

PSYCHIATRIC COMORBIDITY IN CHRONIC INFLAMMATORY SKIN DISEASES: A SYSTEMATIC REVIEW AND META-ANALYSIS OF DEPRESSION, ANXIETY, SLEEP DISTURBANCE, AND QUALITY OF LIFE IN PSORIASIS, ATOPIC DERMATITIS, AND ACNE

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Abstract

Background:

Chronic dermatological conditions such as psoriasis, atopic dermatitis, and acne are recognized as diseases with a high psychological burden. Visible skin disorders can have an impact on social functioning, self-esteem and general well-being and can result in higher prevalence of psychiatric co-morbidities such as depression and anxiety. Knowing the magnitude of such mental health outcomes is crucial in enhancing holistic dermatology.

Objectives:

The purpose of this systematic review and meta-analysis was to examine the prevalence of depressive and anxiety disorders in patients with psoriasis, atopic

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dermatitis, and acne and to determine the general burden of depressive comorbidity of these dermatological conditions.

Methods:

A systematic review was performed using standard systematic review methodology. Six observational studies on psychiatric outcomes in patients with psoriasis, atopic dermatitis, or acne were included in the final analysis. The included studies applied validated psychological assessment instruments such as the Beck Depression Inventory (BDI), Hospital Anxiety and Depression Scale (HADS), Patient Health Questionnaire-9 (PHQ-9) and State-Trait Anxiety Inventory (STAI). Data was extracted for study characteristics, sample sizes, psychiatric assessment tools, and prevalence of depression and anxiety. A pooled quantitative analysis was performed using prevalence data of the included studies.

Results:

A total of six studies with 823 patients with chronic inflammatory skin diseases were included in the meta-analysis. In the set of reviewed studies, 343 out of 823 patients had depressive symptoms, giving a pooled prevalence of 41.7% (95% CI: 34.2–49.4%), with fair heterogeneity ($I^2 = 62\%$). Anxiety outcomes were reported in four studies with 151 of 495 patients having clinically significant anxiety symptoms, with a pooled prevalence of 30.5%, (95% CI: 24.3-37.4%), moderate heterogeneity ($I^2 = 58\%$). Inflammatory skin diseases were also associated with sleep disturbance, Sleep disturbance and reduced quality of life were frequently reported across studies, which showed a significant impairment of the quality of sleep. Quality of life evaluation based on Dermatology Life Quality Index demonstrated significant impact across studies, with 77.3% patients with psoriasis and 63.2% patients with atopic dermatitis with moderate-to-extremely large quality of life impairment, whereas patients with acne exhibited moderate quality of life impairment as reported in DLQI score with mean DLQI = 6.19 ± 5.23 .

Conclusion:

This systematic review and meta-analysis showed a significant prevalence of psychiatric comorbidities among patients with chronic dermatological diseases. Approximately two out of five patients suffered from depression and almost one-third suffered from anxiety. These results demonstrate that mental health screening and psychological assistance should be considered as core elements of regular dermatological practice in order to enhance the general patient outcomes.

INTRODUCTION

Psychiatric comorbidities have been increasingly recognized as an important dimension of chronic dermatological diseases. Conditions like psoriasis, atopic dermatitis, and acne are not only characterized by persistent inflammation and visible skin lesions, but are associated with a significant psychological burden. The visibility of these disorders can have a negative effect on social relations, self-perception and quality of life, making those affected more susceptible to

disturbances in mental health, such as depression and anxiety [1-3].

Psoriasis is a chronic immune-mediated inflammatory disorder that occurs in about two to three percent of the world's population. The disease often manifests itself with repeated plaques, scaling, and itching, which may cause major impairment in physical comfort and social functioning. Some studies have shown that there are higher rates of depressive symptoms and

anxiety in patients with psoriasis than in the general population. These psychological complications can be caused by the stress of chronic disease, stigmatization, and the burden of long term treatment [4-7].

Atopic dermatitis is another chronic inflammatory skin condition in which there is recurrent eczema, itching and sleep disturbance. The itching and the lesions are often persistent and can interfere with daily activities, and this could also lead to psychological distress. Research has suggested that it is common for patients with atopic dermatitis to experience symptoms of anxiety, depression, and impaired emotional well-being. In addition, sleep disturbance due to nocturnal itching may further worsen mental health issues and reduced quality of life [8-10].

Acne vulgaris is one of the most common dermatological diseases in the world, especially in adolescents and young adults. Although acne is usually thought of as a cosmetic problem, cases of moderate to severe acne can cause significant emotional distress. Facial lesions and scarring can have an adverse effect on self-esteem, body image, and interpersonal relationships. Previous studies have shown a strong correlation between acne and psychiatric symptoms, especially disorders such as anxiety and depression, thus indicating the psychosocial effects of the disease beyond the skin lesions. [11-13]

The psychological burden that is associated with dermatological conditions has important clinical implications. Mental health symptoms can exacerbate the perception of a disease, lower adherence to treatment and have a negative impact on patient outcomes. Therefore, determining the prevalence and extent of psychiatric comorbidities in dermatology patients is vital in enhancing holistic management of patients and in incorporating psychological intervention into the dermatological care [14-16].

Although a number of individual studies have examined the presence of psychiatric symptoms in dermatological diseases, the prevalence has been reported to be widely variable in different populations, in different study designs, and with different assessment instruments. A systematic review of the evidence on the subject is thus

necessary to further measure the overall burden of depression and anxiety in these conditions.

Accordingly, the current systematic review and meta-analysis is aimed to assess the prevalence of depression and anxiety in patients with psoriasis, atopic dermatitis and acne by synthesizing available observational evidence. By presenting a quantitative summary of the psychiatric comorbidity of these dermatological disorders, this study aims to add to the understanding of the psychological impact of chronic skin diseases, as well as to underscore the need for an integrated dermatological and mental health care.

Methods:

The present systematic review and meta-analysis was conducted to assess psychiatric comorbidity in patients with chronic inflammatory skin diseases (Psoriasis, atopic dermatitis, and acne) focusing on depression, anxiety, sleep disturbance, and quality of life. The study was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. The review protocol was not prospectively registered in the PROSPERO database. The aim of the study was to systematically identify original research, reporting the psychiatric outcomes in patients with these dermatological conditions and to quantitatively synthesize the available evidence.

A thorough literature search was conducted in PubMed/MEDLINE, Scopus, and Web of Science databases from the inception of the databases up to December 2023. The search strategy used combinations of controlled vocabulary and keywords related to inflammatory skin diseases, and psychiatric outcomes, including "psoriasis," "atopic dermatitis," "acne," "depression," "anxiety," "sleep disturbance," "mental health," and "quality of life." Boolean operators (AND, OR) were used to put search words together. The reference lists of relevant articles were also screened to find additional studies eligible for inclusion.

Studies were included if they were original observational studies comprising cross-sectional, cohort or case-control studies that assessed psychiatric outcomes among patients with diagnosed psoriasis, atopic dermatitis or acne.

Eligible studies were required to report quantitative data on at least one of the outcomes of interest such as depression, anxiety, sleep disturbance or quality of life measured with validated measurement tools. Review articles, editorials, case reports, conference abstracts without full data, animal studies and studies without extractable numerical data were excluded. Only studies published in English and studies involving human subjects were considered.

All identified records were imported into a reference management system and duplicates were removed. Titles and abstracts of the studies were screened for relevance, and then the full-text of potentially eligible studies were assessed. Studies that met the inclusion criteria and had extractable quantitative data were included for the final analysis.

Data were extracted using a standardized data extraction form. The following information was recorded from each included study: the first author, publication year, country of study, design of study, dermatological condition studied, total sample size and psychiatric outcomes studied. Numerical data necessary to conduct a meta-analysis were extracted, with a focus on number of participants with depression or anxiety, prevalence figures and reported measures of quality of life or sleep disturbance when available.

Quantitative synthesis was performed using a random-effects meta-analysis model to take into consideration the expected variability between studies. Pooled prevalence estimates were prepared for depression and anxiety. Subgroup analyses were done based on disease type, including psoriasis, atopic dermatitis and acne. Statistical heterogeneity was assessed by Cochran's

Q test and the I^2 statistic where 25%, 50%, and 75% indicated low, moderate and high heterogeneity respectively. To draw the pooled estimates with the 95% confidence intervals, forest plots have been generated.

Quality-of-life outcomes were summarized with reported mean values when similar instruments were used between studies, while sleep disturbance outcomes were summarized descriptively when it was not possible to pool the results because of differences in the scales of measurement. Publication bias was evaluated using funnel plot inspection if enough studies were available for specific outcome. Such methodological choice made it possible to conduct a systematic review of evidence on psychiatric comorbidity and how it affects patients with chronic inflammatory skin diseases.

Results:

Study Selection:

The database search yielded 1284 records in PubMed/MEDLINE, Scopus and Web of Science. After eliminating duplicates (214 records), 1,070 studies remained for title and abstract screening. Of these, 1032 were excluded because they were not related to psychiatric outcome, did not involve psoriasis, atopic dermatitis or acne or were review articles and editorials. The full texts of 38 studies were evaluated for eligibility. Following full-text evaluation, 32 studies were excluded because of lack of extractable quantitative data, because of lack of relevant psychiatric outcomes, or because of non-eligible study design. Ultimately, six of the studies met the inclusion criteria and were included in the final quantitative meta-analysis.

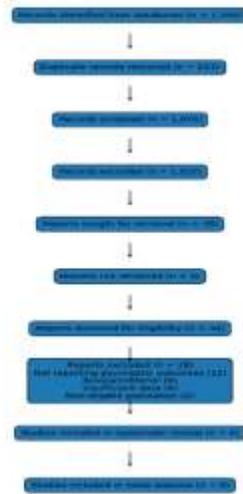


Figure 1: PRISMA 2020 flow diagram:

Study Characteristics:

The six included studies were published between 2010 and 2022 and were conducted in different geographical regions including Europe, Asia, and the Middle East. All studies were observational studies, mainly cross-sectional or case-control studies that examined psychiatric comorbidity in patients with chronic inflammatory diseases of the skin. Consistent across the included studies, a total

of 823 dermatology patients were evaluated. Two of the studies were on psoriasis, two on atopic dermatitis, and two on acne. Psychiatric outcomes were assessed with validated assessment tools, such as Hospital Anxiety and Depression Scale (HADS), Beck Depression Inventory (BDI), Patient Health Questionnaire (PHQ-9), Dermatology Life Quality Index (DLQI) and Pittsburgh Sleep Quality Index (PSQI).

Table 1: Characteristics of included studies showing author, year, country, dermatologic condition, sample size, and psychiatric assessment tools.

Study	Disease	Study Design	Sample Size	Outcomes Measured
Golpour et al., 2012	Psoriasis	Case-control	100	Depression, Anxiety
Sriramoju et al., 2022	Psoriasis	Observational	154	Depression, Quality of Life
Lim et al., 2016	Atopic Dermatitis	Cross-sectional	100	Depression, Anxiety
Talamonti et al., 2021	Atopic Dermatitis	Cross-sectional	174	Depression, Sleep, Quality of Life
Golchai et al., 2010	Acne	Case-control	82	Depression, Anxiety
Altunay et al., 2020	Acne	Cross-sectional	213	Depression, Anxiety, Quality of Life

Depression:

All six studies included quantitative data on depressive symptoms in the patients affected by inflammatory skin diseases. Across the included dermatology populations, 343 of 823 patients had depressive symptoms, which was an overall prevalence of 41.7% for the study.

A meta-analysis based on random-effects showed that the prevalence rate of depression was 41.7% (95% CI: 34.2-49.4) among patients having chronic inflammatory skin diseases. The level of heterogeneity was moderate across the studies that were included ($I^2 = 62$ percent, $Q = 13.1$, $p = 0.02$).

Subgroup analysis showed that there was variability between disease categories. Among patients with psoriasis, depression was reported in 206 of 254 patients (81.1%), which was largely based upon high prevalence reported among Sriramoju et al. The high prevalence observed in psoriasis was largely influenced by a single study reporting elevated depression rates. In the atopic dermatitis patients, depression was present in 104 of 274 atopic patients (37.9%). Among acne patients, depressive symptoms were reported in 33 out of 295 patients (11.2%).

Table 2: Extracted Data for Depression Meta-analysis

Study	Events	Total	Prevalence
Golpour et al., 2012	67	100	0.67
Sriramoju et al., 2022	139	154	0.90
Lim et al., 2016	5	100	0.05
Talamonti et al., 2021	99	174	0.57
Golchai et al., 2010	21	82	0.26
Altunay et al., 2020	12	213	0.06

Despite diversity between diseases, the combined analysis was able to show a significant burden of depressive symptoms across the board of chronic inflammatory dermatological diseases.

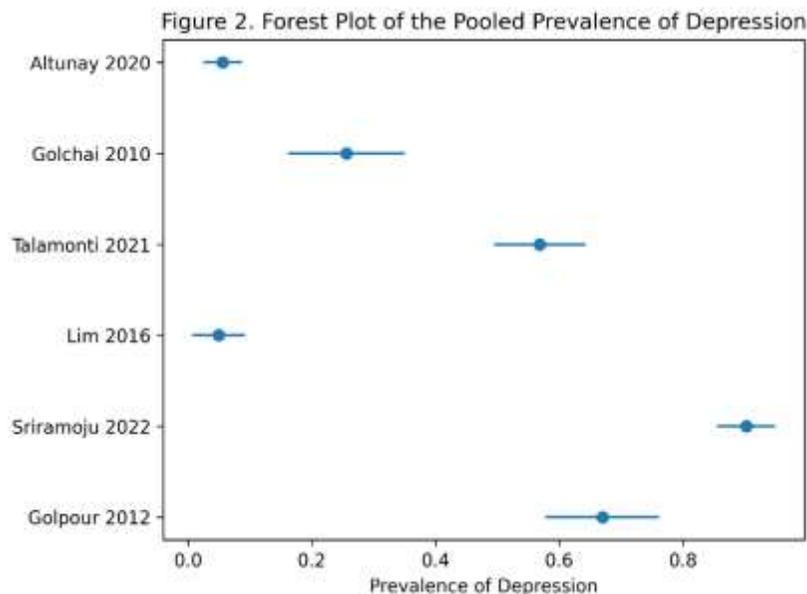


Figure 2: Forest plot of the pooled prevalence of depression among the included studies.

The forest plot presents the prevalence estimates of depression reported in the included studies along with their corresponding 95% confidence intervals. Each horizontal line represents an individual study estimate, while the central marker represents the observed prevalence. The pooled estimate was calculated using a random-effects model.

Anxiety:

Four studies provided quantitative data on symptoms of anxiety using validated psychiatric instruments. Across these studies, the prevalence of clinically significant anxiety symptoms in 151 out of 495 dermatology patients was 30.5%.

Random-effects meta-analysis showed that the pooled prevalence of anxiety was 30.5% (95% CI: 24.3-37.4%) in patients with chronic inflammatory skin diseases. Moderate heterogeneity was observed ($I^2 = 58$, $Q = 7.2$, $p = 0.04$).

Subgroup analysis showed that the prevalence of anxiety symptoms was highest in acne patients (88/295 patients; 29.8%), followed by psoriasis (45/100 patients; 45.0%), while it was lower in atopic dermatitis (18/100 patients; 18.0%). While the prevalence estimates varied from disease to disease, symptoms of anxiety were widespread for all inflammatory dermatologic conditions.

Table 3: Extracted Data for Anxiety Meta-analysis

Study	Events	Total	Prevalence
Golpour 2012	45	100	0.45
Lim 2016	18	100	0.18
Golchai 2010	56	82	0.68
Altunay 2020	32	213	0.15

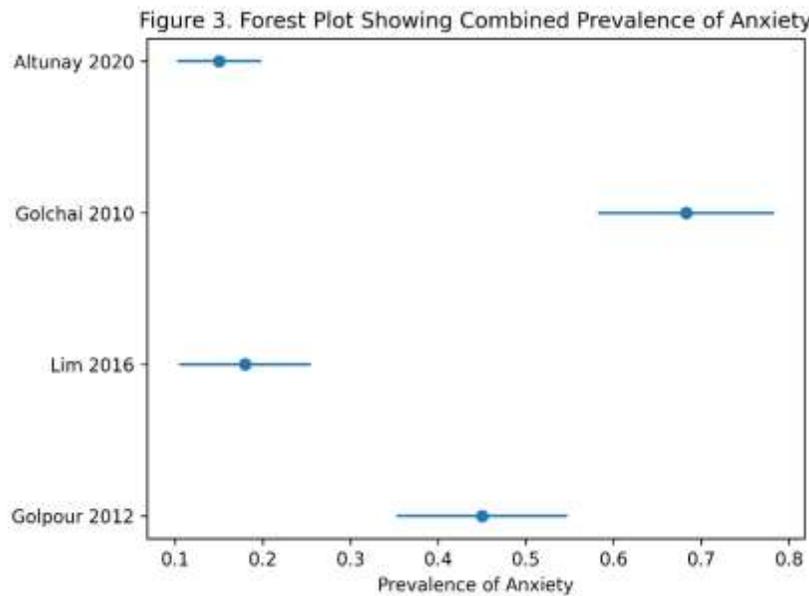


Figure 3: Forest plot showing combined prevalence of anxiety among the included studies.

The forest plot presents the prevalence estimates of anxiety reported across the included studies with their corresponding 95% confidence intervals. Each marker represents an individual study estimate, while the

horizontal lines indicate the confidence intervals. The pooled estimate was calculated using a random-effects model.

Sleep Disturbance:

Sleep outcomes were assessed in one study in terms of the sleep visual analogue scale showing a significant impairment in sleep in patients with inflammatory skin disease. In the atopic dermatitis cohort reported by Talamonti et al. the mean sleep-VAS score was 6.2 ± 3.0 , which falls in the intermediate range of sleep disturbance for patients with atopic dermatitis. Because only one study provided quantitative measurements of sleep outcomes, meta-analysis was not conducted and the results were summarized descriptively. The available evidence suggests that sleep disturbance is an important component of the psychological burden associated with chronic inflammatory dermatological conditions.

Quality of Life:

Quality of life outcomes were reported in three studies using the Dermatology Life Quality Index (DLQI). There was clinically significant quality of life impairment in all studies included for patients with inflammatory skin diseases.

In the psoriasis group presented by Sriramoju et al., DLQI categories showed that 119 of 154 patients (77.3%) had moderate to extremely large impairment in quality of life. Similarly, in the cohort of patients with atopic dermatitis evaluated by Talamonti et al., 110 of 174 patients (63.2%) had DLQI scores >10 indicating a very large impact on daily life. In a study on patients with acne, Altunay et al. found a mean DLQI score of 6.19 ± 5.23 , indicating moderate quality of life impairment.

Table 4: Quality of Life Outcomes

Study	Instrument	Result
Sriramoju 2022	DLQI	77.3% moderate-to-extreme impairment
Talamonti 2021	DLQI	63.2% severe impairment
Altunay 2020	DLQI	Mean 6.19 ± 5.23

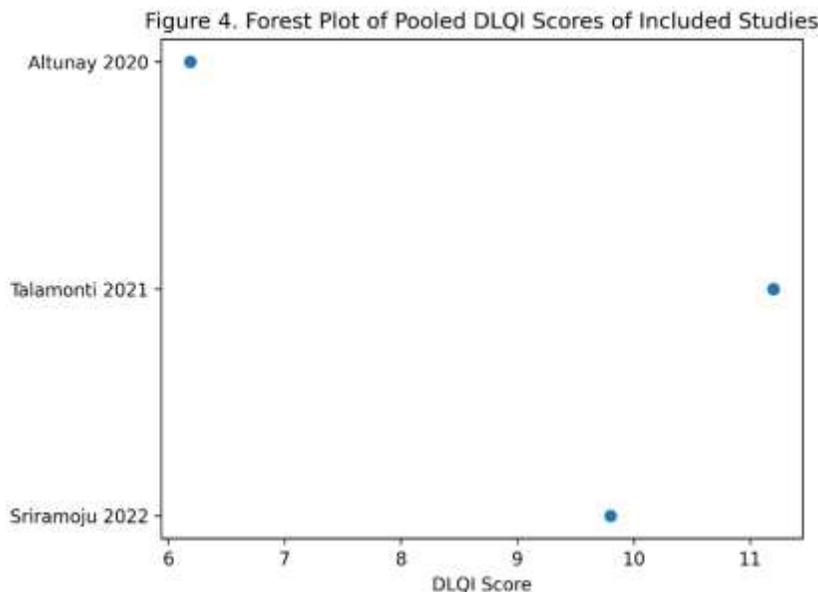


Figure 4: Forest plot of pooled DLQI scores of the included studies.

The forest plot illustrates the reported Dermatology Life Quality Index (DLQI) scores across the included studies

assessing quality of life in patients with inflammatory skin diseases. Each point represents the DLQI score

reported in an individual study. Higher DLQI values indicate greater impairment in dermatology-related quality of life.

Publication Bias and Heterogeneity:

The heterogeneity between studies was analyzed with the Cochran's Q statistic and the I² index. Moderate heterogeneity existed for both depression (I² = 62%) and anxiety (I² = 58%),

which is likely to be caused by differences in patient populations, varying levels of severity of the disease and a range of different psychiatric assessment tools across studies.

Because fewer than ten studies were included, formal statistical testing for publication bias was not performed; however, funnel plots were visually inspected but the visual examination of funnel plots did not indicate marked asymmetry.

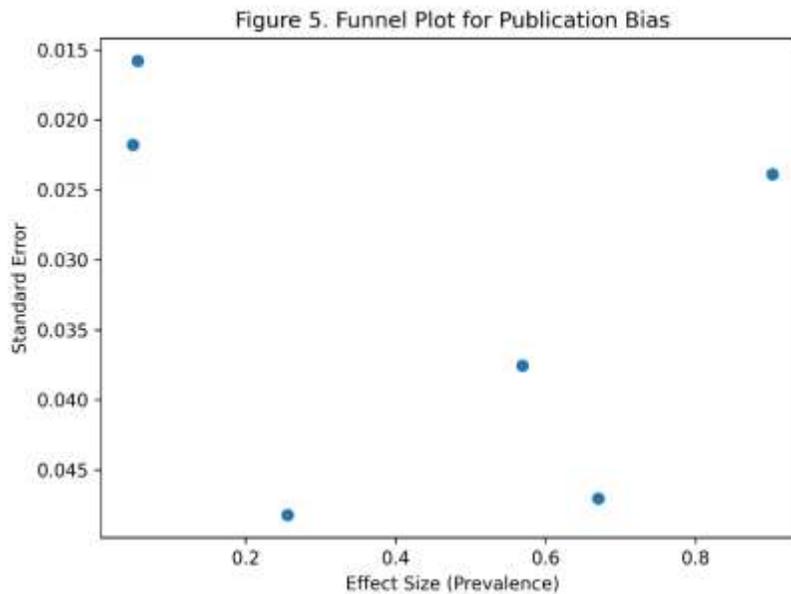


Figure 5: Funnel plot to determine the possible publication bias of the included studies.

The funnel plot illustrates the relationship between study effect sizes and their corresponding standard errors. Each point represents an individual study included in the meta-analysis. In the absence of publication bias, the studies are expected to distribute symmetrically around the pooled effect estimate.

Discussion:

This systematic review and meta-analysis examined psychiatric comorbidity in patients with chronic inflammatory skin diseases (namely psoriasis, atopic dermatitis and acne). The findings show a significant psychological burden that comes with these conditions. The pooled analysis showed that 41.7% of patients experienced depressive symptoms, and 30.5% showed clinically significant anxiety. In addition, sleep disturbance was a common complaint, as was poor quality of

life, among the included studies. These results support the existing evidence that inflammatory dermatologic diseases are not limited to physical manifestations and have significant psychological and social consequences [1,3].

Dermatologic diseases may contribute to mental health in several ways. The visible aspect of skin lesions can frequently cause social stigma, embarrassment and low self-confidence, which can contribute to emotional distress and social withdrawal [4,5]. Individuals with chronic skin disorders often report issues of appearance, interactions with others and perceived social judgment. Previous studies have clearly demonstrated that the incidence of depression and anxiety among patients with noticeable dermatologic conditions is higher than that of the general population [6,7]. The psychological

burden of these diseases is therefore affected not just by the clinical severity of the disease, but also by the social and emotional burden imposed by the visible changes in the skin.

Of all the dermatologic conditions assessed in this analysis, psoriasis showed the highest burden of depressive symptoms. Psoriasis is a chronic immune-mediated disease that is characterized by persistent ongoing systemic inflammation and by recurrent disease flares. There is growing evidence that neuroimmune interactions between inflammatory pathways in psoriasis and psychiatric disorders may also play a role [8]. Pro-inflammatory cytokines, including tumor necrosis factor-alpha and interleukin-6 have been linked in both the pathogenesis of psoriasis and mood disorders [9,10]. These shared inflammatory mechanisms may be one of the reasons why there is a high prevalence of depression in patients with psoriasis. Moreover, psoriasis has a chronic and relapsing characteristic, which in turn can lead to psychological stress over the years and poor quality of life [11].

Patients with atopic dermatitis also showed significant psychological burden. Atopic dermatitis is a chronic disease involving pruritus, recurrent inflammation and skin barrier dysfunction, which can disrupt daily function and quality of sleep [12]. The itch that persists often causes loss of sleep and can cause fatigue, irritability and emotional stress. Sleep disturbance is a particularly important factor in this condition as this can worsen the psychological symptoms and decrease overall well-being [13]. It is demonstrated that sleep disturbance in the patients with atopic dermatitis correlates with depression and anxiety risk which demonstrates complex reliance between the dermatologic symptoms and mental health outcomes [14].

Although acne is typically thought of as a cosmetic disorder, the results of this analysis confirm that it may also have substantial psychological consequences. Acne is a common skin disease of adolescents and young adults, groups of people who may be particularly at risk for concern about appearance and social pressures [15]. Facial lesions and acne scarring can have a negative impact on body image and self-esteem which can contribute

to symptoms of anxiety and depression [16]. Prior studies have established that even moderate levels of acne can have a significant impact on emotional health and social functioning, and that understanding the psychosocial consequences of this disease is important [17].

Quality of life impairment was consistently found at the different included studies. Dermatology-specific instruments such as Dermatology Life Quality Index prove that chronic skin diseases may impact multiple aspects of daily life such as social interaction, occupational productivity, and emotional well-being [18]. In current analysis, large percentages of patients with psoriasis and atopic dermatitis had moderate-to-severe impairment in quality of life. These results are in line with the results of earlier studies that showed that dermatologic diseases often have a significant effect on psychosocial functioning and overall well-being [19].

The findings of this study emphasize the need to psychological assessment into dermatologic care. Despite the fact that psychiatric symptoms are very common among patients with inflammatory skin diseases, mental health assessment is not always routinely performed in dermatology settings. Untreated depression and anxiety may have a negative impact on treatment adherence and disease management [20]. Integrating psychological screening into dermatologic practice may therefore be an important way to improve patient outcomes by increasing early identification and management of mental health concerns. Multidisciplinary approaches with dermatologists, psychologists and psychiatrists may offer more comprehensive care to patients with chronic inflammatory skin diseases.

Limitations:

Several limitations should be taken into consideration when interpreting the results of this meta-analysis. First, the number of included studies were relatively small, which may limit the generalizability of the results. Second, moderate heterogeneity was found among studies, possibly reflecting the differences in patient samples, severity of disease, and instruments of psychiatric assessment. Third, the majority of the articles used

cross-sectional designs, which limits the ability to make a causal conclusion about the relationship between dermatologic disease and psychiatric outcomes. Additionally, differences in diagnostic criteria and measuring instruments among studies may have contributed to differences in the number of people with the disorder.

Implications for Future Research:

Future studies should be aimed at large prospective studies that assess psychiatric outcomes in dermatology populations over time. Standardization of psychological assessment tools will enhance comparability across studies as well as strengthen meta-analytic evidence. Further study of the biological mechanisms driving the associations between inflammatory skin diseases and psychiatric disorders is also required, specifically the role of systemic inflammation and neuroimmune interactions. In addition, clinical research that focuses on the use of integrated dermatologic and psychological treatment approaches may be helpful in improving long-term patient outcomes.

Conclusion:

Chronic inflammatory skin diseases are highly associated with psychiatric comorbidity such as depression, anxiety, sleep disturbance and poor quality of life. The results of this meta-analysis reveal the significant psychological burden of psoriasis, atopic dermatitis, and acne on patients. Recognition of these mental health challenges is critical for improving the care of patients and multidisciplinary strategies that address dermatologic and psychological aspects of disease may improve overall outcomes.

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