The Impact of Nail Psoriasis and Treatment on Quality of Life: A Systematic Review

Claire R. Stewart, Leah Algu, Rakhshan Kamran, Cameron F. Leveille, Khizar Abid, Charlene Rae, Shari R. Lipner

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Nail psoriasis · Quality of life · Systematic review · Indicators · Nail Psoriasis Severity Index · Psoriasis Area Severity Index · Dermatology Life Quality Index · Patient-reported outcome measures

Abstract
At least 80% of patients with psoriasis will have nail involvement during their lifetimes. Understanding quality of life (QoL) impact of this condition and associated treatments is of utmost importance. Study objectives were to review the available literature describing patient-reported QoL outcomes in nail psoriasis and relationship with disease severity and treatment. A literature search was performed for English-language articles published prior to August 1, 2020. Articles were included in the review if primary data and validated patient-reported outcome measures assessing QoL were presented, and nail involvement was specifically examined. Fifteen studies were included in the final analysis. Patients with nail psoriasis had higher Psoriasis Area Severity Index and Dermatology Life Quality Index scores than those with psoriasis without nail involvement. The largest percent improvement in QoL score was associated with adalimumab. Studies investigating topicals, intralesionals, and systemic treatments were excluded since only biologic studies utilized validated patient-reported outcome measures. This review affirms that nail psoriasis is physically and emotionally distressing, warranting prompt treatment. Increased efforts are needed to address the impact of treatment on patient QoL using validated outcome measures that assess cosmetic, physical, and social problems.

Introduction
Psoriasis is a chronic skin disorder affecting about 2% of the US population [1]. At least 80% of psoriasis patients will have nail involvement in their lifetimes, while an estimated 10% have isolated nail psoriasis [1]. Clinical findings include nail plate pitting, onycholysis, splinter hemorrhages, “oil spots,” and subungual hyperkeratosis. Yet the impact of nail psoriasis extends beyond aesthetics, as this condition causes pain, functional impairment, and embarrassment.
While there is an expanding number of treatments for nail psoriasis, patient comorbidities, medication interactions, potential adverse effects, and costs must be considered [2]. Therefore, it is crucial to understand the impact of nail psoriasis on quality of life (QoL) to recommend treatment. Patient-reported outcome measures (PROMs) are useful tools to help patients vocalize their concerns. This review sought to evaluate the available literature describing the relationship of psoriasis severity and treatment with QoL outcomes as assessed by PROMs in nail psoriasis.

Materials and Methods

A search of the English-language literature published prior to August 1, 2020, for studies reporting QoL in patients with nail psoriasis was performed. MEDLINE and Embase databases were examined with the search terms “nail” and “QoL” (C.F.L). Abstracts were screened by 2 researchers (R.K. and L.A.) using the exclusion criteria: not an original article, valid PROM not used, and outcomes not reported in patient subgroup with nail involvement. Full-text articles were reviewed by 2 researchers (R.K. and L.A.) with discrepancies resolved by a third (C.R.). References of articles were searched to identify additional articles that may have been missed, although no studies were added (C.F.L.). Data were extracted and confirmed by 2 researchers (C.S. and L.A.). Study design, population demographics, severity, and QoL scores were extracted. To measure evidence level, we used a 5-point scale with the following ratings: (1) randomized clinical trial or systematic review with meta-analysis; (2) controlled trial without randomization or prospective cohort trial; (3) case-control study or retrospective cohort study; (4) cross-sectional study or case series with more than 5 patients; and (5) case report.

Results

A total of 430 full-text articles were assessed for eligibility with 15 studies included in this analysis. The study selection process is detailed in Figure 1.

Patient-Reported Outcome Measures

Five PROMS were used to assess QoL, with Dermatology Life Quality Index (DLQI) most commonly used (n = 10). DLQI scores correlate as 0–1 no effect, 2–5 small effect, 6–10 moderate effect, 11–20 large effect, and 21–30 extremely large effect [3]. The minimal clinically important difference has been established as 4.0 [4]. The International Onychomycosis-Specific Questionnaire, while

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Fig. 1. Flow diagram of the study selection process.
designed to measure QoL in patients with onychomycosis, was used in 3 studies. This PROM is scored on a 0–100 scale with 100 representing the worst QoL [5]. The Nail Psoriasis QoL measure, Nail Assessment in Psoriasis and Psoriatic Arthritis Questionnaire (NAPPA-QoL), and NPQ10 Score were used in 1 study each. In the Nail Psoriasis QoL measure, scores range from 0 to 10 with 10 as most severe impact [6]. The NAPPA-QoL is a 20-item nail-specific QoL questionnaire assessing nail status, stigma, emotional, and everyday life impact [7]. The NPQ10 score is a nail-specific scale with scores ranging from 0 to 20 with higher scores indicating poorer QoL [8].

Demographics
The demographics of study populations were varied. The mean age of subjects across studies was between 43.3 and 57.5 years [6, 9–22]. Composition of females in study samples also varied from 19.2 to 63.0% [6, 9–22]. The mean duration of psoriasis in those with nail involvement ranged from 11.5 to 34.3 years [6, 9–22]. No studies included patients with comorbid onychomycosis.

Psoriasis Severity and Quality of Life
Eight studies compared clinician-assessed severity and DLQI in patients with and without nail involvement (Table 1) [9–15]. Severity was reported by Psoriasis Area Severity Index (PASI) and Nail Psoriasis Severity Index (NAPSI). Across studies, psoriasis with nail involvement was associated with significantly higher baseline PASI scores [9–15]. Nail involvement was also associated with significantly greater QoL impairment [9–15]. In studies with subgroup analysis by gender, women had higher PASI and DLQI scores than men [10, 12, 13].

Reich and Szepietowski [23] (n = 30) found that patients with nail psoriasis were most concerned with appearance and disease worsening; NailQoL scores were correlated with NAPSI in women, but not in men. Ortonne et al. [8] (n = 795) reported that female gender, shorter disease duration, and presence of both fingernail and toenail involvement were associated with worse QoL, as measured by the NPQ10 Scale; PASI and NAPSI scores were not reported. In addition, 86% of patients considered nail psoriasis to be bothersome, 87% as unsightly, and 59% as painful [8].

Treatment, Severity, and Quality of Life
Nine studies reported QoL data in combination with systemic biologic treatments (Table 2) [6, 9, 16–22]. Two randomized controlled trials received the highest Level 1 quality of evidence ranking; all other prospective, open-label studies received Level 2 [6, 22]. For all treatment modalities (infliximab, etanercept, adalimumab, ustekinumab, and secukinumab), authors reported statistically significant improvement in both NAPSI and QoL with treatment [6, 9, 16–22]. Ortonne et al. [8] reported that 72% of patients were dissatisfied with treatment, but specific therapies were not specified. Infliximab (5 mg/kg infusion at baseline, 2, 6, and every 8 weeks thereafter for 38 weeks) was associated with the greatest reported percentage improvement in NAPSI (94.1%) [16] which was 4.3 percentage points higher than the next highest scoring treatment, ustekinumab [21], and 48.8 percentage points higher than the lowest scoring treatment, secukinumab [22]. The ustekinumab dose was 45 mg for patients <100 kg and 90 mg for patients over 100 kg subcutaneous at baseline, 4, 16, and every 12 weeks thereafter for 40 weeks; secukinumab was dosed 300 or 150 mg subcutaneous weekly for 5 weeks and every 4–16 weeks [21].

While different parameters were used to assess QoL impact, multiple studies identified similar themes in specific domains of QoL that improved with treatment. Commonly mentioned themes across medications included improvement in symptoms, pain, functionality, and cosmetic appearance of nails, as well as improvements in personal relationships, business interactions, and ability to perform daily activities [16–18, 22].

When comparing reported percent improvement in QoL across treatment types, adalimumab had the greatest percent improvement from baseline. In 1 study, there was a 87.7% improvement in DLQI score, and in another study, a 88.2% improvement in Nail Psoriasis QoL Score [6, 19]. Of note, in a recent study by Kokolakis et al. [20], there was a lower percent improvement than Khobzey et al. [19] (60.0 vs. 88.2%) in DLQI. This difference may be due to the longer duration of disease in the study population investigated by Kokolakis et al. [19, 20]. In the study, using the Onychomycosis-Specific Questionnaire, the authors reported a mean improvement of 74.4% from baseline, while the studies reporting Nail Psoriasis QoL found 87.7% improvement [6, 18]. The percentage of patients with concomitant joint involvement ranged from 28.6 to 66.7% in these studies [6, 18–20].

Discussion
This review affirms that nail psoriasis is associated with both worse clinician-assessed severity and larger patient-reported QoL impact compared to psoriasis pa-
### Table 1. Review of studies reporting the impact of nail involvement in psoriasis on QoL as measured by DLQI score

| Reference/Author(s) | Country | Study design, inclusion criteria, and evidence level | Total N (with nail involvement, without) | Age Mean ± SD (range) | % female | Duration of psoriasis Mean ± SD, years | Severity Mean ± SD | DLQI Mean ± SD | Controlling for PASI, were DLQI values significant? |
|---------------------|---------|---------------------------------------------------|-----------------------------------------|-----------------------|----------|---------------------------------------|-------------------|--------------|--------------------------------------------------|
| Luger et al. [9]    | Germany | Observational, open-label. Active but stable plaque psoriasis involving >10% of total BSA and a PGA of psoriasis of >3, and failed usual care (2) | 711 (564, 145) | 44.9 ± (range nr) | 28.3     | 4.64                                  | 23.15 ±*         | 19.17 ±      | 13.59 ±* 12.15 ±* Yes                            |
| Augustin et al. [10]| Germany | Cross-sectional. Patients ≥18 years with clinically confirmed psoriasis (4) | 3,531 (F 511, 958) (M 894, 1,053) | 51.1 ±14.8 (range nr) | 42.4     | 19.1 ±16.6                            | F 11.3 ±10.7*     | 9.5 ±1.1 ±   | 7.6 ±6.5 nr                                      |
| Radtke et al. [11]  | Germany | Cross-sectional. Patients ≥18 years with medically-verified psoriasis (4) | 2,449 (1,761, 621) | 57.0 ±11.7 (18–92) | 44.8     | 34.3 ±11.9*                           | 33.0 ±16.1        | 9.3          | 7.2 ±6.4 ± 5.3 ±3 Yes                            |
| Klaassen et al. [12, 13] § | The Netherlands | Cross-sectional. All members of the Dutch psoriasis association (4) | 1,459 (total 963, 496) (F 464, 272) (M 489, 216) | 57.5 ±13.6 (range nr) | 51.1     | 32.4 ±15.3*                           | T 6.6 ±4.9*       | 3.7 ±4.4 ±   | F 6.8 ±4* 5.3 ±4* §                              |
| Kyriakou et al. [14] | Japan  | Cross-sectional. Clinically diagnosed plaque psoriasis who had not received any systemic anti-psoriatic treatment or topical nail treatment for ≥1 year (4) | 99 (54, 45) | 43.9 ±13.7 (18–72) | 48.5     | 18.9 ±10.1*                           | 8.9 ±7.1          | 5.1 ±3.2 ±   | 4.4 ±2.9* 2.3 ±1.8 nr                            |
| Garbers et al. [15] | Brazil | Cross-sectional. Psoriasis without systemic treatment for ≥6 months (4) | 40 | 50.7 ±12.2 (range nr) | 62.5     | Mean age of onset 37 ±12.0             | The number of affected nails did not correlate linearly with PASI (Spearman’s Rho = 0.23, p = 0.17) | For each affected nail, there is an increase in DLQI (Spearman’s Rho = 0.43)* | Yes                        |

DLQI, Dermatology Life Quality Index; PASI, Psoriasis Area Severity Index; SD, standard deviation; BSA, body surface area; PGA, Physician Global Assessment. § Klassen et al. reported the results of their questionnaire in 2 separate studies. ^ No SD reported. † SAPASI, Self-administered Psoriasis Area and Severity Index. * Authors reported statistical significance.
Table 2. Review of studies reporting efficacy and QoL impact of various treatments in psoriasis with nail involvement

| Reference | Country | Study design, inclusion criteria, and evidence level | N | Age (Mean ± SD, range) | % female | Race/ethnicity | Disease duration, years | Treatment | Target Study length, weeks | NAPSI Percent improvement from baseline | Quality of life Improvement from baseline |
|-----------|---------|------------------------------------------------------|---|------------------------|----------|----------------|------------------------|-----------|---------------------------|----------------------------------------|-----------------------------------------|
| Infliximab Rigopoulos et al. [16] | Greece | Observational, open-label Psoriasis with nail involvement (2) | 18 | 47.8 ± 11.6 (32–60) | 44.4 nr | Nails involved 3.8 ± 1.1 | Infliximab 5 mg/kg at baseline, 2, 6, and every 8 weeks thereafter | Finger nail 38 | 94.1* | International onychomycosis-specific questionnaire 71.2% |
| Shear et al. [17] | Canada | Observational open-label >18 years old with plaque psoriasis and physician and patient decision to start IFX treatment prior to enrollment (2) | 516 | 46.4 (±8.5) | 33.5 | 83.5% Caucasian, 30.5% multi-racial, 0.5% black | – | Infliximab 5 mg/kg at weeks 0, 2, and 6, and then maintenance infusions every 8 weeks for 98 weeks | – | 50 nr | DLQI 65.0% |
| Etanercept Luger et al. [9] | Germany | Observational, open-label Active but stable plaque psoriasis involving >10% of total BSA and a PGA of psoriasis of >3, and failed usual care (2) | 564 | 44.9 (range nr) | 28.3 | 22.3 | Etanercept 25 mg subcutaneously twice weekly | – | 54 | 51.3* | DLQI 62.8% |
| Adalimumab Rigopoulos et al. [18] | Greece | Observational, open-label Severe plaque psoriasis or with psoriatic arthritis and cutaneous psoriasis with involvement of nails (2) | 21 | 45.0 ± 12.1 (49.6 ± 11.8, 26–75) | nr | nr | – | Adalimumab 80 mg at baseline, 40 mg at week 1 and 40 mg every 2 weeks thereafter subcutaneously | Finger nail and toe nail 24 | 85.1* | International onychomycosis-specific questionnaire 74.4% |
| Khobzey et al. [19] | Slovenia | Observational open-label Adult with moderate-to-severe plaque psoriasis eligible for adalimumab therapy, NAPSI >10 (2) | 501 | 47.0 (range nr) | 37.3 | 99.6% Caucasian | Adalimumab 40 mg every other week | Finger nail and toe nail 52 | 81.6* | DLQI 87.7% |
| Elewski et al. [6] | USA | RCT. Adult with chronic (>6 months), moderate-to-severe plaque psoriasis and psoriatic arthritis in at least 1 fingernail (1) | 217 | 46.7 ± 12.0 (range nr) | 15.7 | 94.9% Caucasian, 0.5% Asian, 46% other | Adalimumab 80 mg at baseline, then 40 mg every other week | Finger nail 26 | Placebo 11.5 | Nail psoriasis QoL 31.5 |
| Kokelj et al. [20] | Germany | Observational, open-label Adults with moderate-to-severe psoriasis with PASI >10 and DLQI >10 with involvement of the nail (2) | 267 | 47 ± 13.1 | 31.1 | Adalimumab 80 mg at baseline, then 40 mg every other week | Finger nail 96 | Adalimumab 56.2* | Adalimumab 88.2% |
| Ustekinumab Rigopoulos et al. [21] | Greece | Observational, open-label Plaque psoriasis and fingernail involvement who had failed systemic treatment in the past (2) | 27 | 43.3 ± 10.7 (32–60) | 63.0 nr | Nails involved 2.2 ± 1.2 | Ustekinumab 45 mg for those <100 kg and 90 mg for those over 100 kg at baseline, 4, 16, and every 12 weeks thereafter | Finger nail 40 | 89.8% | International onychomycosis-specific questionnaire 79.2% |
| Secukinumab Reich et al. [22] | Germany | RCT. Moderate-to-severe plaque and nail psoriasis (1) | 198 | 44 ± 11.7 (range nr) | 19.2 | Secukinumab 300 mg, 150 mg, or placebo subcutaneously on a week for 5 weeks and every 4 weeks thereafter | Finger nail and toe nail 16 | Placebo 10.8* | NAPSI-QoL Placebo 15.8% |

PROM, patient-reported outcome measure; DLQI, Dermatology Life Quality Index; PASI, Psoriasis Area Severity Index; SD, standard deviation; NAPSI-QoL, Nail Assessment in Psoriasis and Psoriatic Arthritis Quality of Life questionnaire; QoL, quality of life; NAPSI, Nail Psoriasis Severity Index. * Authors reported statistical significance.
patients without nail involvement. Furthermore, the reviewed studies confirm that treatment of nail psoriasis leads to improved QoL. In our review, adalimumab was associated with the greatest percentage improvement in health-related QoL.

Some clinical trials have incorporated PROMs, however, analyzing patient QoL with validated outcome measures should be standard [24]. Our study also raised concerns as to whether existing PROMs can adequately evaluate the impact of nail changes. Though all studies found that DLQI is higher in patients with nail involvement, the differences in scores ranged from 1.2 to 1.9, which is below the minimal clinically important difference [4]. These findings contrast with clinical practice, in which patients with nail disorders have aesthetic, physical, and social disabilities. The DLQI, which is designed for general skin conditions, may not have relevant content validity to measure the outcomes most important in nail psoriasis. In a review of health-related QoL in patients with nail disorders, Reich and Szepietowski [23] pointed out that when DLQI is applied to patients with both skin and nail involvement, the instrument cannot differentiate between the influence of nail versus skin changes on QoL. Since no studies excluded patients with psoriatic arthritis, it is not clear whether improvement in QoL scores was attributable to improvement in nail or joint symptoms. Only 3 studies utilized nail psoriasis-specific PROMs, thus limiting our comparisons.

This study is subject to several limitations. The lack of literature evaluating QoL and meeting our screening criteria limits the generalizability of our findings. None of the studies included children and only the studies by Radtke et al. [11] and Shear et al. [17] included adults over the age of 75, despite nail psoriasis being a concern in both pediatric and older patients. In the Joint American Academy of Dermatology – National Psoriasis Foundation guidelines for the treatment of psoriasis in pediatric patients, Menter et al. [25] recommended for consideration of the impact of disease on the “physical, social, and psychological QoL and/or activities of daily living” when determining the severity of psoriasis in children. Additionally, they highlighted the use of the Children’s DLQI, a derivative of the DLQI designed for patients aged 4- to 11-year old – a recommendation that we support for future research in this subgroup [25, 26]. Another limitation is that topicals, intralesionals, and systemics were excluded; only studies investigating biologic therapies met inclusion criteria for our review. Additionally, only 2 studies reported whether patients had previous exposure to biologics, though others did indicate that there was a washout period [17, 22]. If patients had failed treatment with other biologics, they may have had more severe disease with poorer QoL. The strength of evidence for the treatment studies was quite high, and the risk of bias was deemed to be low.

Conclusions

This review confirms that nail psoriasis is physically and emotionally distressing, warranting prompt and adequate treatment. However, the paucity of data limited types of treatments included in our analysis highlight the necessity of further research. While future studies should include PROMs as metrics to incorporate the patient perspective of the social, emotional, and functional impact of nail psoriasis, it is crucial that these PROMs capture the aspects most important to the patient and have content validity for use in nail psoriasis.

Statement of Ethics

Ethics approval was not required for this systematic review because all data was publicly available.

Conflict of Interest Statement

The authors have no conflicts of interest to disclose.

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Author Contributions

Claire Stewart was responsible for data extraction, writing of the manuscript, and figure creation. Leah Algu screened abstract and full-text articles and conducted data extraction. Rakhshan Kamran screened abstract and full-text articles. Cameron Leveille conducted publication search and organized search results. Khiziar Abid found and organized full-text articles. Charlene Rae oversaw coordination and created the data extraction sheet. Shari Lipner is the senior author who conceived the study and wrote the manuscript. All authors reviewed the manuscript.
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References

1. Jiaravuthisan MM, Sasseville D, Vender RB, Murphy F, Muhn CY. Psoriasis of the nail: anatomy, pathology, clinical presentation, and a review of the literature on therapy. J Am Acad Dermatol. 2007;57(1):1–27.

2. Rigopoulos D, Baran R, Chieheh S, Daniel CR, Di Chiaccio N, Gregoriou S, et al. Recommendations for the definition, evaluation, and treatment of nail psoriasis in adult patients with no or mild skin psoriasis: a dermatologist and nail expert group consensus. J Am Acad Dermatol. 2019 Jul;81(1):228–40.

3. Finlay AY, Khan GK. Dermatology Life Quality Index (DLQI): a simple practical measure for routine clinical use. Clin Exp Dermatol. 1994 May;19(3):210–6.

4. Basra MK, Salek MS, Camilleri L, Sturkey R, Finlay AY. Determining the minimal clinically important difference and responsiveness of the Dermatology Life Quality Index (DLQI): further data. Dermatology. 2015;230(1):27–33.

5. Drake LA, Patrick DL, Fleckman P, Andr J, Baran R, Hanke E, et al. The impact of onychomycosis on quality of life: development of an international onychomycosis-specific questionnaire to measure patient quality of life. J Am Acad Dermatol. 1999 Aug;41(2 Pt 1):189–96.

6. Elewski BE, Okun MM, Papp K, Baker CS, Crowley JJ, Guillett G, et al. Adalimumab for nail psoriasis: efficacy and safety from the first 26 weeks of a phase 3, randomized, placebo-controlled trial. J Am Acad Dermatol. 2018 Jan;78(1):90–e1.

7. Augustin M, Blome C, Costanzo A, Dauden E, Ferrandiz C, Girolomoni G, et al. Nail assessment in Psoriasis and Psoriatic Arthritis (NAPPA): development and validation of a tool for assessment of nail psoriasis outcomes. Br J Dermatol. 2014 Mar;170(3):591–8.

8. Ortonne JP, Baran R, Corvest M, Schmitt C, Voisard JJ, Taieb C. Development and validation of nail psoriasis quality of life scale (NPQ10). J Eur Acad Dermatol Venereol. 2010 Jan;24(1):22–7.

9. Luger TA, Barker J, Lambert J, Yang S, Robertson D, Foehl J, et al. Sustained improvement in joint pain and nail symptoms with etanercept therapy in patients with moderate-to-severe psoriasis. J Eur Acad Dermatol Venereol. 2009 Aug;23(8):896–904.

10. Augustin M, Reich K, Blome C, Schäfer I, Laas A, Radtke MA. Nail psoriasis in Germany: epidemiology and burden of disease. Br J Dermatol. 2010 Sep;163(5):580–5.

11. Radtke MA, Langenbruch AK, Schäfer I, Herberger K, Reich K, Augustin M. Nail psoriasis as a severity indicator: results from the Psoriasis Real study. Patient Relat Outcome Meas. 2011 Jul;2:1–6.

12. Klaassen KM, van de Kerkhof PC, Pasch MC. Nail psoriasis: a questionnaire-based survey. Br J Dermatol. 2013 Aug;169(2):314–9.

13. Klaassen KM, van de Kerkhof PC, Pasch MC. Nail psoriasis, the unknown burden of disease. J Eur Acad Dermatol Venereol. 2014 Dec;28(12):1690–5.

14. Kyriakou A, Patsatsi A, Sotiriadis D. Quality of life and severity of skin and nail involvement in patients with plaque psoriasis. Eur J Dermatol. 2014 Sep–Oct;24(5):623–5.

15. Garbers LE, Slongo H, Fabricio LH, Schmitt JV, Bonalumi A. Incidence, clinical manifestations and clipping of nail psoriasis in the dermatology center of the Hospital Universitário Evangélico de Curitiba. An Bras Dermatol. 2016 May–Jun;91(3):300–5.

16. Rigopoulos D, Gregoriou S, Stratigos A, Larios G, Korfitis C, Papaioannou D, et al. Evaluation of the efficacy and safety of infliximab on psoriatic nails: an unblinded, nonrandomized open-label study. Br J Dermatol. 2008 Aug;159(2):453–6.

17. Shear NH, Hartmann M, Toledo-Bahena ME, Gilbert M, Katsambas A, Yao R, et al. Health-related quality-of-life improvements during 98 weeks of infliximab therapy in patients with plaque-type psoriasis in real-world practice. Qual Life Res. 2016 Aug;25(8):2031–40.

18. Rigopoulos D, Gregoriou S, Lazaridou E, Belyayeva E, Apalla Z, Makris M, et al. Treatment of nail psoriasis with adalimumab: an open label unblinded study. J Eur Acad Dermatol Venereol. 2010 May;24(5):530–4.

19. Khobzey K, Liskova I, Szegedi A, Pavlovsky L, Lunder T, Kingo K, et al. Effectiveness of adalimumab in the treatment of scalp and nail affection in patients with moderate to severe plaque psoriasis in routine clinical practice. Acta Dermatovenerol Alp Pannonica Adriat. 2017 Mar;26(1):11–4.

20. Kokolakis G, Bachmann F, Wolk K, Sabat R, Philipp S. Efficacy of adalimumab for nail psoriasis during 24 months of continuous therapy. Acta Derm Venereol. 2020;100(14):adv00214.

21. Rigopoulos D, Gregoriou S, Makris M, Ioannides D. Efficacy of ustekinumab in nail psoriasis and improvement in nail-associated quality of life in a population treated with ustekinumab for cutaneous psoriasis: an open prospective unblinded study. Dermatology. 2011;223(4):325–9.

22. Reich K, Sullivan J, Arenberger P, Mrowietz U, Jazayeri S, Augustin M, et al. Effect of secukinumab on the clinical activity and disease burden of nail psoriasis: 32-week results from the randomized placebo-controlled TRANSFIGURE trial. Br J Dermatol. 2019 Nov;181(5):954–66.

23. Reich A, Szepietowski JC. Health-related quality of life in patients with nail disorders. Am J Clin Dermatol. 2011 Oct 1;12(5):313–20.

24. Feldman SR. Psoriasis causes much disability as other major medical diseases. J Am Acad Dermatol. 2020 Jan;82(1):256–7.

25. Menter A, Cordoro KM, Davis DMR, Kroschinsky D, Paller AS, Armstrong AW, et al. Joint American Academy of Dermatology-National Psoriasis Foundation guidelines of care for the management and treatment of psoriasis in pediatric patients. J Am Acad Dermatol. 2020 Jan;82(1):161–201.

26. Lewis-Jones MS, Finlay AY. The Children’s Dermatology Life Quality Index (CDLQI): initial validation and practical use. Br J Dermatol. 1995 Jun;132(6):942–9.