Dermatology Practical & Conceptual

Impact of Seborrheic Dermatitis on Quality of Life: A Systematic Review and Meta-Analysis

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ABSTRACT

Background: Seborrheic dermatitis (SD) is a common chronic relapsing inflammatory skin condition associated with itch, cutaneous erythema and scaling, and multifactorial pathophysiology. Yet there are conflicting reports of its impact on patient quality of life (QoL).

Objectives: To address this gap, a systematic review and meta-analysis was conducted to evaluate the health-related QoL impairment among individuals with SD.

Methods: Comprehensive searches were performed on Embase, PubMed, Scopus, Cochrane, and CINAHL databases for publications available up to August 2024. Original studies in English that reported quantitative QoL measurements of SD were included. Following PRISMA guidelines, data were extracted and analyzed using the Metafor package in R.

Results: From an initial pool of 2,165 non-duplicated articles, 26 studies met the inclusion criteria. These studies consistently highlighted the mental, physical, and psychosocial challenges faced by SD patients, with pooled Dermatology Life Quality Index (DLQI: 16 studies; N=3,812; 7.2; 95% CI: 6.3–8.1) and Skindex-29 (three studies; N=2,501; 26.0; 95% CI: 16.9-35.1) showing a moderate impact on QoL via random-effects model meta-analysis, with high study heterogeneity (I^2=97–98%). Pooled Skindex-29 subdomain scores suggested the highest impact on the symptoms subdomain. Increasing QoL impact was moderately associated with increasing SD severity (pooled r: 0.37; 95% CI: 0.31–0.43; *P*=0.03).

Conclusions: On average, SD patients reported moderately impaired QoL, which was positively associated with disease severity in pooled meta-analysis using multiple validated QoL instruments. QoL impact among SD patients was also highly variable, ranging from mild to severe impairment across studies and populations. These data highlight the patient impact of seborrheic dermatitis, with additional studies needed to better understand the multidimensional burden in order to optimize patient outcomes.

Introduction

Seborrheic dermatitis (SD) is a chronic recurrent inflammatory skin disorder characterized by yellow or white greasy scaling, erythema, and itch, typically affecting sebaceous gland-rich areas like the scalp, face, upper chest, and back [1]. Eczematous dermatoses like SD are prevalent and contribute to a significant cause of disability worldwide, with dermatitis, which includes seborrheic, atopic, and contact dermatitis, constituting the largest skin disease burden as measured by disability-adjusted life years (DALYs) and years lived with disability (YLDs) [2]. SD also imposes a significant economic burden; in 2013, the American Academy of Dermatology estimated the annual cost of SD to be approximately $339 million [3]. Prevalence estimates indicate that SD affects 4.4% of the global population, with major peaks in adolescence, young adulthood, and in those over 50 years of age [4].

While SD is often considered to be a benign condition that can be well managed with emollients and topical corticosteroids, calcineurin inhibitors, and/or anti-fungals [1], its chronic, relapsing, and unpredictable nature, accompanied by visible signs and symptoms, can cause significant physical discomfort and emotional distress for some individuals, affecting daily activities, social interactions, and self-esteem [6]. While there is growing recognition of the link between skin conditions and health-related quality of life (QoL) impairment [5], the full impact of a common condition like SD on physical, social, and psychological well-being is not well understood, with conflicting reports in the literature.

Objectives

We conducted a systematic review and meta-analysis of published studies to evaluate health-related QoL impairment among individuals with SD.

Methods

Literature Search

We conducted systematic searches in PubMed (1946 to present), Embase (1947 to present), Scopus (1788 to present), Cumulated Index in Nursing and Allied Health Literature (1937 to present), and the Cochrane Database (1996 to present) for all relevant studies published in the English language using a combination of keywords and subject headings to identify published literature describing the impact of seborrheic dermatitis on QoL. No publication date restrictions were applied. The search protocol was registered in PROSPERO (CRD42024583359), the search was conducted in August 2024, and the sample search strategy is provided in Table S1.

Study Selection

After completion of the search, results were exported into Rayyan (Qatar Computing Research Institute) for deduplication and screening. Eligible studies included those reporting quantitative QoL measures (e.g., Dermatology Life Quality Index [DLQI], Skindex-29, Scalpdex) in individuals diagnosed with SD (Table 1). Titles and abstracts were independently screened by two authors (J.C. and C.L.) for inclusion/exclusion, followed by a detailed review of full manuscript texts by two authors (J.C. and C.L) in similar manners. Discrepancies were resolved with a third reviewer (R.C.). Studies lacking quantitative measures or with less than 15 sample size were excluded to minimize instability in variance estimates and reduce the small-sample bias, which can disproportionately affect random-effects models. The study followed established methods, and reporting of the findings was guided by the PRISMA checklist, with screening flow diagram shown in Figure 1 and a full listing of final included manuscripts in Table S2. Articles were chosen according to the PEO framework, including population (patients diagnosed with SD), exposure (presence and severity of SD), and outcome (quantitative assessment of QoL). Eligible studies demonstrated data consistency, availability, completeness, and the inclusion of sufficient number of patients for statistical testing. Studies directly comparing individuals with SD to reference populations were of particular interest and were a part of the search strategy but generally found to be lacking in the published literature.

Data Analysis

Meta-analysis was performed using the METAFOR package for R Statistical Software (v4.4.1). A restricted maximum

Table 1. Study characteristics and QoL measurements used in SD patients.

Study	Region	Study type	Total patients, N	SD patients, N	Female, N(%)	Age, mean	QoL Instrument, mean
Kondoh et al., 2004	Japan	Cross-sectional	19	9	1 (11.1%)	65.4	DLQI: -
Peyrí et al., 2005	Spain	Cross-sectional	2159	2107	1032 (47.8%)	43.6	Skindex-29: 20.5 • Emotions subscore: 20.5 • Functioning subscore: 14.9 • Symptoms subscore: 30.1
Lorette et al., 2006	France, Tunisia	Clinical trial	189	175	88 (46.6%)	39.3	DLQI CPO/ZP: 5.98 (SD=3.68); Ketoconazole gel: 58: 5 (SD=3.18) Vehicle shampoo: 54: 4.74 (SD=3.26).
Szepietowsk et al., 2008	Poland	Cross-sectional	3000	899	445 (49.5%)	-	DLQI: 7.7
Pärna et al., 2012	Estonia	Cross-sectional	176	15	8 (53.3%)	34.9	RAND-36-item HRQoL • Physical functioning: 80.0 • Everyday physical limitations: 71.1 • Everyday emotional limitations: 48.7 • Energy/fatigue: 47.4 • Emotional well-being: 79.3 • Social functioning: 82.2 • Pain: 62.0 • General Health: 62.0
Sampogna et al., 2013	Italy	Cross-sectional	194	10	-	>18	Scalpdex • Symptoms: 32.5 • Emotions: 39.1 • Functioning: 34.7
Seite et al., 2013	France	Clinical trial	275	226	140 (62%)	41.6	Scalpdex • Symptoms: 36.1 • Functioning: 28 • Emotions: 32.4
Kosaraju et al., 2014	India	Cross-sectional	73	4	3 (75%)	-	Skindex-29: -
Araya et al., 2015	Thailand	Cross-sectional	166	166	94 (56.6)	41.1	DLQI: 8.1
Abbas et al., 2016	Iran	Clinical trial	68	57	21 (31%)	28.17 (itraconazole) 26.45 (placebo)	DLQI • Itraconazole: 6.7 • Placebo: 5.0
Kamamoto et al., 2016	Brazil	Clinical trial	45	45	30 (66.7%)	Group ISO: 28.7(5.8) Group X: 29.8(6.5)	Group ISO: 5.0 Group X: 4.5

Table 1 continues

Table 1. Study characteristics and QoL measurements used in SD patients. *(continued)*

Study	Region	Study type	Total patients, N	SD patients, N	Female, N(%)	Age, mean	QoL Instrument, mean
Moodley et al., 2016	South Africa	Cross-sectional	45	45	26 (57.8%)	37	17
Sanclemente et al., 2016	Columbia	Cross-sectional	1896	82	-	41.5	Skindex-29: 23.5 • Emotion: 30.3 • Functioning: 14.7 • Symptoms: 28.8
Zhao et al., 2017	China	Clinical trial	30	30	16 (53.3%)	36.0	DLQI Group 1: 7.90 (SD=2.69), Group 2: 9.60 (SD=3.13) Group 3: 7.50 (SD=4.11)
Agustin et al., 2019	Indonesia	Cross-sectional	96	96	61 (63.5%)	30.0	DLQI: 6.9
Alipour et al., 2019	Iran	Experimental	48	48	0 (0%)	30.5	DLQI: -
Xuan et al., 2020	China	Cross-sectional	312	312	210 (67.35)	30.5	Skindex-29: 34.0 • Emotions: 40.79 • Functioning: 28.3 • Symptoms 32.8
Chernyshov et al., 2021	Ukraine	Cross-sectional	176	57	22 (38.6%)	0-4	InToDermQoL: 24.0
Ozcan et al., 2021	Turkey	Cross-sectional	544	120	31 (25.8%)	39.9	DLQI: 4.3
Wang et al., 2021	Taiwan	Clinical trial	34	34	22 (64.7%)	20-65	DLQI: 12.7
Parasramani et al., 2022	India	Clinical trial	72	72	39 (54%)	31.5 (luliconazole) 26.7 (ketoconazole)	Scalpdex • Luliconazole group: 52.4 • Ketoconazole group: 51.6
Svyatenko et al., 2022	Helsinki	Clinical trial	100	13	2 (15.4%)	35.5	DLQI: 10.5
Barbosa et al., 2024	Mauritius, Brazil	Clinical trial	64	64	58 (91%)	34	Scalpdex SeS_2 shampoo: 52.1 Ketoconazole shampoo: 41.0
Blauvelt et al., 2024	North America	Clinical trial	457	457	229 (50.1%)	43.2 (ROF) 41.8 (VEH)	DLQI • Roflumilast group: 5.8 • Vehicle group: 4.7 Scalpdex • Roflumilast group: 41.3 • Vehicle group: 37.8
Chan et al., 2024	China	Cross-sectional	2116	2116	1058 (50%)	33	DLQI • Mild: 7.8 • Moderate: 9.1Severe: 12.8
Grimalt et al., 2024	Global	Cross-sectional	50552	1125	-	>16	-

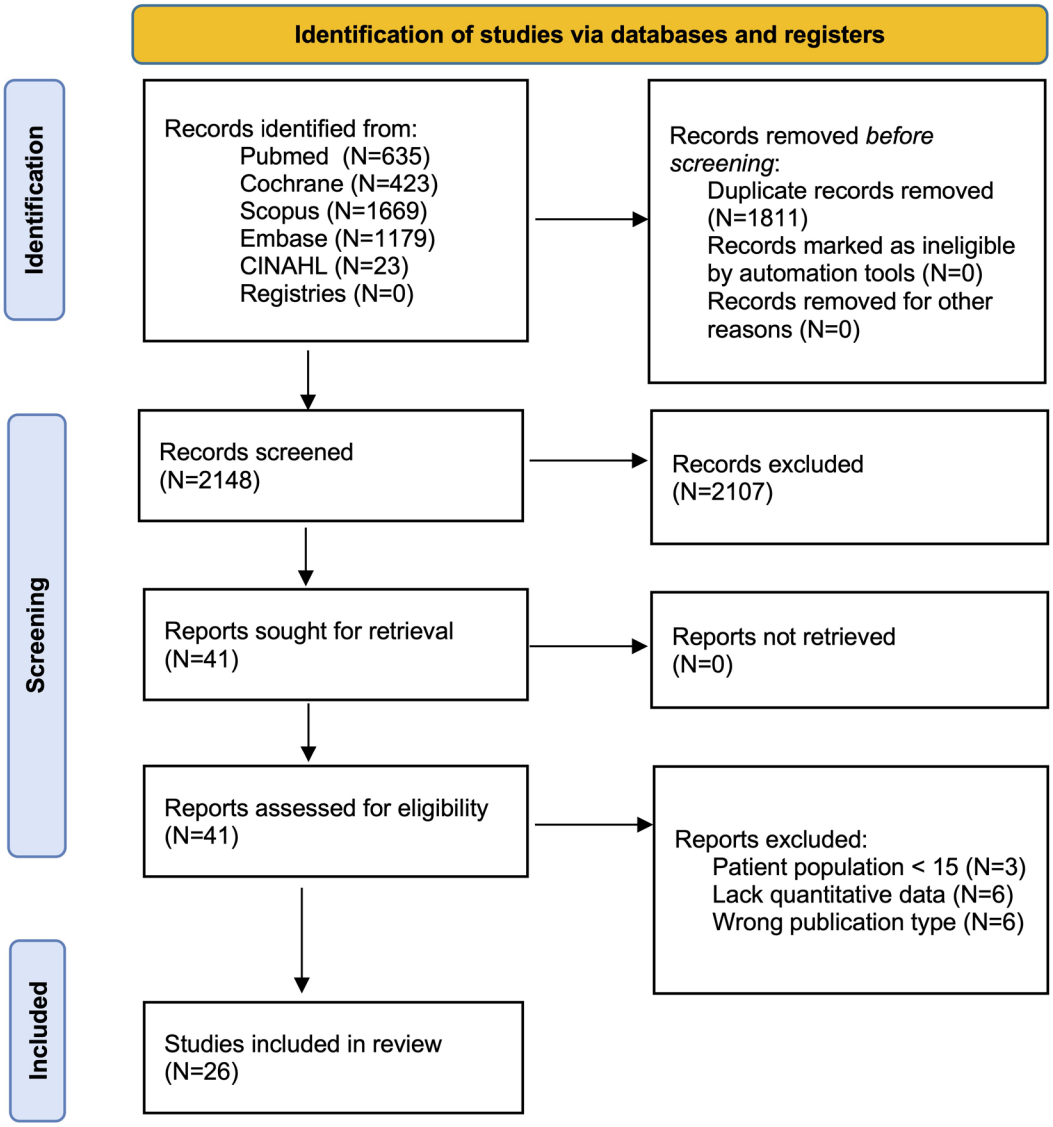

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flow diagram.

likelihood method with a random-effects model was used to estimate pooled QoL scores for SD studies using the same measures (N≥3). A random-effects approach was chosen due to the expected clinical heterogeneity present across the included studies. Between-study heterogeneity was described using the Cochran Q statistic and quantified with an I^2 statistic. Publication bias was evaluated through fail-safe N (Rosenthal method), Kendall τ for funnel plot asymmetry, and a regression test for further asymmetry analysis.

To further evaluate sources of heterogeneity, a meta-regression analysis was conducted for studies reporting DLQI scores. Moderators included study regions, study design, mean age, proportion of female participants, and publication year. Moderator variables were centered prior to model entry. Continuous moderators were assessed using bubble plots weighted by the inverse of study variance. Model fit and residual heterogeneity were evaluated with test for moderators (QM), test for residual heterogeneity (QE), and proportion of variance explained (R^2). Due to the limited number of Skindex-29 studies, a formal meta-regression was not performed; instead, results were summarized descriptively by domains (symptoms, emotions, functioning).

The Joanna Briggs Institute (JBI) critical appraisal checklist was used to assess risk of bias for each included publication. Level of evidence was also graded using current JBI guidelines.

Results

The literature search identified 2,165 non-duplicate articles, with 2,123 excluded after the title and abstract review (Figure 1). A thorough full-text review resulted in 26 studies being selected for meta-analysis: 15 cross-sectional studies, eight randomized clinical trials, and three quasi experimental studies, encompassing a total of 8,384 SD patients. Most were adults, with mean age ranging from early 30s to

mid-40s, and a sex ratio slightly favoring females in most studies. Most studies were conducted in clinical settings (N=23; 88%), with fewer based in the community (N=3; 12%). Geographic regions covered included Asia (35%; dominated by China and India), Europe (25%; Eastern and Western), and South America (20%; mainly Brazil and Colombia), followed by North America (16%), Africa (8%), and Australia (5%).

A variety of quantitative QoL measures were utilized, with DLQI (a 10-item questionnaire measuring health-related QoL among those suffering from skin disease) used most commonly (N=16; 62%), followed by Scalpdex (a 23-item questionnaire designed to measure QoL among those with scalp dermatitis; N=4; 15%) and Skindex-29 (a 29-item questionnaire measuring QoL impairment among those with skin disease; N=3; 12%). Other QoL measures included InToDermQoL scale (N=1; 3.8%), a dermatology-specific proxy health-related quality of life (HRQoL) instrument for children 0-4 years old[6], and RAND 26-item QoL (N=1; 3.8%), a 26-item general health survey. Eleven articles using DLQI and three articles using Skindex-29 had sufficient quality of data for meta-analysis. Data extraction was performed to include study characteristics, patient demographics, QoL measurements, and outcomes.

Pooled Scores by QoL Measures

The DLQI is a concise instrument that assesses the effect of skin disease on seven areas of life: symptoms and feelings, daily and leisure activities, work or school, personal relationships, and treatment effects. Each item is scored from 0 to 3, yielding a total score of 0–30, with increasing scores corresponding to more severe QoL impact. For studies using DLQI, the random-effects model resulted in a pooled mean of 7.2 (95% CI: 6.3–8.1) in a total of 3,812 patients (Figure 2). A high degree of heterogeneity was observed among the studies (I^2 = 97%, τ^2 =3.8). Mean overall DLQI scores for SD patients ranged from 4.3 to 12.7, with an interquartile range of 5.4 to 8.4. DLQI scores range from 0 to 30, and a score between 6 and 10 corresponds to moderate impact on QoL.

Skindex-29 offers a more detailed exploration of skin disease-specific QoL impact by grouping 29 items into three domains: symptoms, emotions, and functioning. Each response is scored on a linear scale of 0 to 100, with higher

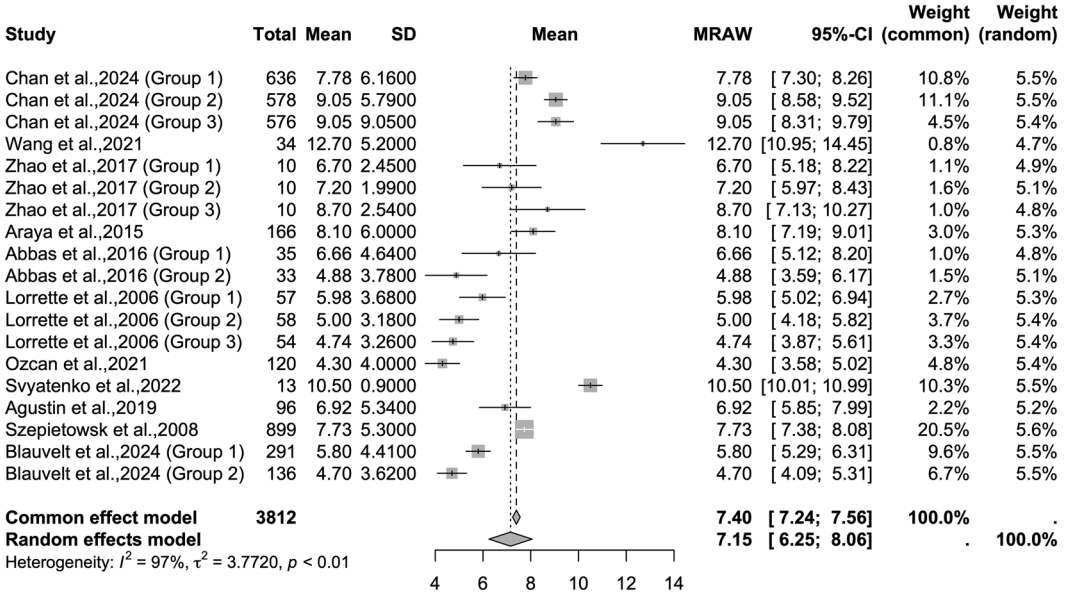

Figure 2. Random-effects meta-analysis of pooled DLQI score in individuals with seborrheic dermatitis.

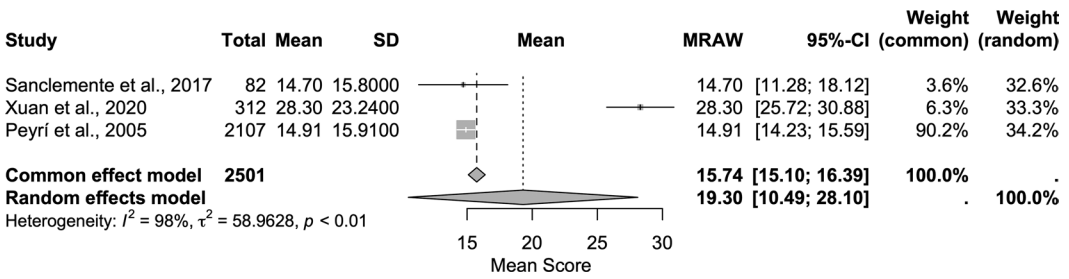

Figure 3. Random-effects meta-analysis of pooled Skindex-29 score in individuals with seborrheic dermatitis.

scores reflecting severity of impairment. For the studies using the Skindex-29 score, the random-effects model yielded a pooled mean of 26.0 (95% CI: 16.9-35.1) with a range of means from 20.5-34.0 across 2,501 patients (Figure 3). Interquartile range was 14.8 to 21.6. Heterogeneity (I^2 = 98% and τ^2 = 63.3) remained high. Skindex-29 scores ranged from 0 to 100, with 26-50 corresponding to moderate QoL impact.

Pooled Subdomain Scores of Skindex-29

The Skindex-29 score is divided into three subdomains: emotions, functioning, and symptoms. These subdomains measure feelings such as embarrassment, frustration, and social anxiety related to the condition, the extent to which the condition interferes with daily, work, or social activities, and the severity of physical symptoms like itching, burning, irritation, and discomfort, respectively. The mean score for the emotions domain across three studies was 27.8 (95% CI: 18.3-37.3) (Figure 4), reflecting a moderate emotional impact. The functioning domain mean score was 19.3 (95% CI: 10.7-28.0), indicating that patients experienced mild interference in daily activities. The highest impact was observed in the symptoms domain, with a mean score of 30.8 (95% CI: 28.8-32.9), indicating moderate impairment.

Correlation with Symptom Severity

A moderate Pearson correlation coefficient was calculated between SD severity and QoL scores across a pool of 2,293 patients from three studies (with two sets of self-reported data extracted from one study), supporting the observation of increasing QoL impact with increasing symptom severity. Using a random-effects model, the meta-analysis yielded a pooled correlation coefficient (r) of 0.37 (95% CI: 0.31–0.43) (Figure 5). A moderate heterogeneity was noted among the studies (I^2 = 67%, τ^2 = 0.0027).

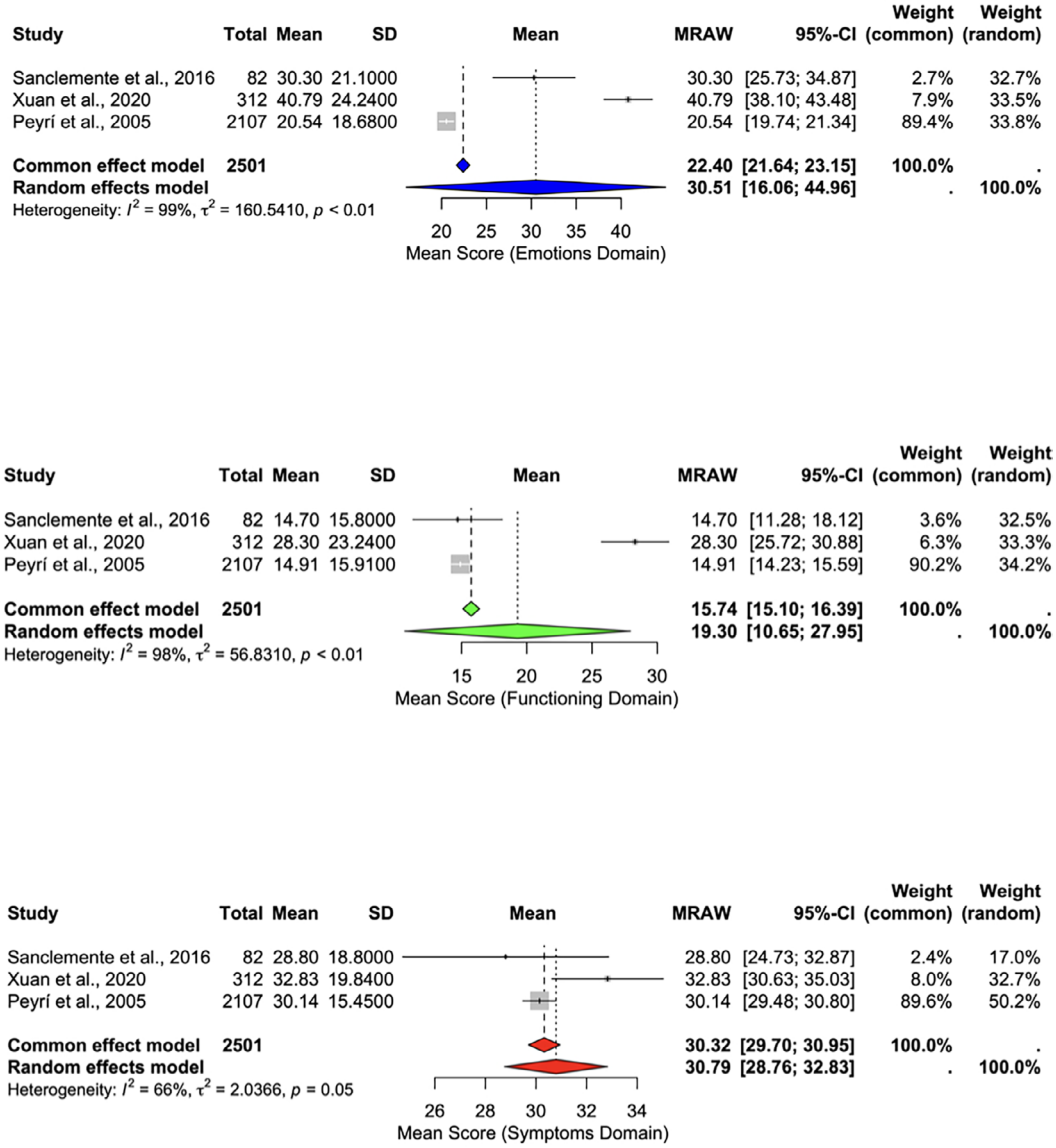

Figure 4. Random-effects meta-analysis of pooled Skindex-29 subdomain scores in individuals with seborrheic dermatitis.

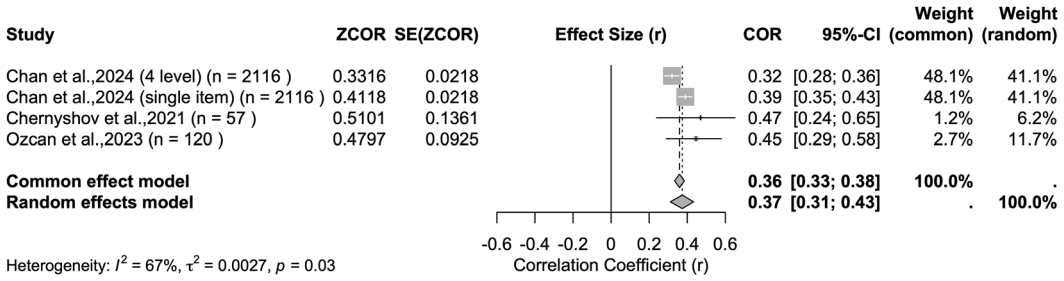

Figure 5. Random-effects meta-analysis of pooled Spearman's correlation coefficient between SD severity and QoL scores.

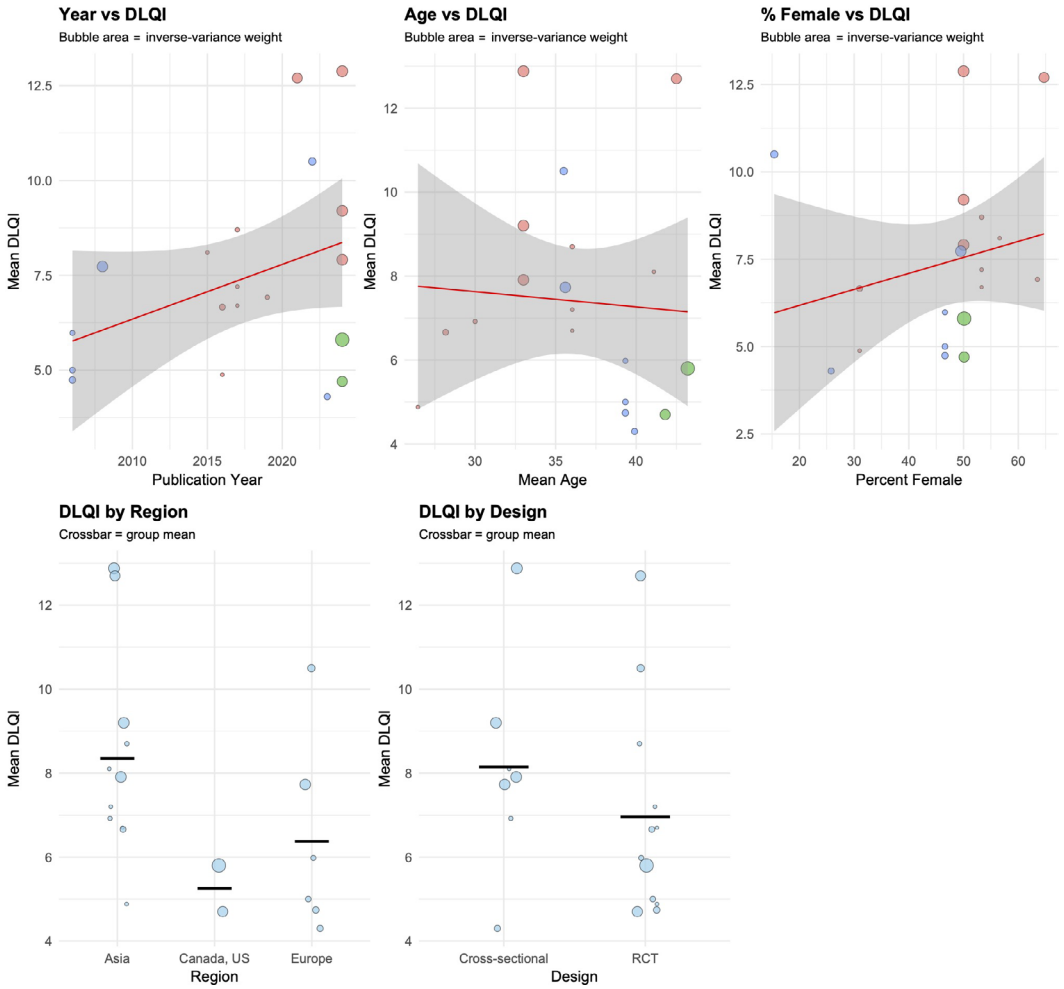

Figure 6. Meta-regression of moderators across studies reporting DLQI.

Heterogeneity and Meta-Regression

A mixed-effects meta-regression was conducted considering high between-study heterogeneity (I^2 = 97%, τ^2 = 4.70) **for DLQI studies,** including region, study design, mean age, percentage of female participants, and publication years as moderators (Figure 6). The model explained 26.6% of the between-study variance (R^2 = 26.6%). The test for moderators was not statistically significant overall (P=0.14), and substantial residual heterogeneity remained (I^2 = 97.2%, QE *P*<0.001). For Skindex-29, heterogeneity also remained high, but a formal meta-regression was not performed due to small number of eligible studies (N=3).

Publication Bias and Study Quality

The funnel plot analysis for DLQI initially appeared asymmetrical, with a higher concentration on the left side of the vertical mean effect size line (Figure 7). Although the regression test for funnel plot asymmetry was not statistically significant (z=0.65; *P*=0.51). Kendall τ indicated a high heterogeneity trend (τ=0.97; *P*<0.0001). After using the

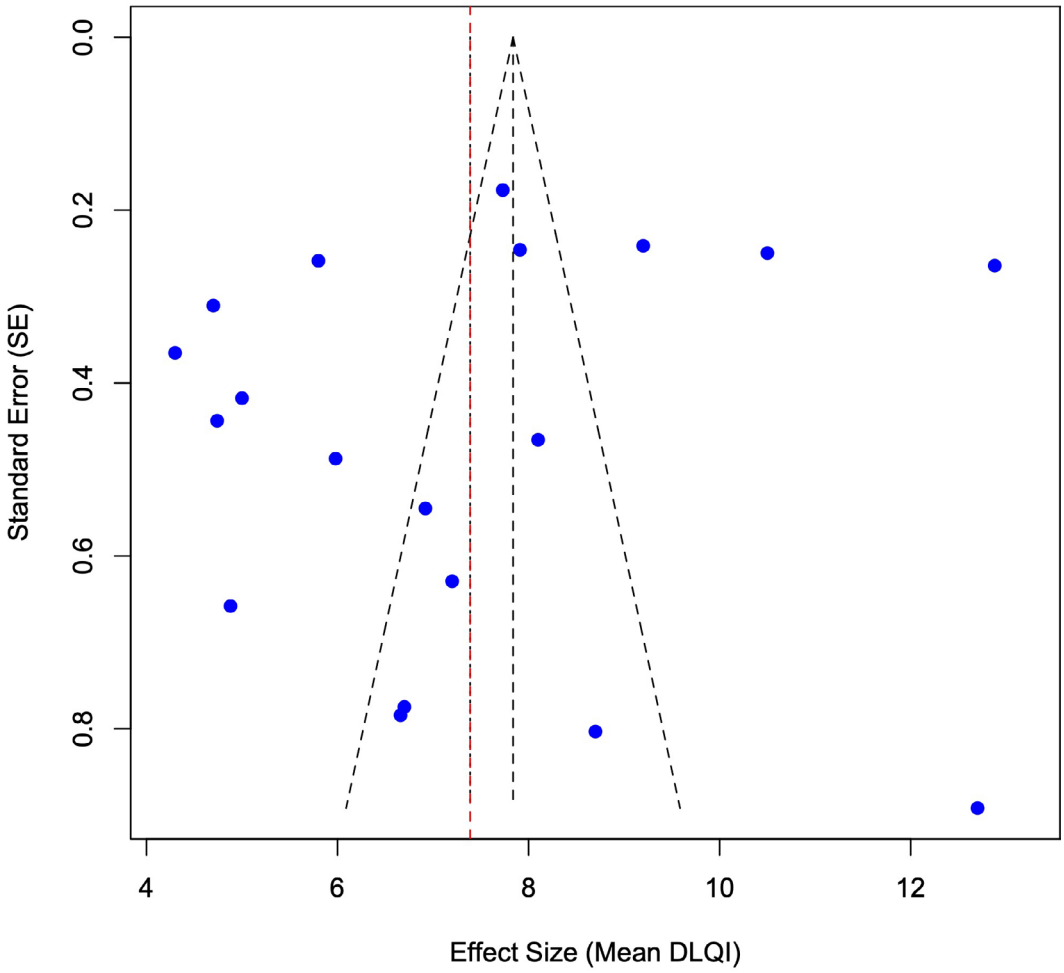

Figure 7. Funnel plot analysis for DLQI meta-analysis.

Tweedie trim-and-fill method to correct for publication bias, the pooled estimate DLQI score was 7.9 (95% CI: 6.9–8.9), again corresponding to moderate QoL impairment, and the fail-safe *N* was low at 35.9, which suggests potential publication bias and caution with interpretation of results.

Levels of evidence were classified based on the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Prevalence Studies. This rating reflects evidence derived from RTCs, quasi-experimental studies, and cross-sectional studies without randomization. Levels of evidence assessment was performed independently by two reviewers (J.C. and C.L.), with disagreements resolved by consensus or third reviewer adjudication (R.C.). The appraisal of the 26 studies through the JBI Critical Appraisal Checklist for Prevalence Studies (Table S3) revealed overall high quality, with six studies exhibited deficiencies in one domain, four studies in two domains, one study in three domains, three studies in four domains, and one study in five domains. Ambiguities were most prevalent in domains such as clarity regarding confounding factor identification and mitigation strategies, or inadequate or unclear sample frames and population descriptions, particularly in cross-sectional and quasi-experimental studies. Despite these uncertainties, all studies demonstrated validity in measurement tools and appropriate statistical coverage.

Discussion

This global systematic review and meta-analysis synthesized evidence across diverse study designs and population to summarize the quality of life burden of seborrheic dermatitis. Across studies, SD was consistently associated with measurable QoL impairment by validated QoL instruments such as DLQI and Skindex-29. Although the pooled mean DLQI corresponded to moderate impairment, individual studies showed DLQI variability ranging from mild to severe, reflecting substantial variability in patient burden. Furthermore, these data showed that SD impairs QoL across multiple distinct domains – physical, emotional, and functional. The consistency of these findings is significant, as it aligns with meta-analyses of other common chronic inflammatory skin conditions which have been more extensively studied in recent decades, including acne vulgaris (pooled DLQI: 8.2) [7], hand eczema (10.7) [8], and rosacea (6.2) [9]. Our findings reflect and support SD's clinical significance as

a chronic disorder with clear patient impact and QoL burden. These data underscore the need for timely diagnosis and appropriate treatment interventions, which continue to be a challenge for SD patients in the modern day [10,11].

The multi-domain breakdown of the Skindex-29 offers valuable insights into particular areas of life disrupted by skin conditions [12]. The pooled mean score for the emotions domain of Skindex-29 reflected a mild-to-moderate emotional impact due to SD. Feelings of embarrassment, frustration, and social anxiety are likely driven by the visible flaking, scaling, and redness observed in SD patients, especially in cosmetically sensitive areas of the head and neck, which can be interpreted as unhygienic or infectious. The functioning domain indicated that while SD patients experience some level of mild interference in daily activities, this may be less pervasive. However, the highest impact was observed in the symptoms domain, suggesting that the symptomatic burden of itch, burning, pain, sensitivity, irritation, and even bleeding may be the most prominent source of QoL impairment in this disease state. The pooled means for the Skindex-29 subdomains should be interpreted with caution given the high between-study heterogeneity. These pooled results are not a uniform effect across population but may reflect the differences in how patients perceive disease burden depending on which domains they value most. This variability may also relate to study designs, cultural difference, and diverse symptom patterns and severities that characterize SD.

To better understand and evaluate potential sources of heterogeneity (I^2=97% for DLQI and 98% for Skindex-29), a meta-regression of studies reporting DLQI was conducted across multiple moderators including region, study design, mean age, proportion of female sex, and publication years. This model only partially explained the between-study variance (26.6%). Among all moderators included, region and publication years contributed most to variability, as studies from Asia reported higher DLQI scores than North America, and more recent studies tended to display higher DLQI score. These patterns suggest that population demographics, cultural factors, and the evolving landscape of SD treatment influenced the perceived QoL burden of SD. Despite this analysis, substantial heterogeneity persisted, implying that unexplored factors such as treatment setting or mental health comorbidities may potentially play a role in the diversity of QoL burden.

Several studies included in this systematic review showed an association between seborrheic dermatitis (SD) and mental health conditions, particularly anxiety and depression. For example, in a study by Ozcan et al. [13], depression symptoms were markedly prevalent in SD patients, with 49 (41.5%) exhibiting depressive symptoms compared to 19 (16.1%) in the control group, resulting in an adjusted odds ratio of 3.53 (95% CI: 1.89–6.59, P<0.001). While anxiety symptoms were also more common in SD patients, the odds ratio did not meet statistical significance. However, in all patient groups, DLQI score was positively correlated with the presence of mental health symptoms, highlighting psychosocial considerations of SD. Chan et al. [14] reported that individuals with SD experienced higher appearance-related anxiety compared to controls. The study also highlighted elevated psychological stress levels in SD patients. Although there were not sufficient data at present in this systematic review to support additional meta-analysis to examine a quantitative relationship between mental health symptoms and QoL impairment in SD, these findings do align with our observed moderate correlation between SD severity and QoL impairment, which is likely related to a combination of the aforementioned features of SD, including the physical skin signs/ rash, cutaneous symptoms, and psychosocial/ mental health considerations. While additional studies are needed to best understand direct and indirect impact from each of these elements, optimal SD management should encompass these factors to best address patient burden.

Potential limitations from this analysis include language/ cultural bias due to exclusion of studies without an English translation and the lack of evaluation of translated assessment tool, and publication bias, an inherent concern in meta-analyses, particularly when studies with significant results are more likely to be published. In this meta-analysis, we assessed publication bias using a funnel plot and Egger's regression test, and the regression test for funnel plot asymmetry was not statistically significant. While there is also a potential for selection bias within studies that rely on patient-reported outcomes, our pooled estimate of QoL impairment was consistent with different instruments, and the high degree of heterogeneity across studies suggests variability in patient populations, geographic regions, and clinical settings, reflecting the diverse experiences for SD patients globally. While most studies focused primarily on patients presenting with SD as their main dermatological issue, other dermatological concerns or health comorbidities may have contributed to measures of QoL impairment.

Conclusion

The findings of this meta-analysis demonstrate SD impact on patient quality of life is both measurable and variable, comparable in magnitude to other chronic inflammatory skin conditions that are associated with considerable patient burden. In addition, QoL impairments of SD extend beyond just visible physical manifestations of the disease, underscoring the importance of addressing the multidimensional impact of SD on patients. Future research should focus on understanding the implementation of routine clinical assessment of QoL in SD patients and its effect on patient outcomes, further examine the relationship between SD and

mental health conditions, and prospectively investigate socioeconomic, environmental, demographic, cultural, and healthcare/treatment-related factors influencing QoL. A better understanding of the health burden associated with SD may have broader implications for disease screening, optimal treatment, and therapeutic innovation.

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