Global prevalence of anxiety, depression, and stress among patients with skin diseases: a systematic review and meta-analysis

Abstract

Background: The changes in human lifestyle over the past few decades have impacted the prevalence of skin diseases within different societies. Skin diseases may result in various physical and mental disorders. The most common mental disorders observed among the patients are stress, anxiety, and depression. This study aims to investigate the global prevalence of anxiety, depression, and stress in patients with skin diseases.

Methods: In this Systematic Review and Meta-Analysis study, the PubMed, Scopus, Science Direct, Embase, Web of Science, and Google Scholar repositories were searched without a lower time limit. Heterogeneity among the identified studies was examined using the I^2 index, and accordingly random effects model was adopted for analysis. Data analysis was conducted within the Comprehensive Meta-Analysis software (v. 2).

Results: In total, 113 studies were included for the final analysis. The overall pooled prevalence of stress, depression, and anxiety in skin disease patients was found to be 39.4%, 27.2% and 28.8%, respectively. Among patients with psoriasis, acne, vitiligo or atopic dermatitis diseases, the highest number of patients suffering from stress was related to patients with acne (75.7%). The highest prevalence of depression, and anxiety was reported in patients with vitiligo (38.3%) and acne (36.5%), respectively.

Conclusion: Considering the high prevalence of mental disorders among patients with skin diseases and recognising the impacts of mental health challenges on patients' well-being, the findings of this study provide valuable insights for identifying specific populations that require targeted interventions for the diagnosis, treatment, and prevention of mental illnesses. Accordingly, healthcare policymakers should incorporate psychological treatment and support measures as integral components of comprehensive care strategies for patients with skin diseases.

Keywords: Dermatological disease, Skin disease, Depression, Anxiety, Stress

Background

The skin as the largest, most external, and the visible organ of human body, serves as a defence barrier against invading agents (1, 2). Any disorder that affects the human skin is defined as a skin disease, which can be accompanied by symptoms such pain, burning, and/or itching (3, 4). Atopic eczema (atopic dermatitis), psoriasis, urticaria, alopecia areata, and vitiligo are examples of skin diseases that can be caused by viral, bacterial, fungal, or allergenic infections; skin diseases can also have a genetic origin (2, 4). Skin disorders are one of the most common diseases in human population, which can be contagious, and are known as the fourth cause of disability globally (4-6).

Due to the changes in environmental conditions and various influencing factors, the prevalence of skin diseases has recently increased. Each year, approximately 900 million people around the world are affected by skin diseases, and their prevalence in developing countries are generally estimated at 20%-80% (7-9). Nevertheless, a study conducted in several European countries reported the prevalence of various skin diseases such as vitiligo, atopic dermatitis, and psoriasis as 1.9%, 7.9%, and 5.2%, respectively (7).

In addition to commonness of these diseases, they cause a heavy burden on patients and healthcare providers globally and can lead to physical disabilities, discomfort, social stigma, reduced quality of life, body image disorders, and stress (2, 7, 10, 11). According to reports, about 85% of patients suffer

from psychological and social complications caused by skin disorders (7). Moreover, at least 30% of patients with skin diseases suffer from mental disorders, and accordingly, depression and anxiety disorders are known as the most common mental disorders among the patients (11). In a cross-sectional study conducted in 13 European countries, the prevalences of anxiety and depression among patients with skin diseases were reported as 33.7% and 19.8%, respectively. Another research reported the rate of depression among skin disease patients at 10%-30%, yet this rate in the general population is 4%-20% (12, 13). According to existing literature, the rates of stress in atopic dermatitis, and vitiligo patients are 59.12% and 76%, respectively (14, 15).

Anxiety, depression, and stress are considered as some of the key mental disorders, and inadequate management of these disorders can have severe negative consequences for individuals and societies (16). Depression is a mental disorder that can be associated with symptoms such as changes in sleep patterns, feelings of guilt, increased suicidal thoughts, and decreased energy levels, and can cause disability among patients (16, 17). Anxiety, similarly, can cause muscle tension and increase the level of irritability (16). Anxiety and depression can also increase the level of stress in patients, which can in turn aggravate skin diseases (18). In other words, in addition to the effect of skin disorders on mental health, the mental state itself can affect skin conditions using different mechanisms (18). Therefore, researchers and medical experts have focused their attention on improving the care of these patients and reducing the resulting complications (19).

Considering the increasing prevalence of skin diseases in different societies, the high rate of mental complications among this group of patients, and the importance of mental health in today's societies, we aimed to examine the global prevalence of anxiety, depression and stress among skin patients. The findings from this study can be used as important evidence for pertinent interventions and decision making.

Methods

The initial search for original articles was conducted in February 2023. In order to identify relevant studies, the keywords of depression, anxiety, stress, skin disease, dermatological disease, together with operators such as 'AND' and 'OR' were selected. The PubMed, Science Direct, Web of Science, Google Scholar, Scopus, and Embase repositories and databased were then searched using the selected keywords. No lower time-limit was imposed on the search process. A manual search was also carried out to ensure the comprehensiveness of the search and in an attempt to identify possible grey literature. The search was last updated on 9 February 2023. Details of all identified studies were transferred into the EndNote reference management software for further examination and analysis.

Inclusion and Exclusion Criteria

Criteria used to identify and select studies are outlined below:

1. Studies that their full texts were available to the research team,

2. Studies that had reported the prevalence of depression, anxiety, and stress among patients with skin diseases, and

3. Studies in which the necessary information was reported (i.e., prevalence rate, sample size).

Criteria to exclude studies were:

1. Articles that were published in a language other than English,

2. Studies that had a focus on Animal contexts,

3. Review articles of any sort,

4. Case report and case series, and

5. Experimental studies.

Study Selection and Data Extraction

The adopted protocol for identifying original research was the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). According to the PRISMA guidelines, duplicate studies were omitted subsequent to the search. Moreover, unrelated studies were removed as part of the screening stage, though the examination of their titles and abstracts and in line with the inclusion and exclusion criteria. Then, the full texts of the remaining studies were assessed, and further irrelevant studies were removed by considering the inclusion and exclusion criteria. To avoid bias, the review activities were conducted by two reviewers independently, and any case of disagreement was resolved with the support of a third reviewer to reach a consensus.

Quality Evaluation

The Strengthening the Reporting of Observational studies in Epidemiology (STROBE) checklist was adopted to check the quality of studies. The checklist has 6 scales and 32 subscales. The scales include title, abstract, introduction, methods, results and discussion. Title, statement of the problem, objectives of the study, type of study, statistical population, sampling method, sample size, definition of variables and procedures, data collection method, statistical analysis techniques and findings are also some of the subscales within the checklist. The maximum score that can be obtained using this checklist is 32. Taking into account the cut-off points of 16, articles with scores of 16 or above were considered as medium- or high-quality articles. Articles with scores less than 16 were considered as low-quality articles, and were therefore excluded from study (20, 21).

Data Extraction

Two researchers performed data extraction independently. To extract data, the researchers used a different checklist which includes fields such as Name of the first author, Year of publication, Place of research, Sample size, Age range of the sample, and Prevalence of depression, anxiety, and depression among patients with skin diseases.

Statistical Analysis

The extracted results were entered into the Comprehensive Meta-Analysis software (v.2) and the I^2 test was adopted to examine the existence of heterogeneity among the articles. To assess publication bias, the Egger's test at the significance level of 0.05 was used and associated Funnel Plots were drawn.

Results

The purpose of this systematic review and meta-analysis was to determine the pooled prevalence of anxiety, depression, and stress among skin patients. After searching in different databases, a total of 2,904 studies were identified. Six additional articles related to the research were identified through manual searches. Information of all these articles were then transferred into the EndNote reference management software. Among the studies, 980 articles were duplicates and were therefore removed, and finally 1,930 articles were retained for further examination. Subsequently, the titles and abstracts of the remaining articles were assessed according to the inclusion and exclusion criteria, and accordingly 438 articles remained, whereas 1,492 articles were excluded. After this stage, the full texts of the remaining articles were examined, and an additional 319 studies were omitted. Low-quality articles were also omitted following the scoring using the STROBE checklist. Ultimately, 113 studies remained for final analyses (Figure 1). The information of these 113 studies is listed in Tables 1, 2, and 3.

Studies related to the prevalence of stress are listed in Table 1. The highest prevalence of stress has been reported in the study of Das et al. and is related to chronic and recurrent dermatophytosis with the prevalence of 99.9%, and an average age of 33.7 ± 11.4. Findings in this study was reported through the use of the Perceived Stress Scale - PSS tool, and mild, moderate, and severe stress were observed among 8.1%, 86.9% and 4.9% of patients, respectively (22). The lowest prevalence of stress was related to the study of Geetha et al. where patients had bacterial, parasitic, or viral infections. Similarly, the study was conducted with the PSS tool, and on an average age of 60-88 years, at the rate of 0% (23). In our study, the pooled prevalence of stress in skin patients in general is calculated as 39.4%.

The studies related to the prevalence of depression are reported in Table 2. Accordingly, the highest prevalence of depression was reported in the study of Bashir et al. (24). Moreover, within the research conducted by Geetha et al., the prevalence of depression in patients with urticaria/angioedema and vesiculobullous diseases was reported as 100%. The research was conducted in 2021 among patients with an average age of 60-88, and Hospital Anxiety and Depression Scale (HADS) was used to evaluate the state of depression (23). The lowest prevalence of depression was also reported in Bashir et al.'s study in 2010, related to fungal infections and leprosy, with the rate of 0%. Bashir et al. considered patients over 18 years old and used the General Health Questionnaire - GHQ-12 tool (24). In our work, the prevalence of depression in skin disease patients is pooled at 27.2%.

Table 3 outlines the prevalence of anxiety in patients with skin diseases. According to the information included in this table, the lowest prevalence of anxiety related to the study of Geetha et al. in 2021, with an average age of 60-88. The study worked with the HADS tool and was related to patients with urticaria/angioedema and vesiculobullous diseases with a prevalence of 100%(23). The lowest prevalence of anxiety is found in the study of Yew et al. in 2020 and was related to skin diseases with a prevalence of 1.4%; This research was conducted on skin disease patients aged 22 years and older, and anxiety was evaluated using European Quality of Life-5 Dimensions-5 Level (EQ-5D-5L) questionnaire (19).

(Figure1 Here)

(Table 1 Here)

(Table 2 Here)

(Table 3 Here)

Stress

In the review of 32 studies with a sample size of 24,168, the I^2 test showed high heterogeneity (I^2: 97.9), and thus random effects method was adopted to analyse the reported results. Our meta-analysis shows the pooled prevalence of stress among skin disease patients as 39.4% (95% CI: 32%-47.3%) (Figure 2). Additionally, the Egger's test shows the absence of publication bias in the studies (p: 0.121) (Figure 3).

(Figure 2 Here)

(Figure 3 Here)

Depression

In the review of 167 studies with a sample size of 229,817, the I^2 test showed high heterogeneity (I^2: 99.2), and therefore random effects method was adopted to conduct the analysis .Our meta-analysis indicates the pooled prevalence of depression among patients with skin disorders as 27.2% (95% CI: 23.6%-31.1%) (Figure 4). The Egger's test shows the existence of publication bias among the studies (p: 0.000) (Figure 5).

(Figure 4 Here)

(Figure 5 Here)

Anxiety

In the review of 111 studies with a sample size of 74,155, the I^2 heterogeneity test showed a high heterogeneity (I^2: 98.9). Similarly, random effects model was adopted to conduct the analysis. Our meta-analysis shows the pooled prevalence of anxiety among patients with skin disorders at the rate of 28.8% (95% CI: 24.1%-34%) (Figure 6). Additionally, the examination of the publication bias in the studies using the Egger's test shows the existence of the publication bias in the studies (p: 0.0001) (Figure 7).

(Figure 6 Here)

(Figure 7 Here)

The subgroup analysis outlined within Table 4, reports the prevalence of stress, anxiety, and depression by skin disease type. There was only one study in which the Atopic Dermatitis, Vitiligo, and Psoriasis is mentioned as the skin disorder, and therefore no meta-analysis was performed with this focus. Nevertheless, the highest pooled prevalence of stress exists among patients with Acne with 75.7% (95% CI: 32.7%-95.2%) The highest prevalence of depression was found to be among Vitiligo patients with 38.3% (95% CI: 27%-51.1%). Moreover, the highest prevalence of anxiety was pooled for patients with Acne at 36.5% (95% CI: 28%-45.9%).

(Table 4 Here)

Discussion

The aim of this study was to investigate the global prevalence of anxiety, depression, and stress among patients with skin disorders. Although the majority of skin diseases do not result in high prevalence of mortality nor cause long-term disabilities among patients, they can still be the cause of various physical and mental disorders (6, 7, 10). Previous studies have shown that patients who are referred to medical centres due to skin diseases are more likely to be affected by mental disorders (3, 25). Accordingly, such diseases have a greater impact on the mental state of patients compared to patients with other disorders and can be a factor in the occurrence of mood and anxiety disorders (3, 25). Moreover, distressing feelings caused by skin diseases can play an important role in the occurrence of depression among the patients (17). It has been proven that the incidences of depression and anxiety in patients with skin diseases are higher than in the general population (10). In our study, the pooled prevalence of stress, depression, and anxiety is found as 39.4%, 27.2% and 28.8%, respectively.

In research conducted by Sorour et al., the prevalence of anxiety in patients with various skin diseases in Egypt was reported as 34.36% whilst in the same study, the prevalence of depression was found to be 39.25% (110). In another article, it was found that 36.32% and 18.41% of skin patients in India suffer from depression and anxiety, respectively (117). In another piece of research, anxiety was observed in 41.58% of patients with chronic skin disorders and depression among 45.54% of the same population (10). In various studies, the prevalence of anxiety or depression in different types of skin diseases has been disclosed (23, 42, 67). In a study by Lukaviciute et al., the prevalence of anxiety in rosacea and folliculitis patients was reported as 36.70% and 30.80%, respectively. In the same study, depression was reported among 18.50% of folliculitis patients, and 30% of rosacea patients. In our work, depression is found among 27.2% of patients and anxiety among 28.8%, which indicates that our findings are approximately in line with the results of the existing research works.

Yew et al. conducted similar research in Singapore, and anxiety was observed among only 1.4% of skin patients, whereas depression was found among 3.20% of the patients (19). This significant difference between these results and the pooled rates in our meta-analysis can be explained by the different sample sizes, and varied measurement tools utilised within the original studies.

On the other hand, various studies have reported the prevalence of anxiety or depression in a variety of skin diseases, including psoriasis, vitiligo, acne, and atopic dermatitis (40, 42, 43, 57). In the study by Pollo et al., 36% of psoriasis patients were also suffering from anxiety (40). Another study conducted in Spain found that anxiety nd depression are present among 51.40%, and 34.30% of patients with psoriasis, respectively (102). In the present work, depression and anxiety were observed in 27.2% and 23.5% of psoriasis patients, respectively. In various studies, the prevalence of anxiety among acne patients in Spain and Lithuania has been reported as 32.30% and 38.20%, respectively (42, 99). In a study by Mola et al., 51.40% of patients with acne had experienced depression, whilst in Lithuania, this figure was 21.90% (42, 56). In the present study, depression was observed among 22.7% of patients with acne, whilst 36.5% of the patients suffered from anxiety, which is almost in line with the results reported within literature.

In our study, anxiety was observed in 34.7% and depression in 38.3% of vitiligo patients. In line with the results of this research, in other studies, depression has been observed in 34% of Mexican patients and anxiety in 31.48% of patients in Egypt (103, 110). Moreover, in the present study, the prevalence of anxiety in patients with atopic dermatitis is 20% whilst 20.8% of the same patients suffer from depression. This is also in line with the results of study conducted by Chiesa Fuxench et al., which reported the prevalence of anxiety among patients with atopic dermatitis in the United States at 24.73% (63). In a work by Kyung et al., 27.81% of the atopic dermatitis patients and in the study by Eckert et al., 25.80% experienced depression (104). These results were not too diverged from the results of our research.

Many patients with chronic skin diseases experience depression throughout their lives, which can be caused by associated treatments of these disorders. Depression and anxiety that a person endures in relation to a skin condition can cause stress. Moreover, since skin is a visible organ, patients' appearance affected by skin disorders can also be linked with a decrease in the quality of life and the occurrence of stress among these patients (2, 3, 122). Various studies have investigated the prevalence of stress among patients with different types of skin diseases (22, 23, 26). In a study conducted by Dalgard et al with samples from a number of European countries, 35.60% of skin patients suffered from stress (27). Stress among skin patients in Egypt and India is also highly prevalent (15, 22). In other studies, the prevalence of stress among patients with some skin diseases has been reported as 40% in Malaysia, 59.12% in Korea, and 41.40% in a number of European countries (6, 14, 26). These results are consistent with the findings within our study, considering that the pooled prevalence of stress in the patients is calculated as 39.4%. In research conducted by Ahmed et al., stress rate among skin patients in Saudi Arabia was reported as 7.50% (33). This is a relatively low rate compared to the results of the reviewed studies and the findings in the current research. Many factors, such health conditions, and different environmental factors and lifestyle can affect the occurrence of stress, hence it is believed that the difference in prevalence rates can be caused by the influences from such factors.

One of the limitations of this research is the adoption of different cut-off points within the selected original articles. In addition, many other studies were excluded due to insufficiency of reported results, or their low quality. Moreover, several factors such as environmental conditions, lifestyle, gender, and diet that can impact the occurrence of mental disorders as well as various skin diseases were not factored in. Accordingly, many of the included studies did not embrace such a holistic assessment of all possible factors involved. Finally, only studies published in English were included in our research, and thus studies and reported results published in other languages were omitted.

Conclusion

According to the results of our systematic review and meta-analysis, the global pooled prevalence of stress among skin patients is 39.4%. Moreover, the prevalence of depression and anxiety among the patients is 27.2% and 28.8%, respectively. In addition, the prevalence of stress, depression, and anxiety associated separately with psoriasis, acne, vitiligo and atopic dermatitis disorders has also been reported. The highest prevalence of stress is found among patients with acne (75.7%) and the prevalence of anxiety among patients with acne, psoriasis, vitiligo, and atopic dermatitis are found as 36.5%, 23.5%, 34.7%, and 20%, respectively. On the other hand, 27.2% of psoriasis patients, 22.7% of acne patients, 38.3% of vitiligo patients and 20.8% of atopic dermatitis patients had some degree of depression. Thus, it is crucial to pay attention to subsequential mental health disorders among skin patients. In addition, health policymakers should devise appropriate interventions, and develop the necessary measures and policies to prevent and/or reduce mental illnesses and associated complications among patients with a skin disorder.

Abbreviations

WoS: Web of Science

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analysis

STROBE: Strengthening the reporting of observational studies in epidemiology for cross-sectional study

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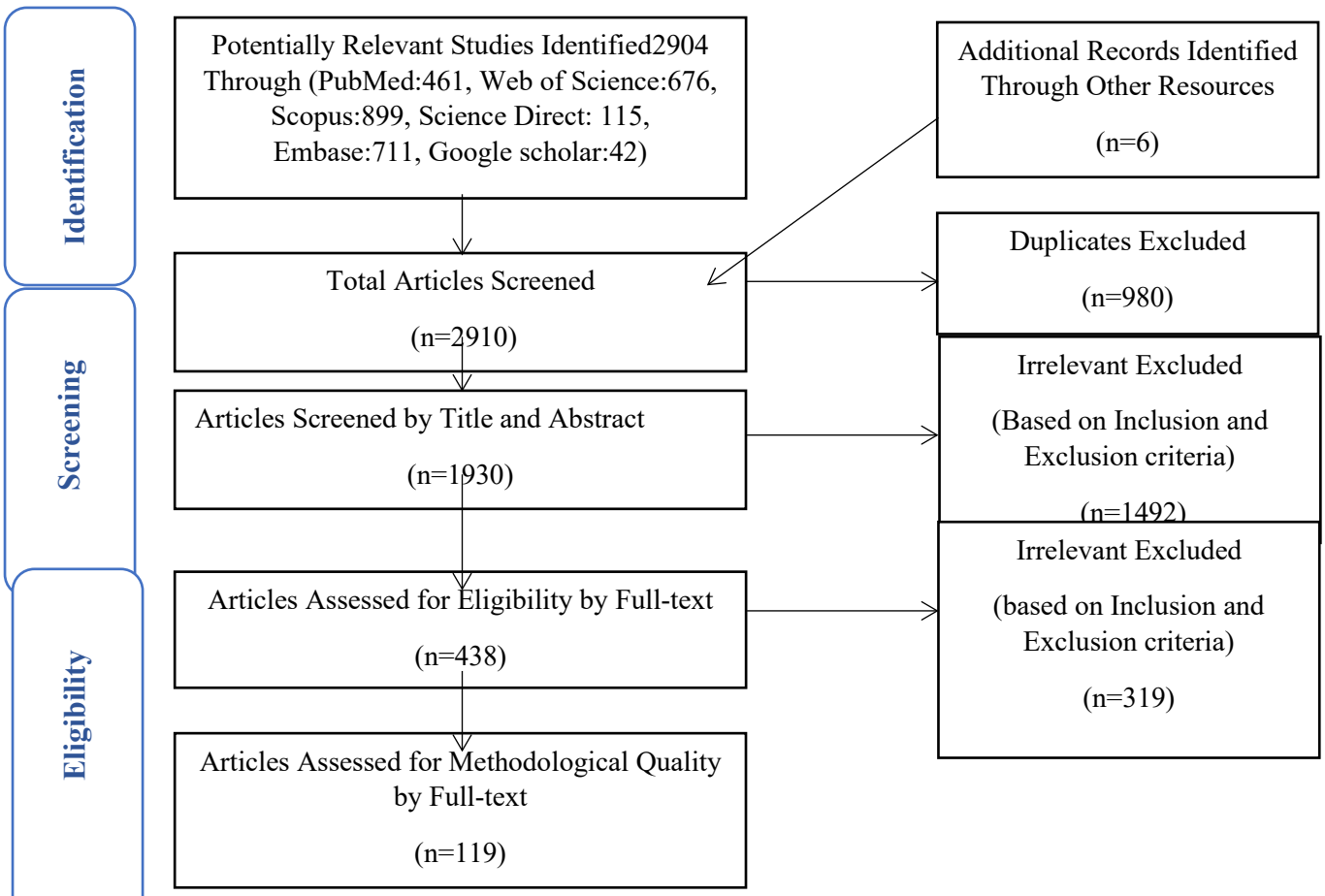


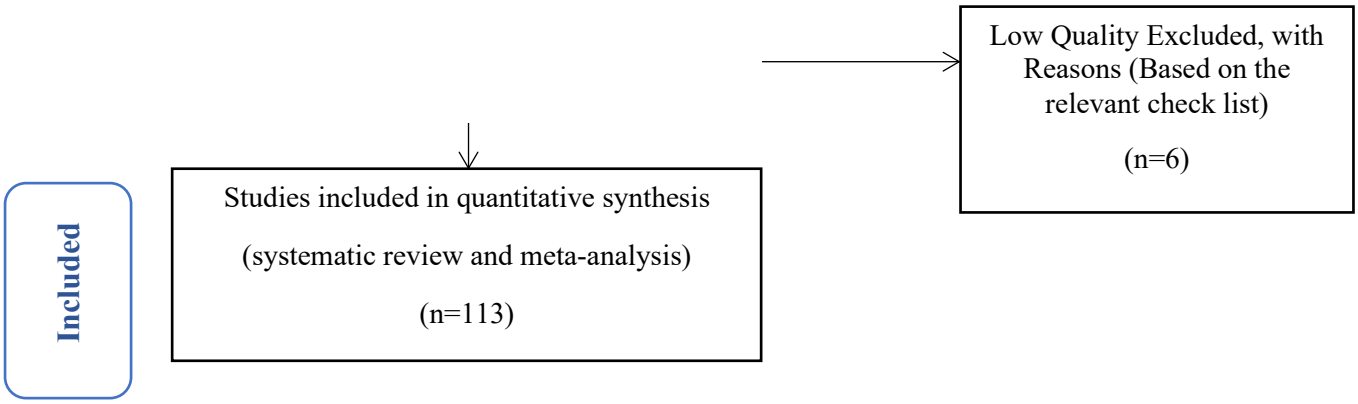


Figure 1: PRISMA Flow Diagram for Identifying Relevant Studies (PRISMA 2009).

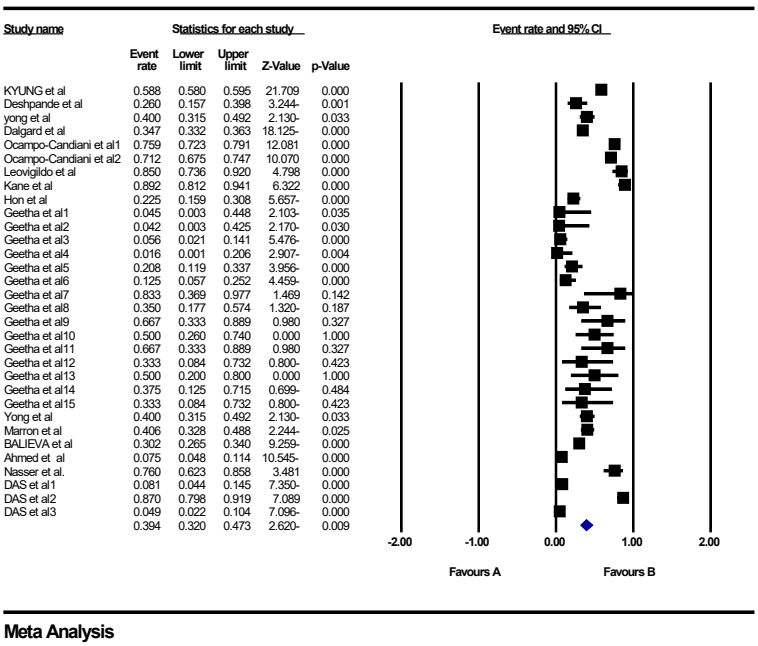


Figure 2: Forest plot of prevalence of stress among skin disease patients based on random effects model.

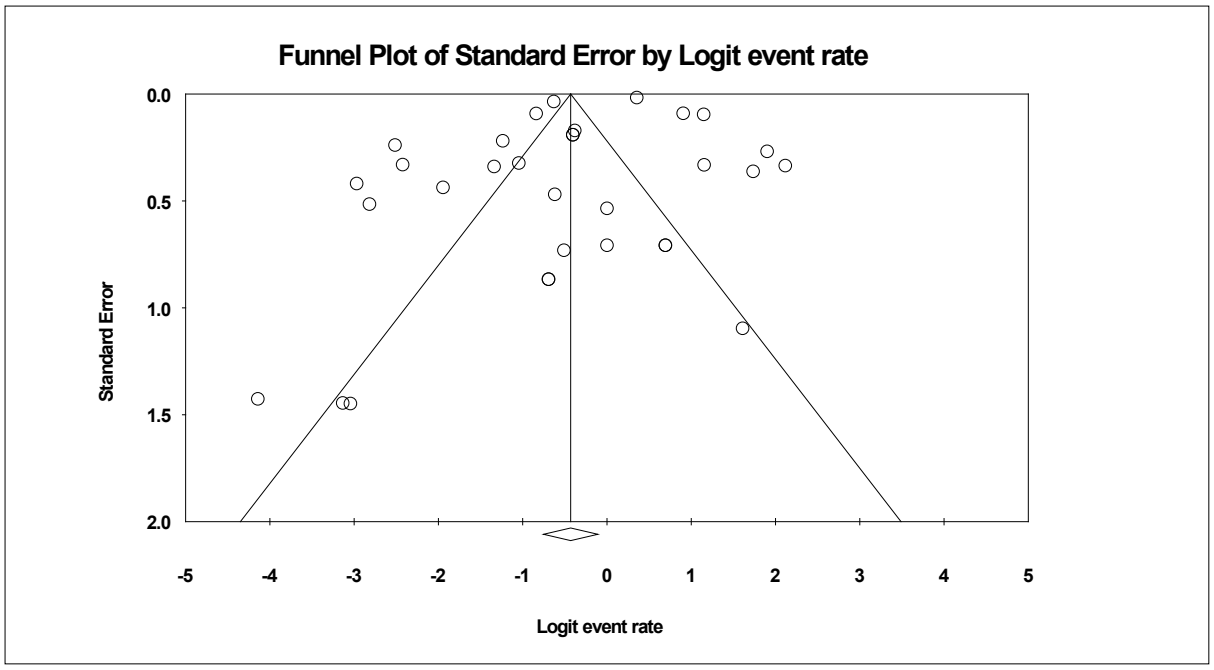
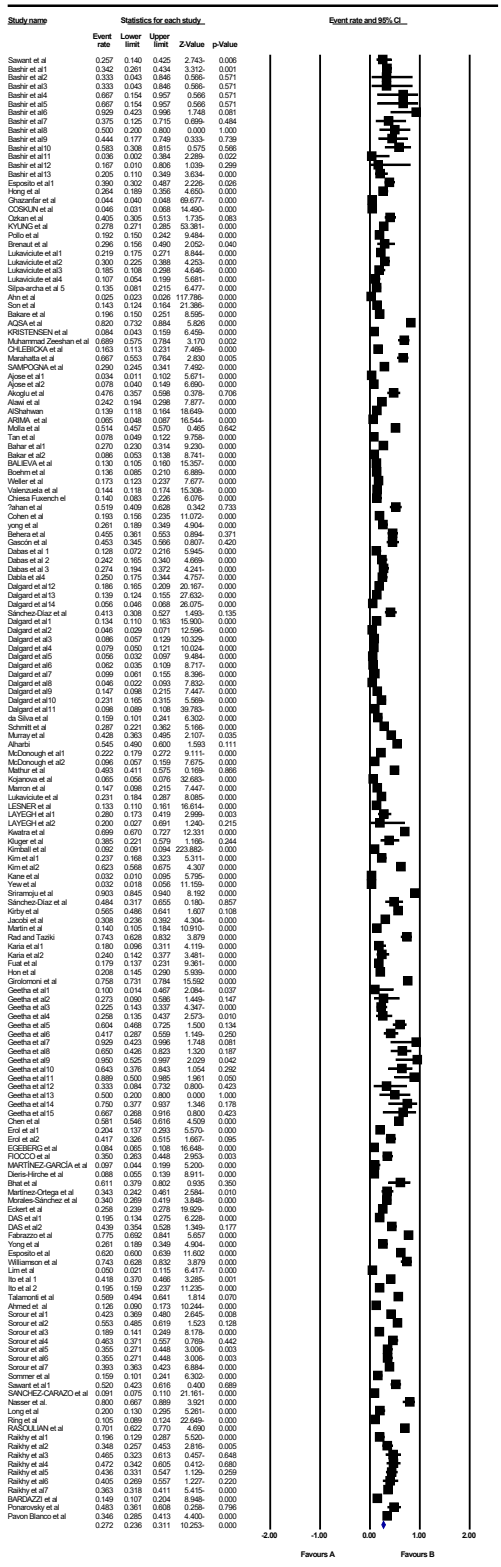


Figure 3: Funnel plot for assessing publication bias in the reviewed studies focused on stress

Meta Analysis



Study name	Event rate	Lower limit	Upper limit	Z-Value	p-Value
Sawant et al	0.257	0.140	0.425	2.743-	0.006
Bashir et al1	0.342	0.261	0.434	3.312-	0.001
Bashir et al2	0.333	0.043	0.846	0.566-	0.571
Bashir et al3	0.333	0.043	0.846	0.566-	0.571
Bashir et al4	0.667	0.154	0.957	0.566	0.571
Bashir et al5	0.667	0.154	0.957	0.566	0.571
Bashir et al6	0.929	0.423	0.996	1.748	0.081
Bashir et al7	0.375	0.125	0.715	0.699-	0.484
Bashir et al8	0.500	0.200	0.800	0.000	1.000
Bashir et al9	0.444	0.177	0.749	0.333-	0.739
Bashir et al10	0.583	0.308	0.815	0.575	0.566
Bashir et al11	0.036	0.002	0.384	2.280-	0.022
Bashir et al12	0.167	0.010	0.806	1.039-	0.299
Bashir et al13	0.205	0.110	0.349	3.634-	0.000
Esposito et al1	0.360	0.302	0.487	2.226-	0.026
Hong et al	0.264	0.189	0.356	4.650-	0.000
Ghazanfar et al	0.044	0.040	0.048	69.677-	0.000
COSKUN et al	0.046	0.031	0.068	14.450-	0.000
Ozkan et al	0.405	0.305	0.513	1.735-	0.083
KYUNG et al	0.278	0.271	0.285	53.381-	0.000
Pollo et al	0.192	0.150	0.242	9.484-	0.000
Brenaut et al	0.296	0.156	0.490	2.052-	0.040
Lukaviciute et al1	0.219	0.175	0.271	8.844-	0.000
Lukaviciute et al2	0.300	0.225	0.388	4.253-	0.000
Lukaviciute et al3	0.185	0.108	0.298	4.646-	0.000
Lukaviciute et al4	0.107	0.054	0.199	5.681-	0.000
Silpa-archa et al 5	0.135	0.081	0.215	6.477-	0.000
Ahn et al	0.025	0.023	0.026	117.786-	0.000
Son et al	0.143	0.124	0.164	21.386-	0.000
Bakare et al	0.196	0.150	0.251	8.595-	0.000
AQSA et al	0.820	0.732	0.884	5.826	0.000
KRISTENSEN et al	0.084	0.043	0.159	6.459-	0.000
Muhammad Zeeshan et al	0.689	0.575	0.784	3.170	0.002
CHLEBICKA et al	0.163	0.113	0.231	7.465-	0.000
Marahatta et al	0.667	0.553	0.764	2.830	0.005
SAMPOGNA et al	0.290	0.245	0.341	7.452-	0.000
Ajose et al1	0.034	0.011	0.102	5.671-	0.000
Ajose et al2	0.078	0.040	0.149	6.690-	0.000
Akcoglu et al	0.476	0.357	0.598	0.379-	0.706
Alawi et al	0.242	0.194	0.298	7.877-	0.000
AlShahwan	0.139	0.118	0.164	18.649-	0.000
ARIMA et al	0.065	0.048	0.087	16.544-	0.000
Molla et al	0.514	0.457	0.570	0.465	0.642
Tan et al	0.078	0.049	0.122	9.758-	0.000
Bahar et al1	0.270	0.230	0.314	9.230-	0.000
Bakar et al2	0.086	0.053	0.138	8.741-	0.000
BALIEVA et al	0.130	0.105	0.160	15.357-	0.000
Boehm et al	0.136	0.085	0.210	6.889-	0.000
Weller et al	0.173	0.123	0.237	7.677-	0.000
Valenzuela et al	0.144	0.118	0.174	15.308-	0.000
Chiesa Fuxench et	0.140	0.083	0.226	6.076-	0.000
?ahan et al	0.519	0.409	0.628	0.342	0.733
Cohen et al	0.193	0.156	0.235	11.072-	0.000
yong et al	0.261	0.189	0.349	4.904-	0.000
Behera et al	0.455	0.361	0.553	0.894-	0.371
Gascón et al	0.453	0.345	0.566	0.807-	0.420
Dabas et al 1	0.128	0.072	0.216	5.945-	0.000
Dabas et al 2	0.242	0.165	0.340	4.669-	0.000
Dabas et al 3	0.274	0.194	0.372	4.241-	0.000
Dabla et al4	0.250	0.175	0.344	4.757-	0.000
Dalgard et al12	0.186	0.165	0.209	20.167-	0.000
Dalgard et al13	0.139	0.124	0.155	27.632-	0.000
Dalgard et al14	0.056	0.046	0.068	26.075-	0.000
Sánchez-Díaz et al	0.413	0.308	0.527	1.493-	0.135
Dalgard et al1	0.134	0.110	0.163	15.900-	0.000
Dalgard et al2	0.046	0.029	0.071	12.596-	0.000
Dalgard et al3	0.086	0.057	0.129	10.329-	0.000
Dalgard et al4	0.079	0.050	0.121	10.024-	0.000
Dalgard et al5	0.056	0.032	0.097	9.484-	0.000
Dalgard et al6	0.062	0.035	0.109	8.717-	0.000
Dalgard et al7	0.099	0.061	0.155	8.366-	0.000
Dalgard et al8	0.046	0.022	0.093	7.832-	0.000
Dalgard et al9	0.147	0.098	0.215	7.447-	0.000
Dalgard et al10	0.231	0.165	0.315	5.569-	0.000
Dalgard et al11	0.098	0.089	0.108	39.783-	0.000
da Silva et al	0.159	0.101	0.241	6.302-	0.000
Schmitt et al	0.287	0.221	0.362	5.166-	0.000
Murray et al	0.428	0.363	0.495	2.107-	0.035
Alharbi	0.545	0.490	0.600	1.593	0.111
McDonough et al1	0.222	0.179	0.272	9.111-	0.000
McDonough et al2	0.096	0.057	0.159	7.675-	0.000
Mathur et al	0.493	0.411	0.575	0.169-	0.866
Kojanova et al	0.065	0.056	0.076	32.683-	0.000
Marron et al	0.147	0.098	0.215	7.447-	0.000
Lukaviciute et al	0.231	0.184	0.287	8.085-	0.000
LESNER et al	0.133	0.110	0.161	16.614-	0.000
LAYEGH et al1	0.280	0.173	0.419	2.998-	0.003
LAYEGH et al2	0.200	0.027	0.691	1.240-	0.215
Kwatra et al	0.699	0.670	0.727	12.331	0.000
Kluger et al	0.385	0.221	0.579	1.165-	0.244
Kimball et al	0.092	0.091	0.094	223.882-	0.000
Kim et al1	0.237	0.168	0.323	5.311-	0.000
Kim et al2	0.623	0.568	0.675	4.307	0.000
Kane et al	0.032	0.010	0.095	5.795-	0.000
Yew et al	0.032	0.018	0.056	11.159-	0.000
Sriramoju et al	0.903	0.845	0.940	8.192	0.000
Sánchez-Díaz et al	0.484	0.317	0.655	0.180-	0.857
Kirby et al	0.565	0.486	0.641	1.607	0.108
Jacobi et al	0.308	0.236	0.392	4.304-	0.000
Martin et al	0.140	0.105	0.184	10.910-	0.000
Rad and Taziki	0.743	0.628	0.832	3.879	0.000
Karia et al 1	0.180	0.096	0.311	4.119-	0.000
Karia et al2	0.240	0.142	0.377	3.481-	0.000
Fuat et al	0.179	0.137	0.231	9.361-	0.000
Hon et al	0.208	0.145	0.290	5.939-	0.000
Girolomoni et al	0.758	0.731	0.784	15.592	0.000
Geetha et al1	0.100	0.014	0.467	2.084-	0.037
Geetha et al2	0.273	0.090	0.586	1.449-	0.147
Geetha et al3	0.225	0.143	0.337	4.347-	0.000
Geetha et al4	0.258	0.135	0.437	2.573-	0.010
Geetha et al5	0.604	0.468	0.725	1.500	0.134
Geetha et al6	0.417	0.287	0.559	1.149-	0.250
Geetha et al7	0.929	0.423	0.996	1.748	0.081
Geetha et al8	0.650	0.426	0.823	1.320	0.187
Geetha et al9	0.950	0.525	0.997	2.029	0.042
Geetha et al10	0.643	0.376	0.843	1.054	0.292
Geetha et al11	0.889	0.500	0.985	1.961	0.050
Geetha et al12	0.333	0.084	0.732	0.800-	0.423
Geetha et al13	0.500	0.200	0.800	0.000	1.000
Geetha et al14	0.750	0.377	0.937	1.346	0.178
Geetha et al15	0.667	0.268	0.916	0.800	0.423
Chen et al	0.581	0.546	0.616	4.509	0.000
Erol et al1	0.204	0.137	0.293	5.570-	0.000
Erol et al2	0.417	0.326	0.515	1.667-	0.095
EGEBERG et al	0.084	0.065	0.108	16.648-	0.000
FIOCCO et al	0.350	0.263	0.448	2.953-	0.003
MARTINEZ-GARCÍA et al	0.097	0.044	0.199	5.200-	0.000
Dieris-Hirche et al	0.088	0.055	0.139	8.911-	0.000
Bhat et al	0.611	0.379	0.802	0.935	0.350
Martínez-Ortega et al	0.343	0.242	0.461	2.584-	0.010
Morales-Sánchez et al	0.340	0.269	0.419	3.848-	0.000
Eckert et al	0.258	0.239	0.278	19.929-	0.000
DAS et al1	0.195	0.134	0.275	6.228-	0.000
DAS et al2	0.439	0.354	0.528	1.349-	0.177
Febrazzo et al	0.775	0.692	0.841	5.657	0.000
Yong et al	0.261	0.189	0.349	4.904-	0.000
Esposito et al	0.620	0.600	0.639	11.602	0.000
Williamson et al	0.743	0.628	0.832	3.879	0.000
Lim et al	0.050	0.021	0.115	6.417-	0.000
Ito et al 1	0.418	0.370	0.468	3.285-	0.001
Ito et al 2	0.195	0.159	0.237	11.235-	0.000
Talamonti et al	0.569	0.494	0.641	1.814	0.070
Ahmed et al	0.126	0.090	0.173	10.244-	0.000
Sorour et al1	0.423	0.369	0.480	2.645-	0.008
Sorour et al2	0.553	0.485	0.619	1.523	0.128
Sorour et al3	0.189	0.141	0.249	8.179-	0.000
Sorour et al4	0.463	0.371	0.557	0.769-	0.442
Sorour et al5	0.355	0.271	0.448	3.006-	0.003
Sorour et al6	0.355	0.271	0.448	3.006-	0.003
Sorour et al7	0.393	0.363	0.423	6.884-	0.000
Sommer et al	0.159	0.101	0.241	6.302-	0.000
Sawant et al1	0.520	0.423	0.616	0.400	0.689
SANCHEZ-CARAZO et al	0.091	0.075	0.110	21.161-	0.000
Nasser et al	0.800	0.667	0.889	3.921	0.000
Long et al	0.200	0.130	0.295	5.261-	0.000
Ring et al	0.105	0.089	0.124	22.649-	0.000
RASOULIAN et al	0.701	0.622	0.770	4.690	0.000
Raikhy et al1	0.196	0.129	0.287	5.520-	0.000
Raikhy et al2	0.348	0.257	0.453	2.816-	0.005
Raikhy et al3	0.465	0.323	0.613	0.457-	0.648
Raikhy et al4	0.472	0.342	0.605	0.412-	0.680
Raikhy et al5	0.436	0.331	0.547	1.129-	0.259
Raikhy et al6	0.405	0.269	0.557	1.227-	0.220
Raikhy et al7	0.363	0.318	0.411	5.415-	0.000
BARDAZZI et al	0.149	0.107	0.204	8.948-	0.000
Ponarovsky et al	0.483	0.361	0.608	0.258-	0.796
Pavon Blanco et al	0.346	0.285	0.413	4.400-	0.000
	0.272	0.236	0.311	10.253-	0.000

Meta Analysis

Figure 4: Forest plot of prevalence of depression among skin disease patients based on random effects model.

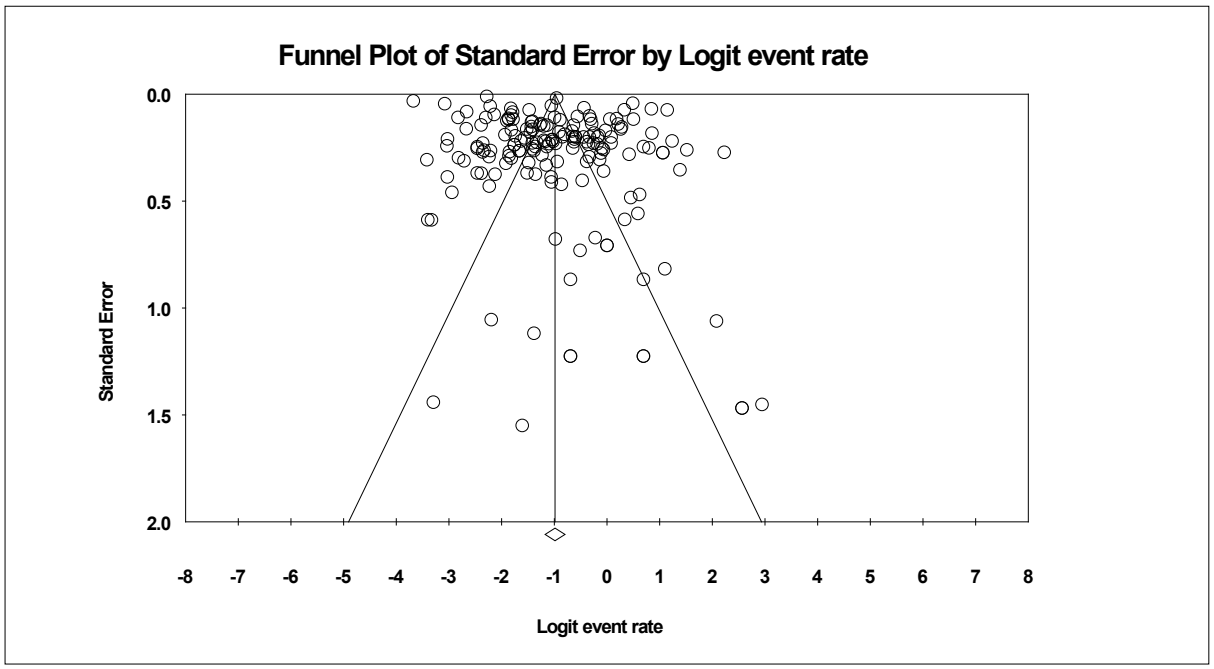
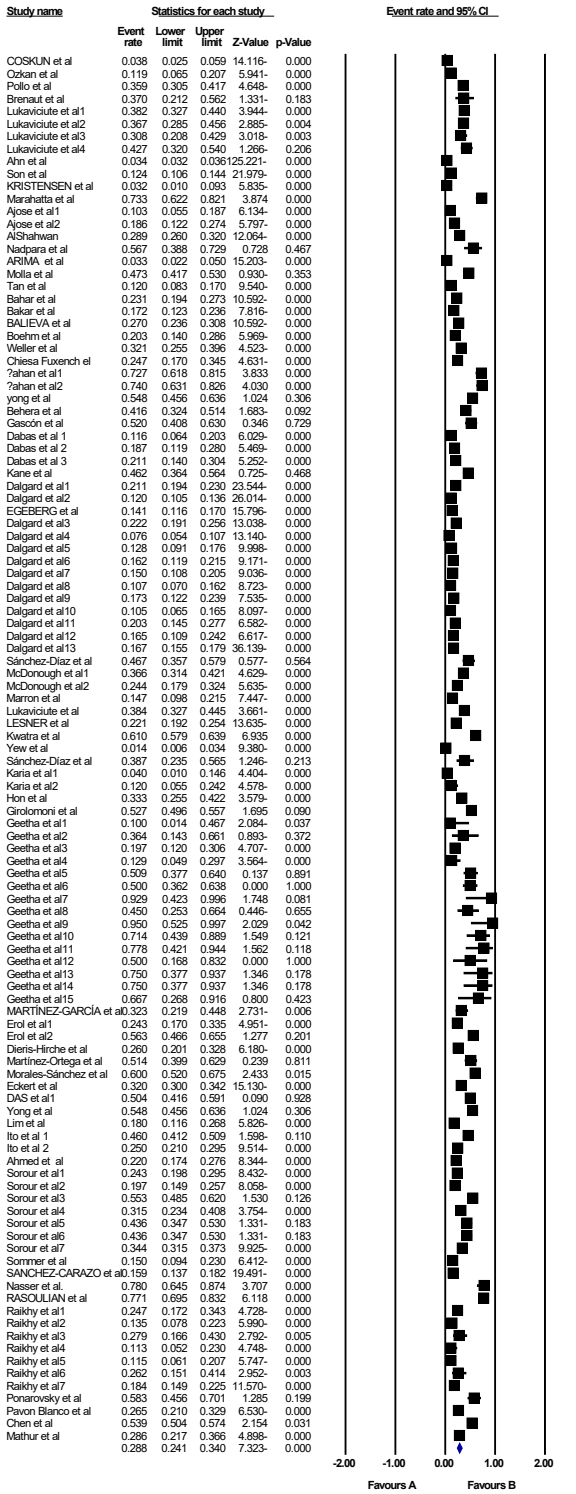


Figure 5: Funnel plot for assessing publication bias in the reviewed studies focused on depression.

Meta Analysis



Study name	Event rate	Lower limit	Upper limit	Z-Value	p-Value
COSKUN et al	0.038	0.025	0.059	14.116-	0.000
Ozkan et al	0.119	0.065	0.207	5.941-	0.000
Pollo et al	0.359	0.305	0.417	4.648-	0.000
Brenaut et al	0.370	0.212	0.562	1.331-	0.183
Lukaviciute et al1	0.382	0.327	0.440	3.944-	0.000
Lukaviciute et al2	0.367	0.285	0.456	2.885-	0.004
Lukaviciute et al3	0.308	0.208	0.429	3.018-	0.003
Lukaviciute et al4	0.427	0.320	0.540	1.266-	0.206
Ahn et al	0.034	0.032	0.036	125.221-	0.000
Son et al	0.124	0.106	0.144	21.979-	0.000
KRISTENSEN et al	0.032	0.010	0.093	5.835-	0.000
Marahatta et al	0.733	0.622	0.821	3.874	0.000
Ajose et al1	0.103	0.055	0.187	6.134-	0.000
Ajose et al2	0.186	0.122	0.274	5.797-	0.000
AlShahwan	0.289	0.260	0.320	12.064-	0.000
Nadpara et al	0.567	0.388	0.729	0.728	0.467
ARIMA et al	0.033	0.022	0.050	15.203-	0.000
Molla et al	0.473	0.417	0.530	0.930-	0.353
Tan et al	0.120	0.083	0.170	9.540-	0.000
Bahar et al	0.231	0.194	0.273	10.592-	0.000
Bakar et al	0.172	0.123	0.236	7.816-	0.000
BALIEVA et al	0.270	0.236	0.308	10.592-	0.000
Boehm et al	0.203	0.140	0.286	5.969-	0.000
Weller et al	0.321	0.255	0.396	4.523-	0.000
Chiesa Fuxench el	0.247	0.170	0.345	4.631-	0.000
?ahan et al1	0.727	0.618	0.815	3.833	0.000
?ahan et al2	0.740	0.631	0.826	4.030	0.000
yong et al	0.548	0.456	0.636	1.024	0.306
Behera et al	0.416	0.324	0.514	1.683-	0.092
Gascón et al	0.520	0.408	0.630	0.346	0.729
Dabas et al 1	0.116	0.064	0.203	6.029-	0.000
Dabas et al 2	0.187	0.119	0.280	5.469-	0.000
Dabas et al 3	0.211	0.140	0.304	5.252-	0.000
Kane et al	0.462	0.364	0.564	0.725-	0.468
Dalgard et al1	0.211	0.194	0.230	23.544-	0.000
Dalgard et al2	0.120	0.105	0.136	26.014-	0.000
EGEBERG et al	0.141	0.116	0.170	15.796-	0.000
Dalgard et al3	0.222	0.191	0.256	13.038-	0.000
Dalgard et al4	0.076	0.054	0.107	13.140-	0.000
Dalgard et al5	0.128	0.091	0.176	9.998-	0.000
Dalgard et al6	0.162	0.119	0.215	9.171-	0.000
Dalgard et al7	0.150	0.108	0.205	9.036-	0.000
Dalgard et al8	0.107	0.070	0.162	8.723-	0.000
Dalgard et al9	0.173	0.122	0.239	7.535-	0.000
Dalgard et al10	0.105	0.065	0.165	8.097-	0.000
Dalgard et al11	0.203	0.145	0.277	6.582-	0.000
Dalgard et al12	0.165	0.109	0.242	6.617-	0.000
Dalgard et al13	0.167	0.155	0.179	36.139-	0.000
Sánchez-Díaz et al	0.467	0.357	0.579	0.577-	0.564
McDonough et al1	0.366	0.314	0.421	4.629-	0.000
McDonough et al2	0.244	0.179	0.324	5.635-	0.000
Marron et al	0.147	0.098	0.215	7.447-	0.000
Lukaviciute et al	0.384	0.327	0.445	3.661-	0.000
LESNER et al	0.221	0.192	0.254	13.635-	0.000
Kwatra et al	0.610	0.579	0.639	6.935	0.000
Yew et al	0.014	0.006	0.034	9.380-	0.000
Sánchez-Díaz et al	0.387	0.235	0.565	1.246-	0.213
Karia et al1	0.040	0.010	0.146	4.404-	0.000
Karia et al2	0.120	0.055	0.242	4.578-	0.000
Hon et al	0.333	0.255	0.422	3.579-	0.000
Girolomoni et al	0.527	0.496	0.557	1.695	0.090
Geetha et al1	0.100	0.014	0.467	2.084-	0.037
Geetha et al2	0.364	0.143	0.661	0.893-	0.372
Geetha et al3	0.197	0.120	0.306	4.707-	0.000
Geetha et al4	0.129	0.049	0.297	3.564-	0.000
Geetha et al5	0.509	0.377	0.640	0.137	0.891
Geetha et al6	0.500	0.362	0.638	0.000	1.000
Geetha et al7	0.929	0.423	0.996	1.748	0.081
Geetha et al8	0.450	0.253	0.664	0.446-	0.655
Geetha et al9	0.950	0.525	0.997	2.029	0.042
Geetha et al10	0.714	0.439	0.889	1.549	0.121
Geetha et al11	0.778	0.421	0.944	1.562	0.118
Geetha et al12	0.500	0.168	0.832	0.000	1.000
Geetha et al13	0.750	0.377	0.937	1.346	0.178
Geetha et al14	0.750	0.377	0.937	1.346	0.178
Geetha et al15	0.667	0.268	0.916	0.800	0.423
MARTÍNEZ-GARCÍA et al	0.323	0.219	0.448	2.731-	0.006
Erol et al1	0.243	0.170	0.335	4.951-	0.000
Erol et al2	0.563	0.466	0.655	1.277	0.201
Dieris-Hirche et al	0.260	0.201	0.328	6.180-	0.000
Martínez-Ortega et al	0.514	0.399	0.629	0.239	0.811
Morales-Sánchez et al	0.600	0.520	0.675	2.433	0.015
Eckert et al	0.320	0.300	0.342	15.130-	0.000
DAS et al1	0.504	0.416	0.591	0.090	0.928
Yong et al	0.548	0.456	0.636	1.024	0.306
Lim et al	0.180	0.116	0.268	5.826-	0.000
Ito et al 1	0.460	0.412	0.509	1.598-	0.110
Ito et al 2	0.250	0.210	0.295	9.514-	0.000
Ahmed et al	0.220	0.174	0.276	8.344-	0.000
Sorour et al1	0.243	0.198	0.295	8.432-	0.000
Sorour et al2	0.197	0.149	0.257	8.058-	0.000
Sorour et al3	0.553	0.485	0.620	1.530	0.126
Sorour et al4	0.315	0.234	0.408	3.754-	0.000
Sorour et al5	0.436	0.347	0.530	1.331-	0.183
Sorour et al6	0.436	0.347	0.530	1.331-	0.183
Sorour et al7	0.344	0.315	0.373	9.925-	0.000
Sommer et al	0.150	0.094	0.230	6.412-	0.000
SANCHEZ-CARAZO et al	0.159	0.137	0.182	19.491-	0.000
Nasser et al.	0.780	0.645	0.874	3.707	0.000
RASOULIAN et al	0.771	0.695	0.832	6.118	0.000
Raikhy et al1	0.247	0.172	0.343	4.728-	0.000
Raikhy et al2	0.135	0.078	0.223	5.990-	0.000
Raikhy et al3	0.279	0.166	0.430	2.792-	0.005
Raikhy et al4	0.113	0.052	0.230	4.748-	0.000
Raikhy et al5	0.115	0.061	0.207	5.747-	0.000
Raikhy et al6	0.262	0.151	0.414	2.952-	0.003
Raikhy et al7	0.184	0.149	0.225	11.570-	0.000
Ponarovsky et al	0.583	0.456	0.701	1.285	0.199
Pavon Blanco et al	0.265	0.210	0.329	6.530-	0.000
Chen et al	0.539	0.504	0.574	2.154	0.031
Mathur et al	0.286	0.217	0.366	4.898-	0.000
	0.288	0.241	0.340	7.323-	0.000

Meta Analysis

Figure 6: Forest plot of prevalence of anxiety among skin disease patients based on random effects model.

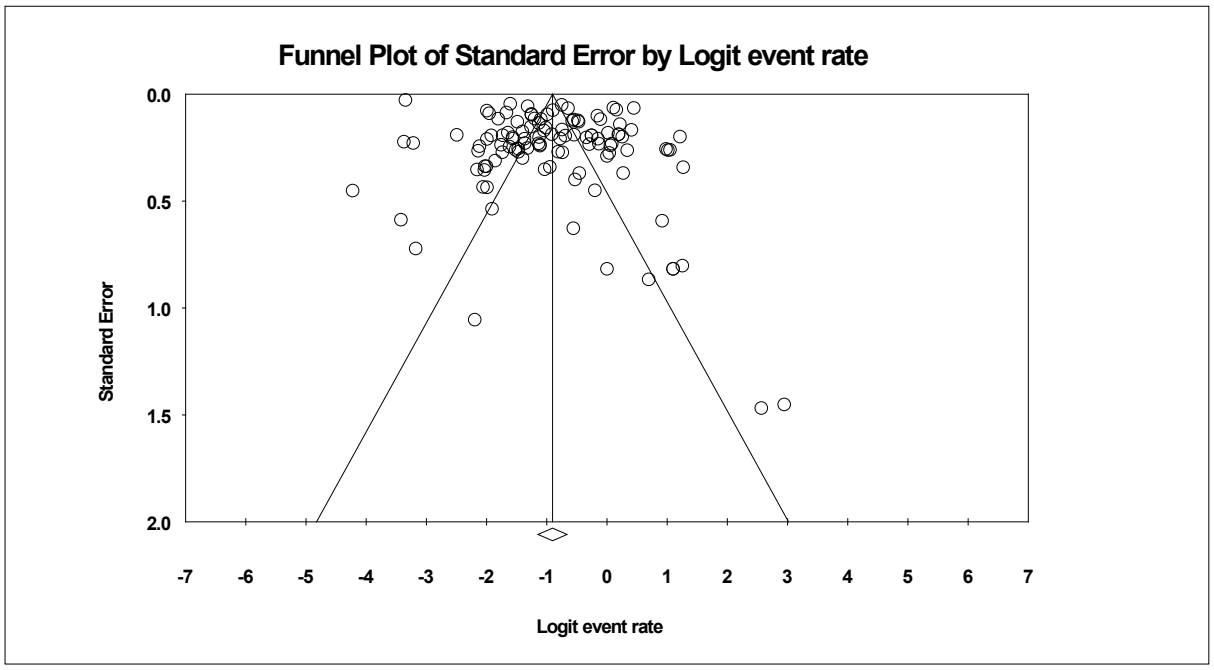


Figure 7: Funnel plot for assessing publication bias in the reviewed studies focused on anxiety.

Table 1: Summary of characteristics of the included studies that had reported prevalence of stress among skin disease patients

Author	Year	Country	Age rang	Sample size	Prevalence	Instrument	Type of disease	cut-off
KYUNG et al(14)	2020	South Korea		15536	59.12%	Self-Reports	Atopic dermatitis	-
Deshpande et al(25)	2018	India	33.4±7.45	50	26%	PSS-4*	Melasma	-
yong et al(26)	2022	Malaysia	19-89	115	40%	DASS-21**	chronic spontaneous urticaria	DASS-21≥15
Dalgard et al(27)	2015	European Countries	47.2±17.9	3635	35.6%	Self-Reported	Skin Diseases	-
Ocampo-Candiani et al(28)	2017	Mexico	18-73	606	75.9%	Self-Reported	fragile skin	-
Ocampo-Candiani et al(28)	2017	Russia	18-80	604	71.2%	Self-Reported	fragile skin	-
Leovigildo et al(29)	2016	Brazil	21-72	60	85%	LSSI***	psoriasis	-
Kane et al(30)	2007	Senegal	14-46	93	89.2%	anonymous questionnaire	Acne	-
Hon et al(31)	2014	China	14.4-18.2	120	23%	DASS-42	Atopic eczema	DASS-42>14
Geetha et al(23)	2021	India	60-88	10	0	PSS	Bacterial infections	-
Geetha et al(23)	2021	India	60-88	11	0	PSS	Viral infections	-
Geetha et al(23)	2021	India	60-88	71	5.6%	PSS	Fungal infections	-
Geetha et al(23)	2021	India	60-88	31	0	PSS	Parasitic infestations	-
Geetha et al(23)	2021	India	60-88	53	20.8%	PSS	Papulosquamous diseases	-
Geetha et al(23)	2021	India	60-88	48	12.5%	PSS	Eczema	-
Geetha et al(23)	2021	India	60-88	6	83.3%	PSS	Vesiculobullous diseases	-
Geetha et al(23)	2021	India	60-88	20	35%	PSS	Vascular diseases	-

Geetha et al(23)	2021	India	60-88	9	66.7%	PSS	Urticaria/angioedema	-
Geetha et al(23)	2021	India	60-88	14	50%	PSS	Acquired pigmentary diseases	-
Geetha et al(23)	2021	India	60-88	9	66.7%	PSS	Connective tissue diseases	-
Geetha etal(23)	2021	India	60-88	6	33.3%	PSS	Neutrophilic dermatoses	-
Geetha et al(23)	2021	India	60-88	8	50%	PSS	Drug reactions	-
Geetha et al(23)	2021	India	60-88	8	37.5%	PSS	Photosensitivity diseases	-
Geetha et al(23)	2021	India	60-88	6	33.3%	PSS	Appendageal diseases	-
Yong et al(26)	2022	Malaysia	19-89	115	40%	DASS-21	chronic spontaneous urticaria	DASS-21≥15
Marron et al(6)	2018	European Countries	45.2±15.2	143	41.4%	Self-Reported	Hand Eczema	-
BALIEVA et al(18)	2016	Norway	18-92	577	30.1%	Self-Reported	Common Skin Diseases	-
Tasoula et al(32)	2012	Greece	11-19	1531	55.4%	Self-Reported	acne vulgaris	-
Ahmed et al(33)	2016	Saudi Arabia	14≥	254	7.5%	DASS-21	Skin Disease	-
Nasser et al(15)	2021	Egypt	34.69±5.87	50	76%	DASS-21	vitiligo	-
DAS et al(22)	2021	India	33.7±11.4	123	8.1%	PSS	chronic and recurrent dermatophytosis	-
DAS et al(22)	2021	India	33.7±11.4	123	86.9%	PSS	chronic and recurrent dermatophytosis	-
DAS et al(22)	2021	India	33.7±11.4	123	4.9%	PSS	chronic and recurrent dermatophytosis	-

Perceived Stress Scale*

Depression Anxiety Stress Scales **

Lipp's Stress Symptoms Inventory***

Table 2: Summary of characteristics of the included studies that had reported prevalence of depression among skin disease patients

Author	year	Country	Age Range	Sample size	Prevalence	Instrument	Type of Disease	Cut off
Sawant et al(34)	2015	India	44.208±13.624	35	25.71%	BDI_II*	Lichen Planus	-
Bashir et al(24)	2010	Pakistan	18≥	114	34.10%	GHQ-12**	Total	-
Bashir et al(24)	2010	Pakistan	18≥	3	33.30%	GHQ-12	Hyperhiderosis	-
Bashir et al(24)	2010	Pakistan	18≥	3	33.30%	GHQ-12	Alopecia areata	-
Bashir et al(24)	2010	Pakistan	18≥	3	66.60%	GHQ-12	Urticaria	-
Bashir et al(24)	2010	Pakistan	18≥	3	66.60%	GHQ-12	Pruritis	-
Bashir et al(24)	2010	Pakistan	18≥	6	100%	GHQ-12	Psychocutaneous disorders	-
Bashir et al(24)	2010	Pakistan	18≥	8	37.5%	GHQ-12	Melasma	-
Bashir et al(24)	2010	Pakistan	18≥	8	50%	GHQ-12	Psoriasis	-
Bashir et al(24)	2010	Pakistan	18≥	9	44.40%	GHQ-12	Vitiligo	-
Bashir et al(24)	2010	Pakistan	18≥	12	58.30%	GHQ-12	Acne vulgaris	-
Bashir et al(24)	2010	Pakistan	18≥	13	0%	GHQ-12	Ch. fungal Infections	-
Bashir et al(24)	2010	Pakistan	18≥	2	0%	GHQ-12	Leprosy	-
Bashir et al(24)	2010	Pakistan	18≥	44	20.50%	GHQ-12	Eczema	-
Esposito et al(35)	2020	Italy	21-71	105	39%	BDI	psoriasis vulgaris	BDI>10
Hong et al(12)	2019	southeast US	51.1±13.3	106	26.40%	PROMIS***	Chronic Cutaneous Lupus Erythematosus	-
Ghazanfar et al(36)	2019	Denmark	38.4	12185	4.40%	ICD-10****, ICD-8	chronic urticaria	-
COSKUN et al(37)	2005	Turkey	24-63	520		SCID*****	chronic dermatoses	-
Ozkan et al(38)	2006	Turkey	36.83±10.26	84	40%	SCID-I	Chronic idiopathic urticaria	-
KYUNG et al(14)	2020	South Korean		15536	27.81%	Self-reported	atopic dermatitis	-
Ergün et al(39)	2007	Turkey	41.04±10.50 female	43 female	60.46% female	HDRS******	Hand Eczema	-
Ergün et al(39)	2007	Turkey	39.0±9.62	45	24.44%	HDRS	Hand Eczema	-

			male	male	male			
Pollo et al(40)	2021	Brazil	52.1±13.8	281	19%	HAD*******	psoriasis	HAD>8
Brenaut et al(41)	2019	European Countries	28-84	27	29.00%	HADS********	Prurigo	HADS≥11
Lukaviciute et al(42)	2020	Lithuania	24.49±0.47	283	21.90%	HADS	Acne	-
Lukaviciute et al(42)	2020	Lithuania	42.3±1.11	120	30.00%	HADS	Rosacea	-
Lukaviciute et al(42)	2020	Lithuania	29.1±0.96	65	18.50%	HADS	Folliculitis	-
Lukaviciute et al(42)	2020	Lithuania	31.9±1.36	75	10.70%	HADS	Perioral dermatitis	-
Silpa-archa et al(43)	2020	Thailand	41.55±15.92	104	13.50%	PHQ-9*********	Vitiligo	PHQ-9≥9
Ahn et al(44)	2019	Korea	>0	42641	2.47%	ICD-10	atopic dermatitis	-
Son et al(45)	2022	South Korea	23.5±15.8	1163	14.30%	patient questionnaire	Atopic Dermatitis	-
Bakare et al(46)	2015	Nigeria	20-100	235	19.50%	CIDI**********	Leprosy	-
AQSA et al(47)	2021	Pakistan	18-65	100	-	PHQ-9	Melasma	PHQ-9≥5
KRISTENSEN et al(48)	2020	Denmark	32±10.9	95	-	HADS	Hyperhidrosis	-
Muhammad Zeeshan et al(49)	2019	Pakistan	14-28	74	68.90%	PHQ-9	ACNE	PHQ-9≥5
CHLEBICKA et al(50)	2021	Poland	17-94	153	16.34%	BDI	Basal Cell Carcinoma	BDI≥10
Marahatta et al(51)	2020	Nepal	29.40±9.90	75	66.70%	BDI	Alopecia Areata	BDI≥10
SAMPOGNA et al(52)	2020	Italy	32.4±11.9	341	29%	GHQ-12	Hidradenitis Suppurativa	GHQ-12≥7
Ajose et al(53)	2013	Nigeria	30.05±9.76	87	3%	HADS	Albino	HADS>10
(53)Ajose et al	2013	Nigeria	35.94±13.65	102	8%	HADS	Vitiligo	HADS>10
Akoglu et al(53)	2021	Turkey	18-66	63	47.60%	BDI	hidradenitis suppurativa	BDI≥17
Alawi et al(17)	2018	Oman	29.47±10.25	260	24.20%	PHQ-9	dermatological disorders	PHQ-9 ≥ 10
AlShahwan(54)	2014	Saudi Arabia	18≥	875	14%	HADS	skin disease	-
ARIMA et al(55)	2018	Japan	38.67±13.07	634	10.25%	Self-reported	atopic dermatitis	-
Molla et al(56)	2021	Saudi Arabia	12-60	296	51.40%	HADS	Vulgaris	HADS≥8
Tan et al(57)	2021	Malaysia	13-87	217	7.80%	HADS	atopic dermatitis	HADS≥11
Bahar et al(58)	2016	Canada& China	35.5	437	27.20%	PHQ-9	hyperhidrosis	-
Bakar et al(59)	2021	Malaysia	46.4±15.14	174	8.50%	HADS	psoriasis	-
BALIEVA et al(18)	2016	Norway	18-92	577	13.30%	HADS	Common Skin Diseases	HADS≥8
Boehm et al(60)	2012	Germany	42±12.9	118	13.50%	HADS	occupational hand eczema	HADS>10
Weller et al(61)	2013	Germany & Greece	16-82	168	17%	HADS	chronic spontaneous urticaria	HADS≥8
Valenzuela et al(62)	2022	Chile	49.2±15.1	598	14.40%	A 48-item researcher-made questionnaire	Psoriasis	-
Chiesa Fuxench el(63)	2018	United States	51.81±18.17	93	13.98%	HADS	Atopic Dermatitis	HADS=11-21
Şahan et al(64)	2020	Turkey	37.68±11.67	77	51.90%	BDI	Genital HPV Infection	-
Cohen et al(65)	2005	southern Israel	20-65	384	19.30%	MINI**********	skin diseases	-
yong et al(26)	2022	Malaysia	19-89	115	26.10%	DASS-21**********	chronic spontaneous urticaria	DASS-21≥10
Behera et al(10)	2022	India	≥18	101	45.54%	PHQ-9	Chronic Skin Disorder	PHQ-9≥10
Gascón et al(66)	2012	Brazil	18-76	75	45.30%	PRIME-MD**********	Skin Disease	
Dabas et al(67)	2019	India	18-60	86	12.80%	PHQ-9	Melasma	PHQ-9≥10
Dabas et al(67)	2019	India	18-60	91	24.20%	PHQ-9	acquired dermal macular hyperpigmentation	PHQ-9≥10
Dabas et al(67)	2019	India	18-60	95	27.10%	PHQ-9	Vitiligo	PHQ-9≥10
Dabla et al(68)	2021	New Zealand	49.8±16.0	100		PHQ-9	psoriasis	PHQ-9≥10

Dalgard et al(69)	2007	Norway	30-76	1232	19.50%	HSCL******** ******	Itch	HSCL >1.85
Dalgard et al(13)	2019	European countries	47.2±17.5	1917	14.10%	HADS	skin diseases with itch	HADS≥11
Dalgard et al(13)	2019	European countries	47.2±17.5	1613	5.70%	HADS	Skin disease without itch	HADS≥11
Sánchez-Díaz et al(70)	2022	Spain	46.48±11.25	75	41.33%	HADS	Chronic Spontaneous Urticaria	-
Dalgard et al(27)	2015	European Countries	47.2±17.9	626	13.80%	HADS	Psoriasis	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	394	5%	HADS	Non-melanoma skin cancer	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	243	8.90%	HADS	Infections skin	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	229	8.00%	HADS	Eczema	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	213	5.70%	HADS	Acne	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	177	6.00%	HADS	Nevi	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	162	10.10%	HADS	Atopic eczema	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	152	4.80%	HADS	Benign skin tumors	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	143	15%	HADS	Hand eczema	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	121	24.30%	HADS	Leg ulcers	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	3635	10.10%	HADS	Dermatological out-patients overall	HADS≥11
da Silva et al(71)	2022	Germany	46.28±14.63	107	15.90%	PHQ-2	psoriasis	PHQ-2 ≥3
Schmitt et al(72)	2012	Brazil	51±20	157	29%	ICD-10	Hair loss	PHQ-2 ≥3
Murray et al(73)	2020	Ireland	≥18	215	43%	self-reported	atopic dermatitis	-
Alharbi(74)	2020	Saudi Arabia	27±14.5	308	54.50%	BDI	Vitiligo	-
McDonough et al(75)	2014	Canada	53.8±12.9	306	22.20%	HADS	Psoriatic arthritis	HADS ≥ 8
McDonough et al(75)	2014	Canada	52.4±13.2	135	9.60%	HADS	psoriasis alone	HADS ≥ 8
Mathur et al(76)	2021	India	20-72	140	49.30%	PHQ-9	severe chronic plaque psoriasis	PHQ-9≥10
Kojanova et al(77)	2021	Czech	52.2±13.2	2472	6.50%	BIOREP	psoriasis	-
Marron et al(6)	2018	European countries	45.2±15.2	143	15.90%	HADS	Hand Eczema	-
Lukaviciute et al(78)	2017	Lithuania	25.21±0.48	255	23.10%	HADS	Acne	HADS≥8
LESNER et al(79)	2017	European countries	47.0±15.6	682	13.30%	HADS	Psoriasis	HADS≥11
LAYEGH et al(80)	2013	Iran	21-79	50	28.00%	BDI	pemphigus vulgaris	BDI≥16
LAYEGH et al(80)	2013	Iran	17-38	5	20%	BDI	pemphigus foliaceus	BDI≥16
Kwatra et al(81)	2021	USA	37.4±14.5	1017	70.70%	PHQ-9	Atopic Dermatitis	-
Kluger et al(82)	2017	Southern Finland	23-72	26	38.50%	BDI-21	Hidradenitis Suppurativa	BDI-21>12
Kimball et al(83)	2010	USA	≥18	114512	9.20%	ICD-9	psoriasis	-
Kim et al(84)	2014	USA	48	114	24%	self-reported	Psoriasis	-
Kim et al(85)	2012	Korea	69.04±6.30	313	62.30%	GDS********** ******	Skin disease	GDS≥10
Kane et al(30)	2007	Senegal	14-46	93	3.40%	anonymous questionnaire	Acne	-
Yew et al(19)	2020	Singapore	≥22	347	3.20%	PHQ-9	skin diseases	-
Sriramoju et al(86)	2022	India	18-75	154	90.30%	PHQ-9	Psoriasis	PHQ-9≥1
Sánchez-Díaz et al(87)	2022	Spain	46.41±8.92	31	48.40%	HADS	Chronic Spontaneous Urticaria	HADS≥8
Kirby et al(88)	2017	Denmark & United States	40.9±13.5	154	56.50%	HADS	Hidradenitis Suppurativa	HADS≥8
Jacobi et al(89)	2013	Germany	56.2±16.7	133	30.80%	DLQI******** ********	plaque-type psoriasis	-

Martin et al(90)	2022	Germany	78.6±11.2	300	14%	Medical Records	bullous pemphigoid	-
Rad and Taziki(91)	2018	Iran	32.25±10.4	70	74.30%	BDI- II	Psoriasis	BDI-II≥14
Karia et al(92)	2015	India	27-76	50	18%	Hamilton‑D	Alopecia areata	-
Karia et al(92)	2015	India	39-76	50	24%	Hamilton‑D	psoriasis	-
Fuat et al(93)	2022	Malaysia	46.6±16.7	257	18.70%	BDI-Malay	Psoriasis	BDI-Malay≥10
Hon et al(31)	2014	China	14.4-18.2	120	21%	DASS-42	Atopic eczema	DASS-D>9
Girolomoni et al(94)	2020	European countries	39.7-42.3	1014	75.90%	PHQ-9	Atopic Dermatitis	PHQ-9≥5
Geetha et al(23)	2021	India	60-88	10	10%	HADS	Bacterial infections	-
Geetha et al(23)	2021	India	60-88	11	27.30%	HADS	Viral infections	-
Geetha et al(23)	2021	India	60-88	71	22.50%	HADS	Fungal infections	-
Geetha et al(23)	2021	India	60-88	31	25.80%	HADS	Parasitic infestations	-
Geetha et al(23)	2021	India	60-88	53	60.40%	HADS	Papulosquamous diseases	-
Geetha et al(23)	2021	India	60-88	48	41.70%	HADS	Eczema	-
Geetha et al(23)	2021	India	60-88	6	100%	HADS	Vesiculobullous diseases	-
Geetha et al(23)	2021	India	60-88	20	65%	HADS	Vascular diseases	-
Geetha et al(23)	2021	India	60-88	9	100%	HADS	Urticaria/angioedema	-
Geetha et al(23)	2021	India	60-88	14	64.30%	HADS	Acquired pigmentary diseases	-
Geetha et al(23)	2021	India	60-88	9	89%	HADS	Connective tissue diseases	-
Geetha et al(23)	2021	India	60-88	6	33.30%	HADS	Neutrophilic dermatoses	-
Geetha et al(23)	2021	India	60-88	8	50%	HADS	Drug reactions	-
Geetha et al(23)	2921	India	60-88	8	75%	HADS	Photosensitivity diseases	-
Geetha et al(23)	2021	India	60-88	6	66.70%	HADS	Appendageal diseases	-
Chen et al(95)	2021	China	18-70	774	58.10%	PHQ-9	Rosacea	-
Erol et al(96)	2020	Turkey	40.62±12.51	103	20.40%	HADS	Chronic Spontaneous Urticaria	HADS≥11
Erol et al(96)	2020	Turkey	40.62±12.51	103	41.80%	HADS	Chronic Spontaneous Urticaria	HADS≥8
EGEBERG et al(97)	2021	European countries	18-85	631	8.40%	PSC********** *******	atopic dermatitis	-
FIOCCO et al(98)	2021	Germany	53.73±14.51	100	35%	BDI–II	Lichen Planus	BDI–II≥14
MARTÍNEZ-GARCÍA et al(99)	2020	Spain	16-36	62	9.70%	HADS	Acne	HADS≥8
Dieris-Hirche et al(100)	2017	Germany	18-60	181	8.80%	HADS	Atopic Dermatitis	HADS≥11
Bhat et al(101)	2021	United States	26-80	18	-	interview	cutaneous T-cell lymphoma	-
Martínez-Ortega et al(102)	2019	Spain	48.9±17.1	70	34.30%	HADS	psoriasis	HADS>10
Morales-Sánchez et al(103)	2017	Mexico	38±20	150	34%	BDI	Vitiligo	-
Eckert et al(104)	2019	European countries	43.9±14.5	1860	25.80%	self-reported	atopic dermatitis	-
DAS et al(22)	2021	India	33.7±11.4	123	19.50%	HADS	chronic and recurrent dermatophytosis	HADS≥11
DAS et al(22)	2021	India	33.7±11.4	123	43.90%	HADS	chronic and recurrent dermatophytosis	HADS≥8
Fabrazzo et al(105)	2022	Italy	49.1±12.6	120	77.50%	HAM-D********** *****	Psoriasis	-
Yong et al(26)	2022	Malaysia	19-89	115	26.10%	DASS-21	chronic spontaneous urticaria	DASS≥10
Esposito et al(106)	2006	Italy	(Men 49.5)& (Women 46)	2391	62%	CES-D********** ******	Psoriasis	-
Williamson et al(107)	2001	Canada	24-72	70	74%	CES-D	hair loss	CES-D>8
Lim et al(108)	2016	Singapore	14-58	100	5%	HADS	Atopic Dermatitis	-
Ito et al(109)	2022	Japan	17-84	400	41.80%	HADS	alopecia areata	HADS≥8
Ito et al(109)	2022	Japan	17-84	400	19.50%	HADS	alopecia areata	HADS≥11
Talamonti et al(2)	2021	Italy	18-81	174	56.90%	BDI-21	Atopic Dermatitis	BDI-21>13

Ahmed et al(33)	2016	Saudi Arabia	≥14	254	12.6 %	DASS-21	Skin Disease	BDI-21>13
Sorour et al(110)	2017	Egypt	17-60	300	42.33%	DSM-5********** ****** questionnaire	Psoriasis	-
Sorour et al(110)	2017	Egypt	17-60	208	55.29%	DSM-5 questionnaire	Alopecia areata	-
Sorour et al(110)	2017	Egypt	17-60	206	18.93%	DSM-5 questionnaire	Acne	-
Sorour et al(110)	2017	Egypt	17-60	108	46.30%	DSM-5 questionnaire	Vitiligo	-
Sorour et al(110)	2017	Egypt	17-60	110	35.45%	DSM-5 questionnaire	Chronic urticaria	-
Sorour et al(110)	2017	Egypt	17-60	110	35.45%	DSM-5 questionnaire	Atopic dermatitis	-
Sorour et al(110)	2017	Egypt	17-60	1042	39.25%	DSM-5 questionnaire	Total	-
Sommer et al(111)	2021	Germany	46.28±14.63	107	15.90%	PHQ-2	Psoriasis	PHQ-2≥3
Sawant et al(112)	2019	India	18-68	100	52%	BDI	Vitiligo	-
SANCHEZ-CARAZO et al(113)	2014	Spain	46.3±13.8	1022	9.10%	comprehnsive electronic case report form	Psoriasis	-
Nasser et al(15)	2021	Egypt	34.69±5.87	50	80%	DASS-21	vitiligo	-
Long et al(114)	2022	China	25-53	90	20%	HAMD	psoriasis	HAMD ≥18
Ring et al(115)	2019	European countries	18-87	1189	10%	HADS	Atopic eczema	HADS ≥ 8
RASOULIAN et al(116)	2010	Iran	18-56	144	70%	HADS	skin diseases	HADS≥11
Raikhy et al(117)	2017	India	18-60	97	19.59%	ICD-10&MSE*** ********** **&Clinical interview	Acne Vulgaris	-
Raikhy et al(117)	2017	India	18-60	89	34.83%	ICD-10&MSE*** ********** **&Clinical interview	Psoriasis	-
Raikhy et al(117)	2017	India	18-60	43	46.51%	ICD-10&MSE& Clinical interview	Lichen Planus	-
Raikhy et al(117)	2017	India	18-60	53	47.17%	ICD-10&MSE& Clinical interview	Vitiligo	-
Raikhy et al(117)	2017	India	18-60	78	43.59%	ICD-10&MSE& Clinical interview	Urticaria	-
Raikhy et al(117)	2017	India	18-60	42	40.48%	ICD-10&MSE& Clinical interview	Others	-
Raikhy et al(117)	2017	India	18-60	402	36.32%	ICD-10&MSE& Clinical interview	Total	-
BARDAZZI et al(118)	2022	Italy	18-67	208	14.90%	PHQ-9	psoriasis	PHQ-9 >10
Ponarovsky et al(119)	2011	Israel	39.0±3.0	60	48.30%	HDRS	allergic cutaneous disorders	HDRS>7

Pavon Blanco et al(120)	2019	United Kingdom	17-71	211	35%	PHQ-2	Hidradenitis Suppurativa	PHQ-2≥3

Beck's depression inventory*

General Health Questionnaire**

The Patient Reported Outcomes Measurement Information System***

International Classification of Diseases****

Structured Clinical Interview*****

Hamilton Depression Rate Scale******

Hospital Anxiety and Depression Scale*******

The Hospital Anxiety and Depression Scale********

Patient Health Questionnaire*********

Composite International Diagnostic Interview**********

Mini International Neuropsychiatric Interview **********

Depression Anxiety Stress Scales**********

Primary Care Evaluation of Mental Disorders**********

Hopkins Symptom Checklist**********

Geriatric Depression Scale**********

Dermatology Life Quality Index**********

paper-based selfcompletion**********

Hamilton Depression Rating Scale**********

Center for Epidemiological Studies-Depression Scale**********

Diagnostic and Statistical Manual of Mental Disorders, 5th ed**********

Status Examination**********

Table 3: Summary of characteristics of the included studies that had reported prevalence of anxiety among skin disease patients

Author	Year	Country	Age range	Sample size	prevalence	Instrument	Type of Disease	Cut off
COSKUN et al(37)	2005	Turkey	24-63	520	-	SCID	chronic dermatoses	-
Ozkan et al(38)	2006	Turkey	36.83±10.26	84	12%	SCID-I	Chronic idiopathic urticaria	-
Pollo et al(40)	2021	Brazil	52.1±13.8	281	36%	HAD	psoriasis	HAD>8
Brenaut et al(41)	2019	European Countries	28-84	27	37%	HADS	prurigo	HADS≥11
Lukaviciute et al(42)	2020	Lithuania	24.49±0.47	283	38.2%	HADS	Acne	-
Lukaviciute et al(42)	2020	Lithuania	42.3±1.11	120	36.7%	HADS	Rosacea	-
Lukaviciute et al(42)	2020	Lithuania	29.1±0.96	65	30.80%	HADS	Folliculitis	-
Lukaviciute et al(42)	2020	Lithuania	31.9±1.36	75	42.70%	HADS	Perioral dermatitis	-
Ahn et al(44)	2019	Korea	>0	42641	3.40%	ICD-10	atopic dermatitis	-
Son et al(45)	2022	South Korea	23.5±15.8	1163	12.60%	patient questionnaire	Atopic Dermatitis	-
KRISTENSEN et al(48)	2020	Denmark	32±10.9	95	-	HADS	Hyperhidrosis	-
Marahatta et al(51)	2020	Nepal	29.40±9.90	75	73.30%	BAI	Alopecia Areata	
Ajose et al(53)	2013	Nigeria	30.05±9.76	87	10%	HADS	Albino	HADS>10
Ajose et al(53)	2013	Nigeria	35.94±13.65	102	19%	HADS	Vitiligo	HADS>10

AlShahwan(54)	2014	Saudi Arabia	≥18	875	29%	HADS	Skin Disease	-
Nadpara et al(121)	2017	India	11-64	30	56.70%	HAM-A*	Moderate Alopecia	HAM-A≥14
ARIMA et al(55)	2018	Japan	38.67±13.07	634	3.31%	Self-reported	atopic dermatitis	-
Molla et al(56)	2021	Saudi Arabia	12-60	296	47.30%	HADS	Vulgaris Acne	HADS≥8
Tan et al(57)	2021	Malaysia	13-87	217	12.00%	HADS	atopic dermatitis	-
Bahar et al(58)	2016	Canada & China	35.5	437	23.10%	GAD-7**	hyperhidrosis	-
Bakar et al(59)	2021	Malaysia	46.4±15.14	174	16.90%	HADS	psoriasis	-
BALIEVA et al(18)	2016	Norway	18-92	577	27.10%	HADS	Common Skin Diseases	HADS≥8
Boehm et al(60)	2012	Germany	42±12.9	118	20.30%	HADS	occupational hand eczema	HADS>10
Weller et al(61)	2013	Germany & Greece	16-82	168	32%	HADS	chronic spontaneous urticaria	HADS≥8
Chiesa Fuxench el	2018	United States	51.81±18.17	93	24.73%	HADS	Atopic Dermatitis	HADS= 11-21
Şahan et al(64)	2020	Turkey	37.68±11.67	77	72.80%	STAI-1***	Genital HPV Infection	-
Şahan et al(64)	2020	Turkey	37.68±11.67	77	74%	STAI-2	Genital HPV Infection	-
yong et al(26)	2022	Malaysia	19-89	115	54.80%	DASS-21	chronic spontaneous urticaria	DASS≥8
Behera et al(10)	2022	India	≥18	101	41.58%	GAD-7	Chronic Skin Disorder	GAD-7≥10
Gascón et al(66)	2012	Brazil	18-76	75	52%	PRIME-MD	Skin Disease	-
Dabas et al(67)	2019	India	18-60	86	-	GAD-7	melasma	GAD-7≥8
Dabas et al(67)	2019	India	18-60	91	-	GAD-7	acquired dermal macular hyperpigmentation	GAD-7≥8
Dabas et al(67)	2019	India	18-60	95	-	GAD-7	Vitiligo	GAD-7≥8
Kane et al(30)	2007	Senegal	14-46	93	46.70%	anonymous questionnaire	Acne	-
Dalgard et al(13)	2019	European Countries	47.2±17.5	1917	21.40%	HADS	skin diseases with itch	HADS≥11
Dalgard et al(13)	2019	European Countries	47.2±17.5	1613	12.30%	HADS	Skin disease without itch	HADS≥11
EGEBERG et al(97)	2021	European Countries	18-85	631	14.10%	PSC	atopic dermatitis	-
Dalgard et al(27)	2015	European Countries	47.2±17.9	626	22.70%	HADS	Psoriasis	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	394	8%	HADS	Non-melanoma skin cancer	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	243	13.20%	HADS	Infections skin	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	229	16.70%	HADS	Eczema	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	213	15.10%	HADS	Acne	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	177	11.20%	HADS	Nevi	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	162	17.60%	HADS	Atopic eczema	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	152	10.90%	HADS	Benign skin tumors	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	143	21%	HADS	Hand eczema	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	121	17.50%	HADS	Leg ulcers	HADS≥11
Dalgard et al(27)	2015	European Countries	47.2±17.9	3635	17.20%	HADS	Dermatological out-patients overall	HADS≥11
Sánchez-Díaz et al(87)	2022	Spain	46.48±11.25	75	46.67%	HADS	chronic spontaneous urticaria	-
McDonough et al(75)	2014	Canada	53.8±12.9	306	36.60%	HADS	Psoriatic arthritis	HADS≥8
McDonough et al(75)	2014	Canada	52.4±13.2	135	24.40%	HADS	psoriasis alone	HADS≥8
Marron et al(6)	2018	European Countries	45.2±15.2	143	15.90%	HADS	Hand Eczema	-
Lukaviciute et al(78)	2017	Lithuania	25.21±0.48	255	38.40%	HADS	Acne	HADS≥8
LESNER et al(79)	2017	European Countries	47.0±15.6	682	22.10%	HADS	Psoriasis	HADS≥11
Kwatra et al(81)	2021	USA	37.4±14.5	1017	60.90%	self-reported	Atopic Dermatitis	-
Yew et al(19)	2020	singapore	≥22	347	1.40%	EQ-5D-5L****	skin diseases	-
Sánchez-Díaz et al(87)	2022	Spain	46.41±8.92	31	38.70%	HADS	Chronic Spontaneous Urticaria	HADS≥8
Karia et al(92)	2015	India	27-76	50	4%	Hamilton-A	Alopecia areata	-
Karia et al(92)	2015	India	39-76	50	12%	Hamilton-A	Alopecia areata	-

Hon et al(31)	2014	China	14.4-18.2	120	33%	DASS-42	Atopic eczema	DASS-A>7
Girolomoni et al(94)	2020	European Countries	39.7-42.3	1014	52.7%	self-reported	Atopic Dermatitis	-
Geetha et al(23)	2021	India	60-88	10	10%	HADS	Bacterial infections	HADS≥11
Geetha et al(23)	2021	India	60-88	11	36.40%	HADS	Viral infections	HADS≥11
Geetha et al(23)	2021	India	60-88	71	19.70%	HADS	Fungal infections	HADS≥11
Geetha et al(23)	2021	India	60-88	31	13%	HADS	Parasitic infestations	HADS≥11
Geetha et al(23)	2021	India	60-88	53	51%	HADS	Papulosquamous diseases	HADS≥11
Geetha et al(23)	2021	India	60-88	48	50%	HADS	Eczema	HADS≥11
Geetha et al(23)	2021	India	60-88	6	100%	HADS	Vesiculobullous diseases	HADS≥11
Geetha et al(23)	2021	India	60-88	20	45%	HADS	Vascular diseases	HADS≥11
Geetha et al(23)	2021	India	60-88	9	100%	HADS	Urticaria/angioedema	HADS≥11
Geetha et al(23)	2021	India	60-88	14	71.40%	HADS	Acquired pigmentary diseases	HADS≥11
Geetha et al(23)	2021	India	60-88	9	77.80%	HADS	Connective tissue diseases	HADS≥11
Geetha et al(23)	2021	India	60-88	6	50%	HADS	Neutrophilic dermatoses	HADS≥11
Geetha et al(23)	2021	India	60-88	8	75%	HADS	Drug reactions	HADS≥11
Geetha et al(23)	2021	India	60-88	8	75%	HADS	Photosensitivity diseases	HADS≥11
Geetha et al(23)	2021	India	60-88	6	66.70%	HADS	Appendageal diseases	HADS≥11
MARTÍNEZ-GARCÍA et al(99)	2020	Spain	16-36	62	32.30%	HADS	Acne	HADS≥8
Erol et al(96)	2020	Turkey	40.62±12.51	103	24.30%	HADS	Chronic Spontaneous Urticaria	HADS≥11
Erol et al(96)	2020	Turkey	40.62±12.51	103	56.30%	HADS	Chronic Spontaneous Urticaria	HADS≥8
Dieris-Hirche et al(100)	2017	Germany	18-60	181	26%	HADS	Atopic Dermatitis	HADS≥11
Martínez-Ortega et al(102)	2019	Spain	48.9±17.1	70	51.40%	HADS	psoriasis	HADS>10
Morales-Sánchez et al(103)	2017	Mexico	38±20	150	60%	BAI*****	Vitiligo	-
Eckert et al(104)	2019	European Countries	43.9±14.5	1860	31.90%	self-reported	atopic dermatitis	-
DAS et al(22)	2021	India	33.7±11.4	123	50.40%	HADS	chronic and recurrent dermatophytosis	-
Yong et al(26)	2022	Malaysia	19-89	115	54.80%	DASS-21	chronic spontaneous urticaria	DASS≥8
Lim et al(108)	2016	Singapore	14-58	100	18%	HADS	Atopic Dermatitis	
Ito et al(109)	2022	Japan	17-84	400	46%	HADS	alopecia areata	HADS≥8
Ito et al(109)	2022	Japan	17-84	400	25%	HADS	alopecia areata	HADS≥11
Ahmed et al(33)	2016	Saudi Arabia	≥14	254	22.10%	DASS-21	Skin Disease	-
Sorour et al(110)	2017	Egypt	17-60	300	24.33%	DSM-5 questionnaire	Psoriasis	-
Sorour et al(110)	2017	Egypt	17-60	208	19.71%	DSM-5 questionnaire	Alopecia areata	-
Sorour et al(110)	2017	Egypt	17-60	206	55.34%	DSM-5 questionnaire	Acne	-
Sorour et al(110)	2017	Egypt	17-60	108	31.48%	DSM-5 questionnaire	Vitiligo	-
Sorour et al(110)	2017	Egypt	17-60	110	43.64%	DSM-5 questionnaire	Chronic urticaria	-
Sorour et al(110)	2017	Egypt	17-60	110	43.64%	DSM-5 questionnaire	Atopic dermatitis	
Sorour et al(110)	2017	Egypt	17-60	1042	34.36%	DSM-5 questionnaire	Total	
Sommer et al(111)	2021	Germany	46.28±14.63	107	15.00%	GAD-2	psoriasis	GAD-2≥3
SANCHEZ-CARAZO et al(113)	2014	Spain	46.3±13.8	1022	15.90%	retrospectively retrieved	Psoriasis	-
Nasser et al(15)	2021	Egypt	34.69±5.87	50	78%	DASS-21	vitiligo	-
RASOULIAN et al(116)	2010	Iran	18-56	144	77%	HADS	skin diseases	HADS≥11
Raikhy et al(117)	2017	India	18-60	97	24.74%	ICD-10&MSE&Clinical interview	Acne Vulgaris	-
Raikhy et al(117)	2017	India	18-60	89	13.48%	ICD-10&MSE&Clinical interview	Psoriasis	-
Raikhy et al(117)	2017	India	18-60	43	27.91%	ICD-10&MSE&Clinical interview	Lichen Planus	-
Raikhy et al(117)	2017	India	18-60	53	11.32%	ICD-10&MSE&Cl	Vitiligo	-

						inical interview		
Raikhy et al(117)	2017	India	18-60	78	11.54%	ICD-10&MSE&Clinical interview	Urticaria	-
Raikhy et al(117)	2017	India	18-60	42	26.19%	ICD-10&MSE&Clinical interview	Others	-
Raikhy et al(117)	2017	India	18-60	402	18.41%	ICD-10&MSE&Clinical interview	Total	-
Ponarovsky et al(119)	2011	Israel	39.0±3.0	60	58.30%	HAS******	allergic cutaneous disorders	HAS>7
Pavon Blanco et al(120)	2019	United Kingdom	17-71	211	26%	GAD-2	Hidradenitis Suppurativa	GAD-2≥3
Chen et al(95)	2021	China	18-70	774	53.90%	GAD-7	Rosacea	
Mathur et al(76)	2021	India	20-72	140	28.6%	GAD-7	severe chronic plaque psoriasis	GAD-7≥10

Table 4: Subgroup analysis of the prevalence of stress, anxiety, and depression according to the type of skin disorder

Type of skin disorder	**disorder**	**N**	**Sample size**	**I^2**	**Egger's test**	**Prevalence (95 % CI)**
Atopic Dermatitis	Stress	1	15536	-	-	-
	Depression	15	65586	99.8	0.826	20.8 (95% CI: 10.3-37.7)
	Anxiety	12	49661	99.8	0.174	20 (95% CI: 8.2-41.3)
Vitiligo	Stress	1	50	-	-	-
	Depression	10	1079	92.6	0.299	38.3 (95% CI: 27-51.1)
	Anxiety	6	558	94.7	0.470	34.7 (95% CI: 17.9-55.8)
Acne	Stress	2	1624	96.8	-	75.7 (95% CI: 32.7-95.2)
	Depression	10	1591	95.7	0.278	22.7 (95% CI: 13.4-35.9)
	Anxiety	8	1505	91.9	0.217	36.5 (95% CI: 28-45.9)
Psoriasis	Stress	1	60	-	-	-
	Depression	28	125421	99.5	0.009	27.2 (95% CI: 18.2-38.6)
	Anxiety	12	3982	91.1	0.915	23.5 (95% CI: 19-28.8)