHO. The PedsQL 4.0 is validated for ages 2–18 years and con-

sists of 4 core scales, including physical function (8 items), emotional function (5 items), social function (5 items), and school function (5 items). Each core scale is scored on a 0–4 scale that is linearly transformed to an overall score from 0 to 100. Additionally, there are different formats for subsets of age groups including an adolescent form for ages 13–18 years written in developmentally appropriate language [25].

The PedsQL 4.0 has been used successfully in adolescent psoriasis patients. Varni et al. [26] compared changes in HRQL in 208 patients with moderate-severe plaque psoriasis (mean PASI 18.46; mean affected body surface area 25.16%) to both published data on healthy children and pediatric patients with chronic illnesses (including arthritis, psychiatric disorders, asthma and diabetes). The patients were 4–17 years old, including a sizeable portion

of adolescent patients (64% between 12 and 17 years old). No adolescent subanalysis was performed, but psoriasis patients overall had impaired HRQL compared to the healthy population and published data on diabetes patients. Furthermore, psoriasis patients had similar HRQL compared to arthritis and asthma patients, and better HRQL compared to patients with psychiatric disorders.

While advantageous to compare across diseases, the generality of the PedsQL 4.0 may also be a disadvantage. Langley et al. [24] implemented the PedsQL 4.0 as a general HRQL measure along with the CDLQI (discussed below) in a phase 3 randomized control trial of etanercept in pediatric patients with moderate to severe psoriasis. Interestingly, patients on etanercept who achieved a 75% reduction in PASI scores (PASI 75) at week 12 showed a significant improvement in HRQL as assessed by the CDLQI, but no significant improvement was detected by the PedsQL 4.0 [24]. However, the minimal important difference (a measurement of the smallest change in questionnaire points that a patient would identify as clinically important) for this questionnaire is known to be 4.4. The etanercept group that achieved PASI 75 was the only group to show at least a 4.4-point improvement in PedsQL 4.0 score. Thus, the authors argue that while the improvement in PedsQL 4.0 score in the etanercept group was not statistically significant, it was a clinically important difference using the known minimal important difference. The fact that the dermatology-specific HRQL measurement tool CDLQI did find a statistically significant difference in the HRQL of the two groups raises the concern that the PedsQL 4.0 may not be specific enough to adequately address the concerns of psoriasis patients. For example, the unique characteristics of psoriasis, such as the physical capability of activities that patients do not participate in due to psychosocial factors or the pruritus associated with the disease, are not addressed by the PedsQL 4.0.

Dermatology-Specific HRQL Measurement Tools

The dermatology-specific measurement tools commonly used in adolescent psoriasis populations are all pediatric versions modified from dermatology-specific adult indices. While at least 10 psoriasis-specific measures exist, including the Psoriasis Life Stress Inventory and Psoriasis Disability Index, none are consistently used to measure HRQL [27]. The most commonly used index in the adult psoriasis population is a dermatology-specific questionnaire, the Dermatology Life Quality Index (DLQI) [27]. Other common HRQL indices validated for use in adult psoriasis include the Dermatology-Specific

Quality of Life Index, Dermatology Quality of Life Scale, and Skindex series [28]. The modified versions applicable to adolescents include the CDLQI (modified from the DLQI) and the Skindex-Teen (modified from Skindex-16).

Children's Dermatology Life Quality Index

The CDLQI, modeled after the adult DLQI, was developed in 1995 as the first HRQL assessment tool in children with skin conditions. It consists of 10 items that ask about itchiness, embarrassment, friendship, ability to change clothes, ability to play, ability to play sports, school and holidays, teasing, sleep, and treatment. Each item is scored on a 4-point Likert scale with the overall score ranging from 0 to 30 with a higher score representing greater impairment. The CDLQI has been validated for pediatric skin conditions in ages 4–16 years and has been widely used in over 100 studies including 7 multinational studies with 44 validated translations [29–31]. There is also a cartoon version designed for the youngest age group, which has validated translations in at least 10 languages [30]. The mean CDLQI score in pediatric psoriasis ranges from 5.05 to 10.0 [29].

The CDLQI has been used in multiple studies that include adolescents with psoriasis [11, 14, 24, 32–36]. The first prospective observational study, completed by Oostveen et al. [37], used the Child-CAPTURE patient registry to examine 85 patients with mild psoriasis (PASI 7.0 ± 5.8) from 3 to 17 years old who were grouped into 3 treatment clusters. The mean CDLQI at baseline was 7.5 ± 5.0 , which showed a significant mean decrease, thus an improvement of HRQL, of 2.7 points with treatment. The highest impact was in itch and sleep, with adolescents specifically reporting increased problems with clothes and sports [37]. Langley et al. [24] also showed improvement of CDLQI scores in patients with moderate-to-severe psoriasis (mean PASI 18.5) treated with etanercept in a phase 3 randomized control trial. By week 12, there was a mean 49.7% improvement in CDLQI score in the patients aged 13–17 years under etanercept treatment as compared to only 17.6% improvement in the placebo group. Likewise, van Geel et al. [38] showed a significant ($p = 0.0006$) improvement in CDLQI score from 9.0 at baseline to 3.9 at week 48 of methotrexate treatment in 25 patients (6–17 years old) with plaque psoriasis. Interestingly, most of the improvement occurred in the first 12 weeks similar to results of HRQL improvement in adults treated with methotrexate [38]. The existence of multiple studies showing consistent and significant improvement in CDLQI scores with effective treatment of psoriasis sug-

gests that the CDLQI is an appropriate and effective measurement tool for HRQL in most adolescents with psoriasis.

However, there is some concern based on the use of the CDLQI in patients up to 17 years old since it was originally validated up to the age of 16 years only. A recent study by van Geel et al. [38] compared the CDLQI to the DLQI (validated in >16-year-olds) in 56 psoriasis patients aged 16–17 years. The study showed a close correlation between the two questionnaires, yet noted a slightly lower DLQI score, representing improved HRQL compared to the score measured by the CDLQI. This difference was attributed to the difference in one question topic between the two tools – the DLQI question concerned sexual difficulties scored low (not impacting the HRQL), while the CDLQI question focused on sleep impairment scored high (having a greater impact on HRQL). These authors suggested that the ideal solution would be to use an age-specific HRQL tool, such as the Skindex-Teen, or to develop a psoriasis-specific tool for this population of 16- to 17-year-olds [39].

Skindex-Teen

The Skindex-Teen is a self-administered 22-item questionnaire that focuses on quality of life in adolescents (defined as 12–17 years old) over the past 4 weeks. The questionnaire was developed in 2008 by adapting the adult questionnaires, Skindex and Skindex-16, in combination with expert opinion, clinical experience and a review of the literature. The authors tested this draft on 20 adolescent patients and made minor revisions based on their suggestions. Each question is answered using 5 standard response choices based on frequency and is scored from 0 to 5. The overall score is between 0 and 84 with a higher score signifying greater impairment. The overall score can be broken down into two subscales pertaining to physical symptoms (5 items) and psychosocial function (16 items). The validation study by Smidt et al. [40] confirmed strong face validity and test-retest reliability at 4 weeks by looking at 205 dermatological patients from ages 12 to 17 years (mean age 15.3 ± 1.4 years); 11 of the patients had psoriasis who reported impairment in physical symptoms, especially itching and pain, appearance and impact on clothing choices, self-esteem and self-image [31, 40]. Unfortunately, to these authors' knowledge this questionnaire has not appeared in many other publications. This may be due to its recent publication or the unfortunate fact that few studies examine dermatological conditions in adolescents specifically. However, this questionnaire appears to have great potential and may

become more prominent in the future due to its specific and focused nature on issues relevant to the developmental stage of adolescence.

Psoriasis-Specific HRQL Measurement Tool: Children's Scalpdex in Psoriasis

The only disease-specific measurement tool developed for pediatric psoriasis is the Children's Scalpdex in Psoriasis, which was validated in 2014 for 6- to 18-year-olds with scalp psoriasis [41]. It is adapted from the adult Scalpdex for scalp psoriasis. The Children's Scalpdex in Psoriasis is a 22-item questionnaire asking about the last 4 weeks in 3 major areas: symptoms, functioning, and emotions. Similar to the other scales reviewed, each question is based on a 5-point Likert scale with an overall lower score indicating a better HRQL. While being one of the few, if not the only, tools made for pediatric psoriasis, it has not been widely adapted especially since it only looks at a specific subset of psoriasis. For example, Oostveen et al. [42] used it in their prospective observational study. While they did not include an adolescent subanalysis, overall patients with scalp psoriasis (mean age 10.8 ± 3.7 years) showed a significant improvement in all 3 constructs when scalp psoriasis was treated with calcipotriene/betamethasone dipropionate [42]. Further studies are needed for a deeper comprehension of its strengths and limitations overall and in an adolescent population, but it may have potential use and could be used as a model for further psoriasis-specific HRQL measurement tools.

Concerns for Current HRQL Measurements in Adolescents with Psoriasis

The European Academy of Dermatology and Venereology task force on quality of life recently discussed the need for better HRQL measurement in dermatology and venereology pediatric populations, including psoriasis. They recommended that studies and clinicians always select questionnaires that are validated for the appropriate age of the patient. However, a major problem with the measurement of HRQL in adolescents with dermatological conditions, like psoriasis, is the limited number of studies and validated measurement tools. While adolescence represents a unique phase of human development, the actual definition of adolescence often varies with a range of ages being tested in almost every study on 'adolescence'. Furthermore, adolescents are often grouped in with pediatric populations or adult populations and thus

are given measurement tools that may not address developmentally appropriate physical and psychosocial challenges that this group encounters. Even the modification of adult scales often fails to recognize the unique aspects of adolescent development and function [9].

When assessing an HRQL measurement tool, it is important to consider the patient's age, developmental stage, communication ability, the status of their caregivers (for pediatric populations) and their socioeconomic status in order to capture a true assessment of that patient. The complex nature of HRQL assessment in an already complicated age group may be in part the reason why it has not been studied in depth.

The task force also recommends using both a disease-specific HRQL measure together with a generic measure whenever possible in order to facilitate comparisons within the disease group, with other disease groups and with healthy controls. A few studies have implemented this method, but these represent a minority and not a consistent standard within studies or clinical practice. For the adolescent with psoriasis, there is no well-known or reliable disease-specific measurement tool validated for this population. While not ideal, the best combination thus far would be to implement a general HRQL tool, such as the PedsQL 4.0, along with a dermatology-specific measure, such as the CDLQI or Skindex-Teen.

Ways to Improve HRQL in Adolescents with Psoriasis

It is important for physicians and health care workers involved in the care of adolescents with psoriasis to address any impairment in HRQL to avoid any detrimental cumulative effects or future comorbidities. Evidently, the most important way health care professionals can impact psoriatic patients' lives is by improving their disease [17]. Unfortunately, disease improvement may not always be achievable, so recognizing psychological morbidity with an empathetic approach is paramount. Physicians should refer to a mental health specialist when necessary [17]. Peer support groups are another potential resource as they have been proven to decrease anxiety in adults with psoriasis [43]. These support groups would likely help adolescents feel less isolated and stigmatized. An online forum, such as the one used in Fox et al. [16], may be especially helpful since it eliminates the stress of appearance that these adolescents perpetually feel, and the anonymity appears to help them to express their feelings freely. This method has been used successfully in adolescents with HIV [44]. Additionally, Oostveen et al. [45] have pub-

lished promising preliminary results of one case study for their multidisciplinary training program focused at outpatient children and adolescents with psoriasis. Their program consists of 4 sessions led by dermatologists and/or psychologists focusing on the education of coping skills and self-management. Additional resources (including patient education and support groups) for adolescents with psoriasis are already offered by organizations such as the National Psoriasis Foundation, Psoriasis Association, Psoriasis Help Organization and the Sparklestone Foundation [29]. These resources may be helpful for health care professionals to keep in mind and may be offered to their patients regardless of whether they formally test HRQL.

Conclusion

Overall, the HRQL of adolescents with psoriasis is an important, yet understudied field. With a large percentage of psoriasis beginning in adolescence, it is essential to recognize the impact psoriasis has on these individuals' lives during an already inherently difficult stage of life and attempt to improve their HRQL in order to reduce cumulative life effects. However, there are many challenges and complexities in studying the HRQL of adolescents with psoriasis, in part due to the inherent complications of the developmental stage, with even the definition of adolescence having large variations between studies. An additional difficulty is the lack of widespread measurement instruments that are validated, well studied and specific to both the disease and age. While the PedsQL 4.0 offers the possibility to compare HRQL with other chronic diseases, it may lack the ability to truly measure HRQL in a dermatological condition. The CDLQI appears to be a strong measurement tool in adolescents with psoriasis due to its widespread use and the fact that it addresses cutaneous concerns. The Skindex-Teen may be even more promising due to its more specific focus on dermatological issues specific to adolescence, but its overall use must increase to better understand the strengths and weaknesses of the index. Yet, there is still the need for the development of a psoriasis-specific questionnaire focused on adolescent appropriate issues. Regardless of the instrument used, the importance of health care providers recognizing and responding to the quality of life issues and needs of their patients cannot be overlooked. It is the responsibility of the dermatologist and primary pediatrician to not only treat the physical symptoms and cutaneous lesions of adolescents with psoriasis, but also the more elusive psychosocial impact that is more difficult to define.

Disclosure Statement

The following is the disclosure of relevant relationships with industry for Dr. Alice Gottlieb:

Current Consulting/Advisory Board Agreements: Amgen Inc.; Astellas, Akros, Centocor (Janssen) Inc.; Celgene Corp., Bristol Myers Squibb Co., Beiersdorf Inc., Abbott Labs (Abbvie), TEVA, Actelion, UCB, Novo Nordisk, Novartis, Dermipor Ltd., Incyte, Pfizer, Canfit, Lilly, Coronado, Vertex, Karyopharm, CSL Beh-

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