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Global prevalence of sexual dysfunction in women with skin diseases: a systematic review and meta-analysis

Pegah Heidarian[1], Amir Jalali[2,3*], Mohammadrasool Ghasemianrad[1], Romina Jalali[3] and Ebrahim Ezzati[4]

Abstract

Background Skin diseases are a category of chronic conditions that often impact patients' appearance, potentially leading to psychological issues, including sexual dysfunction. The present study is an attempt to determine the global prevalence of female sexual dysfunction (FSD) in women with skin diseases.

Methods For this systematic review and meta-analysis, databases including PubMed, Web of Science, Scopus, Science Direct, Embase, and Google Scholar were systematically searched for relevant studies. All published research up to April 2024 imported into EndNote for further analysis. A random-effects model was applied for the analysis, and the I^2 statistic was used to assess study heterogeneity.

Results Analysis of 24 studies (45 datasets) indicated that the overall prevalence of FSD in women with skin diseases was estimated at 61.3% (95% CI: 53.9–68.2%). Additionally, subgroup analysis based on skin disease type revealed an FSD prevalence of 69.8% (95% CI: 56.7–80.2%) in women with vitiligo, 59.2% (95% CI: 49.1–68.5%) in those with psoriasis, and 56.5% (95% CI: 47.8–64.8%) in women with hidradenitis suppurativa.

Conclusion There was a high prevalence of FSD in women with skin diseases. There is a need for policy makers and healthcare providers to prioritize the well-being of these patients.

Keywords Prevalence, Sexual dysfunction, FSD, Skin diseases, Meta-analysis, Systematic review

Introduction

The skin, recognized as the largest organ of the body, consists of three layers: the epidermis, dermis, and hypodermis. It also contains vascular tissues, muscles, and certain nerves [1]. Studies have shown that fungal or bacterial growth on the skin, along with exposure to allergens, can trigger various skin diseases [2–4]. These conditions are common and can cause inflammation, irritation, pain, or itching in the affected areas [5].

It is estimated that around 33% of the global population suffers from skin conditions [6], with approximately 900 million individuals affected each year [7]. There is a wide variety of skin diseases, including psoriasis, vitiligo, and atopic dermatitis [8], and studies have reported the

*Correspondence:
Amir Jalali
jalali_amir@yahoo.com
[1]Student Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran
[2]Substance Abuse Prevention Research Center, Research Institute for Health, Kermanshah University of Medical Sciences, Kermanshah, Iran
[3]Sleep Disorder Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran
[4]Department of Anaesthesiology, School of Paramedical, Kermanshah University of Medical Sciences, Kermanshah, Iran

prevalence of specific types across different regions [9–11]. For instance, the prevalence of psoriasis in American adults aged 20 and older is about 3% [9], while vitiligo affects 3.1% of adults in Italy and 1.4% in the United States [10].

Although skin diseases usually do not lead to mortality [12], they often significantly reduce the quality of life for patients [10]. Many skin conditions affect physical appearance, which can cause psychological distress such as stress, anxiety, and depression [12, 13]. This impact may lead to a decreased quality of life, impair social functioning [14], and even affect sexual health, potentially resulting in sexual dysfunction [15].

Sexual dysfunction is defined as recurrent problems in any phase of the sexual response cycle [16] and occurs more frequently in women than in men [15]. Female sexual dysfunction (FSD) is a progressive disorder that can arise at any stage of life [15, 17]. It is characterized by issues such as diminished sexual desire, arousal difficulties, inadequate lubrication, reduced sexual satisfaction, pain during intercourse, and anorgasmia [18]. Studies indicate that various factors may contribute to sexual dysfunction, including psychological disorders and certain physical illnesses [19–21]. Numerous studies have explored the prevalence of sexual dysfunction among women with skin diseases [22–24]. For example, the prevalence of FSD was reported to be 49.4% among Turkish women with rosacea [22], while rates were found to be 47.37% among Spanish women with atopic dermatitis and 44.7% among French women with psoriasis [23, 24].

Female sexual dysfunction (FSD) includes various disorders that can significantly impact mental health, contributing to conditions such as depression and anxiety [25]. Beyond its effects on individuals, FSD can also affect sexual partners and the broader family unit, leading to substantial social and economic challenges, as well as a reduced quality of life [26]. Conditions like keratosis pilaris and lichen planus, though uncommon, can notably affect women's appearance and body image, which may interfere with their sexual experiences [27]. Therefore, studying these disorders, even in smaller groups, can offer valuable insights. Since the objective of this study is to assess the global prevalence of FSD among women with different skin diseases, including these less common conditions will enhance our understanding of FSD in this demographic. Considering the high prevalence of FSD linked to specific physical illnesses and its adverse effects on relationships, combined with the varying prevalence rates reported in existing literature, this study aims to provide a comprehensive estimate of the global prevalence of FSD in women with skin disorders.

Methods

This study was conducted as a systematic review and meta-analysis following PRISMA guidelines [28]. To identify relevant studies, the keywords "sexual disorders," "sexual disorder," "sexual dysfunction," "FSD," "Dyspareunia," "Orgasm disorders," "Females," "Women," "skin disease," "skin diseases," "dermatological diseases," "dermatological disease," and "dermatology" (using operators such as AND and OR) were systematically searched in different databases including PubMed, Web of Science, Scopus, Science Direct, Embase, and Google Scholar. All published studies in these databases reporting FSD prevalence among individuals with skin diseases up to April 5, 2024, were imported into EndNote. A manual search was also performed by the researchers to ensure comprehensiveness and prevent loss of relevant data. Additionally, the search process was repeated in late April 2024.

Article selection

Inclusion criteria

The inclusion criteria were: (1) Reported the prevalence of FSD in individuals with skin diseases; (2) Full text was accessible; (3) provided sufficient data necessary for analysis (sample size, FSD prevalence rate, etc.); (4) Published in English; and (5) Included cross-sectional studies, cohort studies, and case-control studies.

Exclusion criteria

The exclusion criteria were (1) Review articles; (2) Animal studies; (3) Case reports; (4) Case series studies.

Selection process of studies

In the initial selection phase, duplicate articles were removed. Researchers then reviewed the titles and abstracts of the remaining articles to eliminate irrelevant studies. The full texts of these articles were subsequently assessed, leading to further exclusions of non-relevant studies. All stages of the selection process were independently conducted by two researchers (P.H., A.J.). In the event of disagreement, a third researcher was involved in the review. To minimize bias, the names of the authors and journals were concealed throughout the selection process (Fig. 1).

Qualitative evaluation of the studies

The STROBE checklist, a validated tool for assessing the quality of observational studies, was used for quality assessment. This checklist comprises six domains and 32 items, with scores ranging from 0 to 32. A score of 16 was set as the cutoff, where studies scoring 16 or above were considered medium or high quality, and those scoring below 16 were deemed low quality and excluded from the research [29].

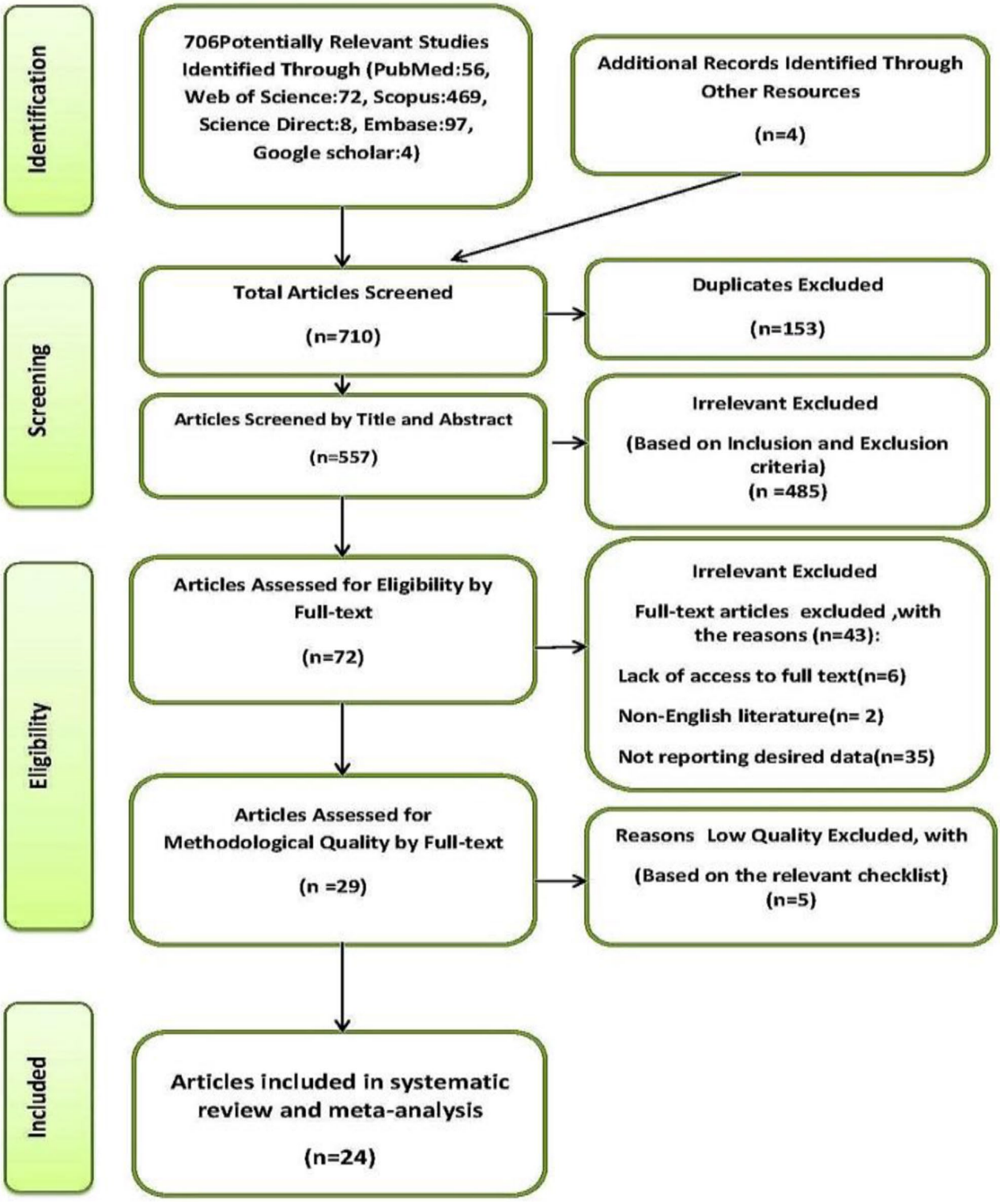

Fig. 1 PRISMA flow diagram

Data extraction

Data extraction was conducted using Microsoft Excel, with a checklist that included author names, publication year, study type, research location, sample size, FSD prevalence, sample age range or mean age, FSD assessment tool, and type of skin disease.

Statistical analysis

Data analysis was performed using Comprehensive Meta-Analysis (Version 2). The focus of this study was the prevalence of sexual dysfunction in women with skin diseases. We analyzed various studies by comparing the frequency of sexual dysfunction reported in each. To assess the heterogeneity among these studies, we used the I^2 index. Given the high level of heterogeneity (I^2 > 75%) found in the meta-analysis, we employed a Random Effects model. This model accounts for variations across studies, making its results more generalizable than those obtained using a fixed-effect model, especially in heterogeneous conditions. To evaluate publication bias, we utilized funnel plots and the Begg and Mazumdar rank correlation tests. Additionally, meta-regression analyses were conducted to explore the relationship between the overall prevalence of sexual dysfunction in women with skin diseases and factors such as the year of publication, mean age, and sample size. Subgroup analyses were carried out based on different continents and the specific tools used to assess sexual dysfunction in the studies. Data analysis was performed using Comprehensive Meta-Analysis (Version 2) software, and a P-value of less than 0.05 was considered statistically significant.

Results

Summary of Article inclusion for meta-analysis

After conducting a systematic search across the mentioned databases, 706 studies were identified (including four obtained through manual search), all of which were imported into EndNote version 8. After removing 153 duplicate entries, 557 studies remained. Upon screening the abstracts of these remaining articles, 485 studies were excluded based on exclusion criteria, leaving 72 articles. Following full-text review, 43 additional studies were excluded due to failing to meet inclusion criteria, and five were removed for low quality during the qualitative assessment phase. Ultimately, 24 studies were selected for data extraction.

General characteristics of the studies

As listed in Table 1, the 24 studies included in this research span from 2007 to 2023, with most conducted in Egypt [12, 24–30]. Among the reviewed studies, the highest prevalence of FSD in women with skin diseases was reported in the study by El-Ammawi et al., conducted in Egypt [15], while the lowest prevalence was observed in the study by Sorour et al. [30].

Global meta-analysis of FSD prevalence in women with skin diseases

The I^2 index for the global prevalence of Female Sexual Dysfunction (FSD) in women with skin diseases indicated substantial variability across studies (I^2 = 93.92%). Consequently, the data were analyzed using a Random Effects model (Table 2). Based on the results of the Begg and Mazumdar rank correlation, there was no significant publication bias among the studies (P = 0.107) (Fig. 2).

After aggregating the results from the studies included in the meta-analysis, the estimated global prevalence of FSD in women with skin diseases was found to be 61.3% (95% Confidence Interval: 53.9 – 68.2%) using the Random Effects model. The black square represents the prevalence rate, while the horizontal line indicates the 95% confidence interval for each study. The diamond symbol in Fig. 3 illustrates the overall global prevalence estimate of FSD in women with skin diseases.

The sensitivity analysis results showed that removing any of the studies did not significantly affect the final outcome (Supplementary Fig. 1), indicating the robustness of the findings.

Meta-Analysis of FSD global prevalence in women with psoriasis

The I^2 index for the global prevalence of FSD in women with psoriasis also showed considerable heterogeneity among studies (I^2 = 91.82%). Consequently, a random effects model was applied to the data. Based on the Begg and Mazumdar rank correlation results, there was no significant publication bias across the studies (P = 0.087). Following the integration of results from studies included in the meta-analysis, the estimated global prevalence of FSD in women with psoriasis was 59.2% (95% Confidence Interval: 49.1 – 68.5%) according to the random effects model. In Fig. 4, the black square represents the prevalence rate, and the horizontal line indicates the 95% confidence interval for each study. The diamond symbol illustrates the overall global prevalence estimate of FSD in women with psoriasis.

Subgroup analysis

Due to the high heterogeneity among studies, a subgroup analysis was conducted based on different continents and tools used in the studies. The highest global prevalence of FSD in women with psoriasis was observed in Africa, with an estimated rate of 63.8% (95% CI: 50.39 – 75.3%). Regarding the assessment tools, the Dermatology Life Quality Index (DLQI) indicated a prevalence rate of 94.4% (95% CI: 85.9 – 97.9%) in the studies that used this tool. There was a statistically significant difference in the

Table 1 Characteristics of included studies on prevalence of FSD in women with skin diseases

Author	Year	Study Type	Location	Sample Size	Prevalence of FSD in women with skin diseases (%)	mean age or range of age	FSD measuring tool	Type of skin disease
Aktas Karabay et al [22]	2022	prospective, case-control	Turkey	85	49.4%	20 to 47	FSFI	Rosacea
Halioua et al [31]	2020	cross-sectional	France	71	94.3%	≥ 18	DLQI	psoriasis
Cuenca-Barrales And Molina-Leyva [32]	2020	cross-sectional	Spain	306	51%	37.44 ± 8.69	FSFI-6	Hidradenitis Suppurativa
Hassanin et al [33]	2018	cross-sectional	Egypt	100	55%	37.31 ± 7.61	FSFI	chronic skin disease
Abul Maaty et al [34]	2013	cross-sectional	Egypt	52	65.4%	21 to 50 (35 ± 7.8)	FSFI	Psoriasis
Alariny et al [35]	2019	cross-sectional	Egypt	110	79.10%	34.33 ± 8.23	FSFI	Psoriasis
Nogueira et al. [36]	2022	cross-sectional	Brazil	76	78.90%	18 to 81(45.9 ± 16.6)	FSFI	leprosy
El-Ammawi et al [15]	2023	cross-sectional	Egypt	60	80%	18 to 50	FSFI	Psoriasis
El-Ammawi et al [15]	2023	cross-sectional	Egypt	45	66.70%	18 to 50	FSFI	Eczema
El-Ammawi et al [15]	2023	cross-sectional	Egypt	27	77.80%	18 to 50	FSFI	Leprosy
El-Ammawi et al [15]	2023	cross-sectional	Egypt	24	62.50%	18 to 50	FSFI	Acne
El-Ammawi et al [15]	2023	cross-sectional	Egypt	21	71.4%	18 to 50	FSFI	Alopecia Areata
El-Ammawi et al [15]	2023	cross-sectional	Egypt	21	85.7%	18 to 50	FSFI	Vitiligo
El-Ammawi et al [15]	2023	cross-sectional	Egypt	18	100%	18 to 50	FSFI	Lichen planus
El-Ammawi et al [15]	2023	cross-sectional	Egypt	18	100%	18 to 50	FSFI	Melasma
El-Ammawi et al [15]	2023	cross-sectional	Egypt	18	66.70%	18 to 50	FSFI	Hirsutism
El-Ammawi et al [15]	2023	cross-sectional	Egypt	15	80%	18 to 50	FSFI	Keratosis pilaris
El-Ammawi et al [15]	2023	cross-sectional	Egypt	15	80%	18 to 50	FSFI	Urticaria
El-Ammawi et al [15]	2023	cross-sectional	Egypt	9	66.70%	18 to 50	FSFI	Hidradenitis suppurativa
El-Ammawi et al [15]	2023	cross-sectional	Egypt	3	100%	18 to 50	FSFI	Lupus erythematosus
El-Ammawi et al [15]	2023	cross-sectional	Egypt	3	100%	18 to 50	FSFI	Amyloidosis
El-Ammawi et al [15]	2023	cross-sectional	Egypt	3	100%	18 to 50	FSFI	Rosacea
Khaled et al [37]	2021	case–control	Egypt	30	56.70%	18 to 55	FSFI	psoriasis
Khaled et al [37]	2021	case–control	Egypt	30	63.30%	18 to 55	FSFI	Vitiligo
Cuenca-Barrales et al [38]	2022	cross-sectional	Spain &Poland	32	40.60%	36.8 ± 11.9	FSFI-6	Hidradenitis Suppurativa
Ureña-Paniego et al [24]	2023	prospective observational	Spain	20	47.37%	30.4 ± 14.48	FSFI	Atopic Dermatitis
Janse et al [39]	2017	cross-sectional	Netherlands	234	62%	43.5 ± 12.1	FSFI	Hidradenitis Suppurativa
Meeuwis et al [40]	2011	cross-sectional	Netherlands	209	48.70%	53.9 ± 12.3	FSFI	psoriasis
Adawiyah et al [41]	2017	cross-sectional	Malaysia	79	20.30%	40.32 ± 10.04	FSFI	Psoriasis
Sancak et al [42]	2016	case-control	Turkey	115	52.20%	36.28 ± 8.92	FSFI	androgenetic alopecia
Sarhan et al [37]	2016	cross-sectional	Egypt	50	82%	18 to 60	FSFI	Vitiligo
Salle et al [23]	2023	cross-sectional	France	866	44.7%	≥ 18	Anonymous questionnaire	Psoriasis
Sorour et al [30]	2017	cross-sectional	Egypt	133	49.62%	17 to 60	DSM-5	Psoriasis
Sorour et al [30]	2017	cross-sectional	Egypt	103	7.77%	17 to 60	DSM-5	Acne
Sorour et al [30]	2017	cross-sectional	Egypt	60	56.67%	17 to 60	DSM-5	Vitiligo
Sorour et al [30]	2017	cross-sectional	Egypt	61	24.59%	17 to 60	DSM-5	Chronic urticaria
Sorour et al [30]	2017	cross-sectional	Egypt	61	24.59%	17 to 60	DSM-5	Atopic dermatitis
Sorour et al [30]	2017	cross-sectional	Egypt	86	29.07%	17 to 60	DSM-5	Alopecia areata
SUKAN and MANER [44]	2007	cross-sectional	Turkey	24	62.50%	35.82 ± 12.56	ASEX	Vitiligo
SUKAN and MANER [44]	2007	cross-sectional	Turkey	34	70.50%	35.82 ± 12.56	ASEX	Chronic urticaria

Table 1 (continued)

Author	Year	Study Type	Location	Sample Size	Prevalence of FSD in women with skin diseases (%)	mean age or range of age	FSD measuring tool	Type of skin disease
Vittrup et al [45]	2022	cross-sectional	Denmark	158	90%	18 to 79	FSFI	Lichen Sclerosus
Elsaie et al [46]	2023	cross-sectional	Egypt	100	47%	18 to 40	FSFI	Psoriasis
Linares-Gonzalez et al [47]	2022	cross-sectional	Spain	13	76.9%	33 ± 10.46	FSFI	atopic dermatitis
Santaliz-Ruiz et al [48]	2023	cross-sectional	Puerto Rico	45	67%	34	FSFI-6	Hidradenitis Suppurativa
Kurizky et al [49]	2018	case-control	Brazil	75	58.60%	45 ± 12	FSFI	Psoriasis

FSFI: Female Sexual Function Index, DLQI: Dermatology Life Quality Index, DSM-5:Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, ASEX: Arizona Sexual Experience Scale

Table 2 Report the results of fixed and random effects model on meta-analysis

Model	Number studies	Point estimate	Lower limit	Upper limit	*P*-value	*P*-value between	I^2 (%)	Tau squared	Standard Error	Variance	Tau
Fixed	24	0.525	0.508	0.542	0.005	0.000	93.921	0.496	0.238	0.056	0.705
Random	24	0.613	0.539	0.682	0.003						

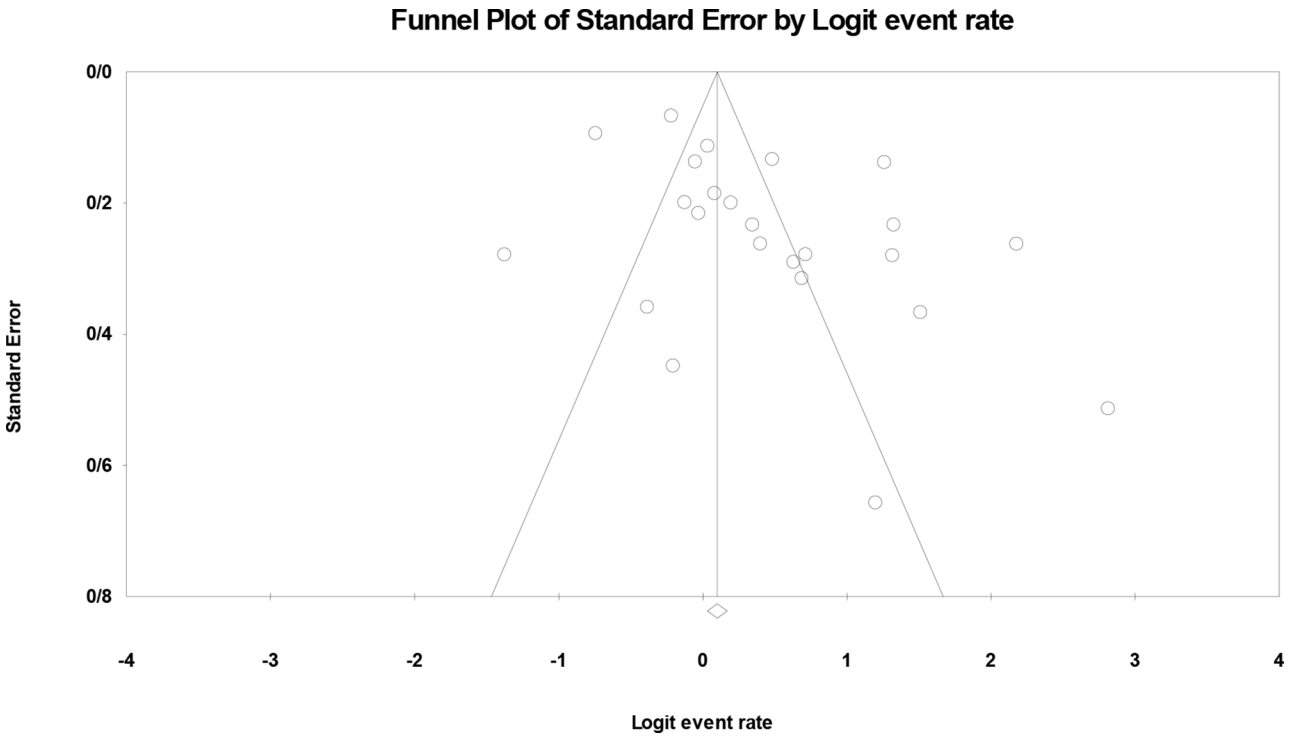

Fig. 2 Funnel plot of the estimated global prevalence of FSD in women with skin disease based on random effects model

global prevalence of FSD in women with psoriasis based on the continent where studies were conducted and the type of tool used (Table 3).

Meta-Analysis of global prevalence of FSD in women with vitiligo

The I^2 index for global FSD prevalence in women with vitiligo indicates considerable heterogeneity among studies (I^2 = 63.937%). Consequently, data were analyzed using a random effects model (Table 4). According to the Begg and Mazumdar rank correlation, there was no publication bias detected in these studies at the 0.1 significance level (P = 0.806)). After combining the results of the studies included in the meta-analysis, the estimated global prevalence of FSD in women with vitiligo was found to be 69.8% (95% CI: 56.7 – 80.2%) using the random effects

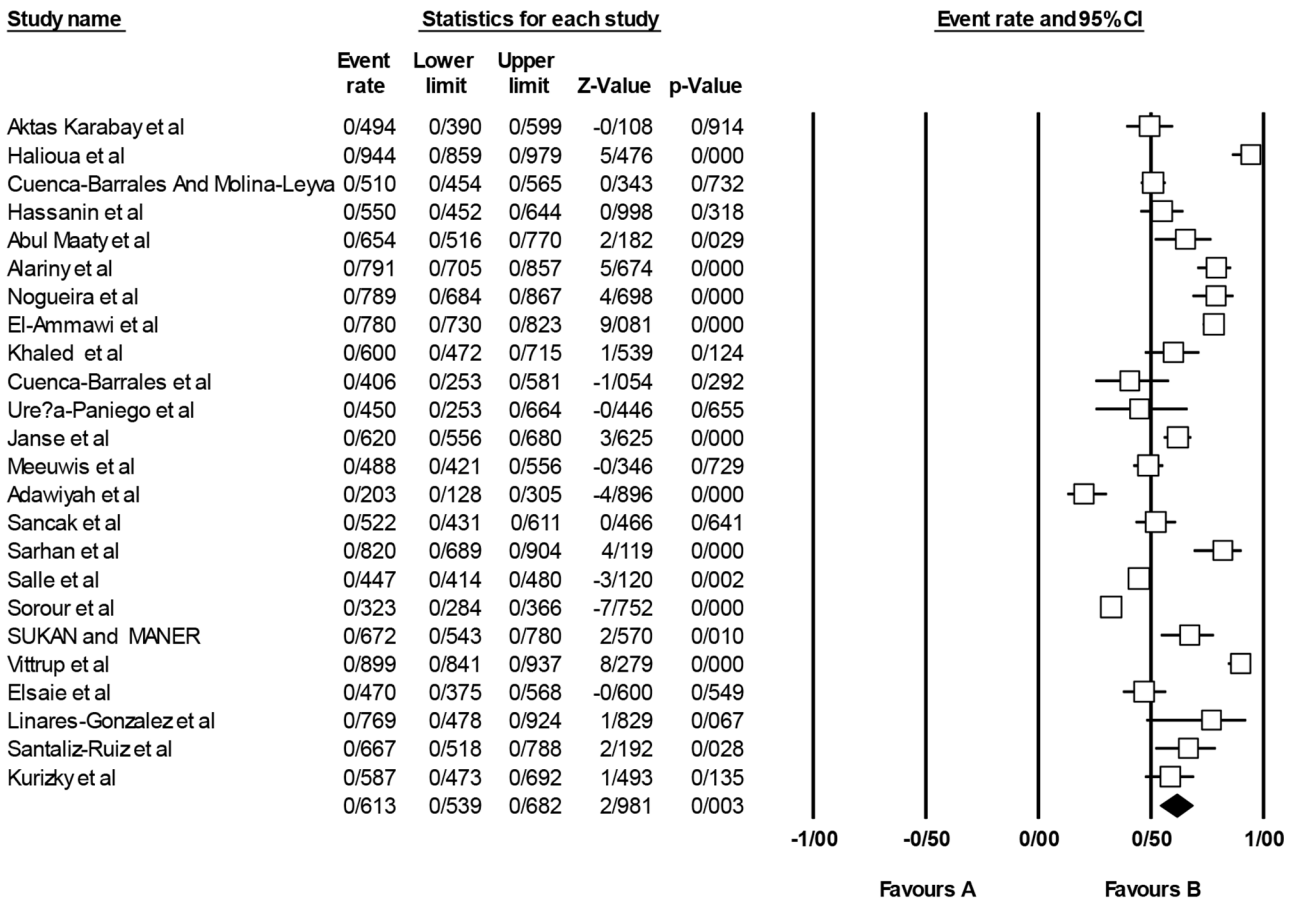

Fig. 3 Frost plot diagram of global prevalence of FSD in women with skin diseases based on random effects model

model. The black squares represent the prevalence percentage, with the horizontal lines indicating the 95% confidence intervals for each study, and the diamond symbol displaying the overall global FSD prevalence in women with vitiligo (Fig. 5).

Subgroup analysis

Given the high heterogeneity among studies, a subgroup analysis was conducted based on continents and assessment tools used in the studies. The highest global prevalence of FSD in women with vitiligo was observed in Africa, estimated at 71.8% (95% CI: 55.5 – 83.8%), with studies utilizing the FSFI tool reporting a prevalence of 77.1% (95% CI: 61.2 – 87.7%). However, there was no statistically significant difference in the global FSD prevalence in women with vitiligo based on study continent or the type of assessment tool used (Table 4).

Meta-Analysis of the global prevalence of FSD in women with hidradenitis suppurativa

The I^2 index for the global prevalence of FSD in women with hidradenitis suppurativa indicated a substantial heterogeneity among studies (I^2 = 66.337%). Consequently, the data were analyzed using a random effects model. According to Begg and Mazumdar's rank correlation test, no publication bias was detected at the 0.1 significance level ($P = 1$). After combining the results of studies included in the meta-analysis, the estimated global prevalence of FSD in women with hidradenitis suppurativa was equal to 56.5% (95% CI: 47.8 – 64.8%), based on the random effects model. The black squares represent prevalence rates, with the length of each line indicating the 95% confidence interval for each study. The diamond symbol illustrates the global prevalence estimate of FSD in women with hidradenitis suppurativa (Fig. 6).

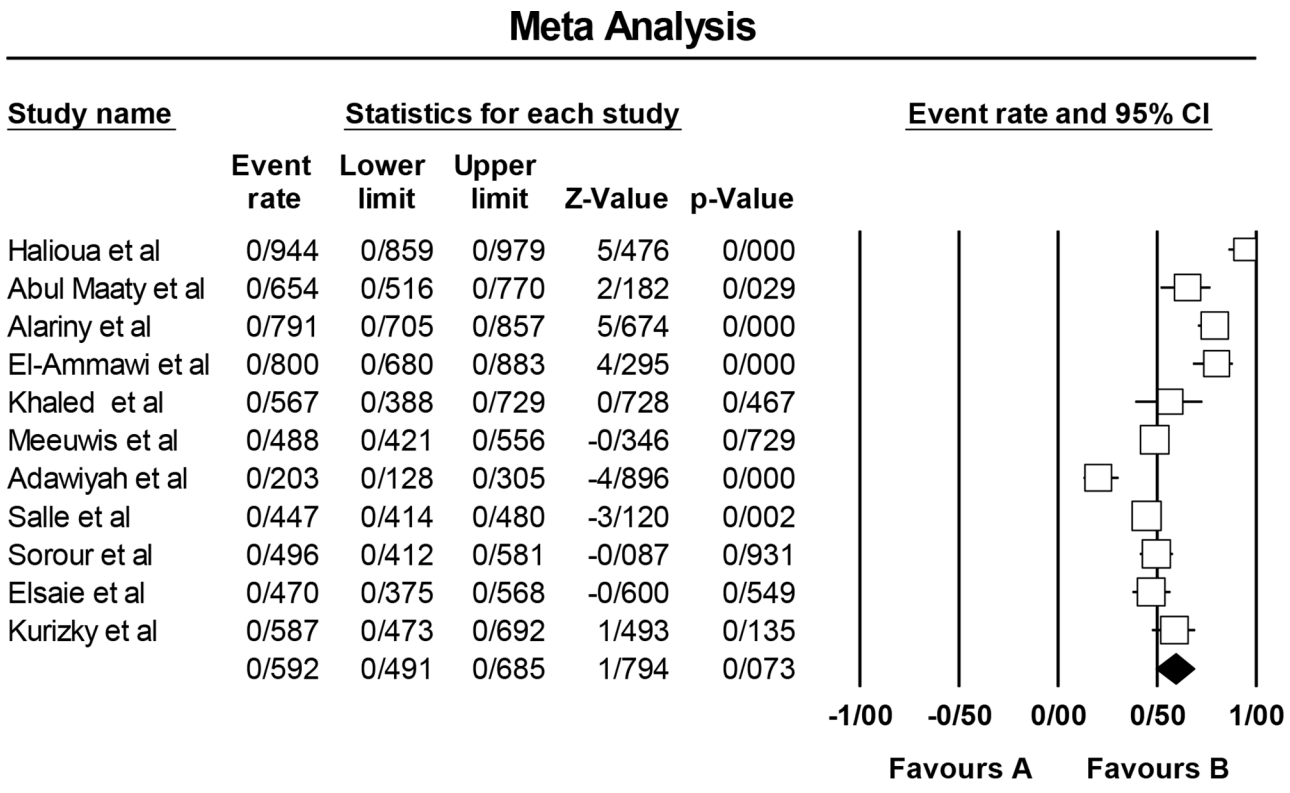

Fig. 4 Forest plot of the estimate of global prevalence of FSD in women with skin disease based on random effects model

Table 3 Subgroup analysis of estimated global prevalence of FSD in women with psoriasis

Subgroups		Number Studies	Point estimate	Lower limit	Upper limit	*P*-value	*P*-value between	I^2 (%)	Tau
Location	Africa	6	0.638	0.503	0.753	0.045	0.000	86.95	0.634
	Asia	1	0.203	0.128	0.305	0.00		0.000	0.00
	Europe	3	0.633	0.451	0.784	0.151		94.224	0.601
	South America	1	0.587	0.473	0.692	0.135		0.00	0.00
Tools	Anonymous	1	0.447	0.414	0.48	0.002	0.000	0.00	0.00
	DLQI	1	0.944	0.859	0.979	0.000		0.00	0.00
	DSM-5	1	0.496	0.412	0.581	0.931		0.00	0.00
	FSFI	8	0.573	0.438	0.699	0.051		90.87	0.743

Table 4 Subgroup analysis of global prevalence of FSD in women with vitiligo

Subgroups		Number Studies	Point estimate	Lower limit	Upper limit	*P*-value	*P*-value between	I^2 (%)	Tau
Location	Africa	4	0.718	0.555	0.838	0.01	0.447	0.367	0.606
	Europe	1	0.625	0.422	0.792	0.22		0.000	0.00
Tools	ASEX	1	0.625	0.422	0.792	0.226	0.126	0.00	0.00
	DSM-5	1	0.567	0.44	0.685	0.303		0.00	0.00
	FSFI	3	0.771	0.612	0.877	0.002		0.248	0.498

Subgroup analysis

Given the high heterogeneity among studies, a subgroup analysis was conducted based on different continents and the assessment tools used in studies. The highest global prevalence of FSD in women with hidradenitis suppurativa was reported in Africa, at 66.7% (95% CI: 33.3 – 88.9%), and in studies using the FSFI tool, the prevalence was estimated at 62.1% (95% CI: 55.9 – 68.0%). There was no statistically significant difference in the global prevalence of FSD in women with hidradenitis suppurativa based on the continent where the study was conducted or the assessment tool used (Table 5).

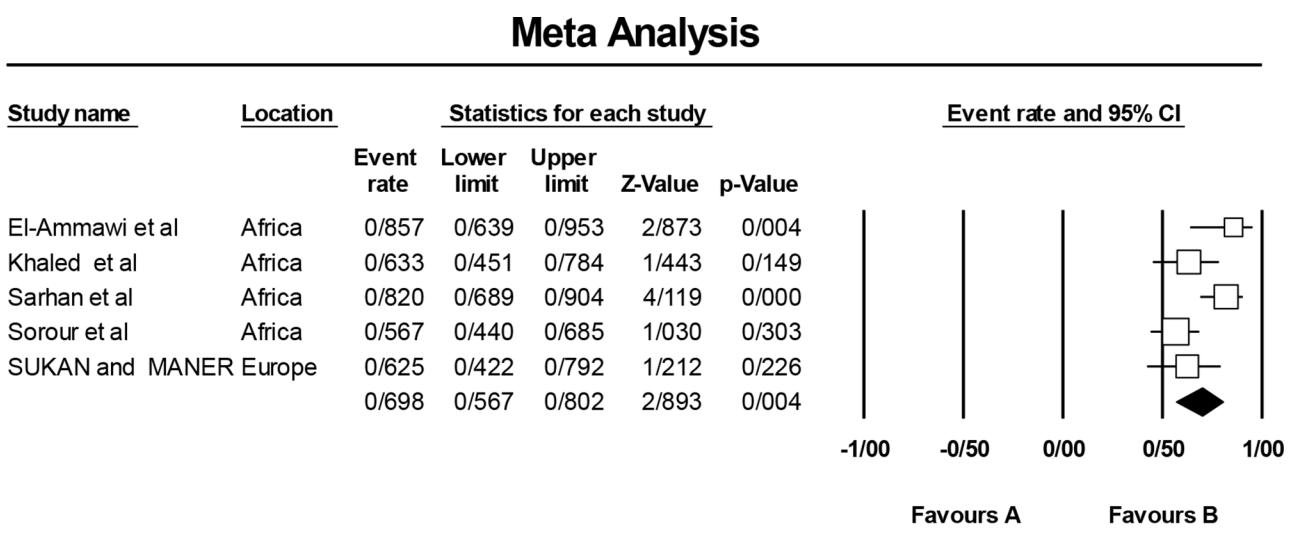

Fig. 5 Forest plot of the estimate of global prevalence of FSD in women with vitiligo based on random effects model

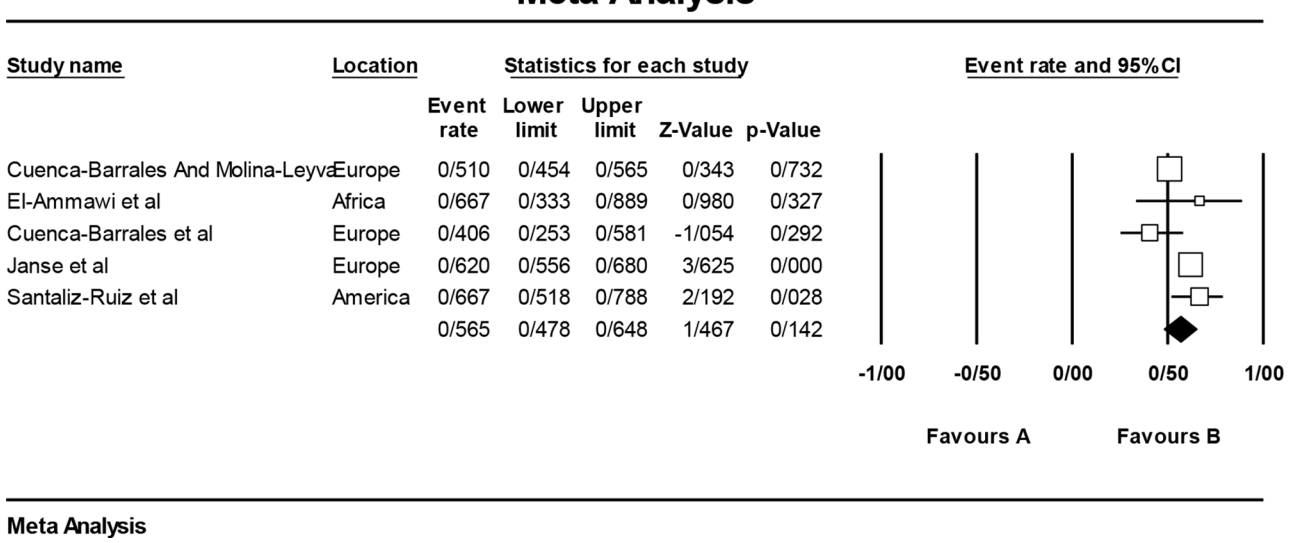

Fig. 6 Forest plot of the estimated global prevalence of FSD in women with hidradenitis suppurativa based on the random effects model

Table 5 Subgroup analysis of the estimated global prevalence of FSD in women with hidradenitis suppurativa

Subgroups		Number Studies	Point estimate	Lower limit	Upper limit	*P*-value	*P*-value between	I^2 (%)	Tau
Location	Africa	1	0.667	0.333	0.889	0.327	0.292	0.00	0.00
	America	1	0.667	0.518	0.788	0.028		0.000	0.00
	Europe	3	0.533	0.43	0.633	0.529		0.095	0.308
Tools	FSFI	2	0.621	0.559	0.68	0.00	0.179	0.00	0.00
	FSFI-6	3	0.53	0.41	0.646	0.627		0.116	0.34

Meta-regression analysis

Using meta-regression, the relationship between publication year (Fig. 7) and sample size (Fig. 8) was examined in relation to the global prevalence of FSD in women with dermatological disorders (psoriasis, vitiligo, and hidradenitis suppurativa). No significant change in the prevalence of FSD over time was observed with increase in the publication year ($P > 0.05$). Similarly, as sample size increased, there was a very slight downward trend in FSD

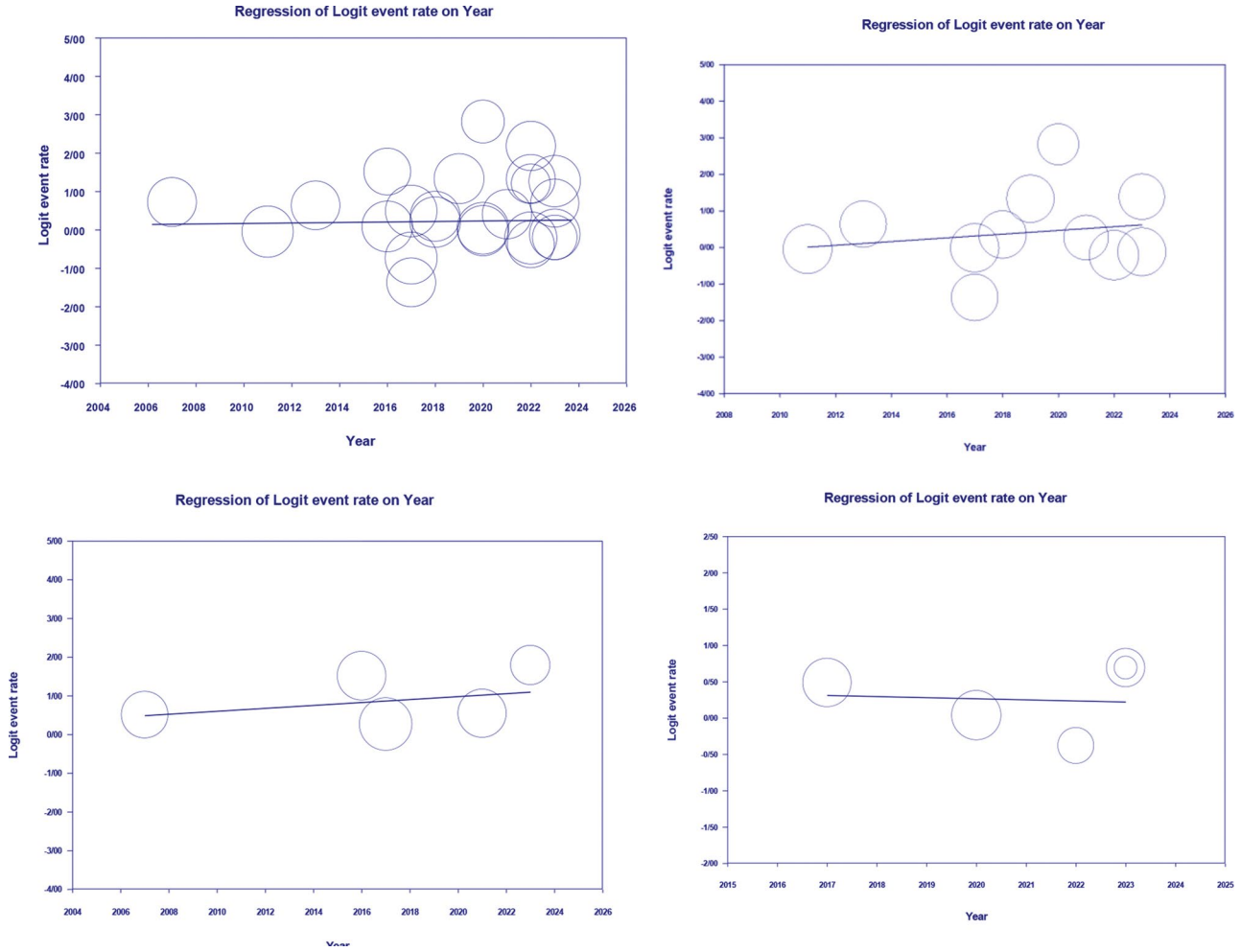

Fig. 7 Meta-regression of the relationship between the study year and global prevalence of FSD in women with skin disorders (psoriasis, vitiligo, and hidradenitis suppurativa)

prevalence for vitiligo and hidradenitis suppurativa and a more noticeable downward trend for psoriasis. However, these trends were also statistically insignificant ($P > 0.05$).

Discussion

The overall global prevalence of female sexual dysfunction (FSD) among affected women is estimated at 61.3%. Additionally, prevalence rates for FSD were analyzed in relation to specific skin disorders: vitiligo, psoriasis, and hidradenitis suppurativa, with rates of 69.8%, 59.2%, and 56.5%, respectively. Several factors contribute to this issue, particularly the high prevalence of FSD among women with vitiligo. The challenges associated with vitiligo can greatly affect patients' mental and emotional well-being [50], which, in turn, can impact their sexual function [51]. Oxidative stress significantly contributes to melanocyte destruction and may play a role in vitiligo. It leads to changes in keratinocytes that result in melanocyte death. Since the oxidative stress mechanism in vitiligo resembles that of other diseases linked to ferroptosis, future research on ferroptosis in vitiligo is expected [52].

The skin serves as a vital protective organ, safeguarding the body against pathogens and preventing excessive moisture loss, which helps maintain bodily fluids [53]. Being the largest and most visible part of the body [8, 54], any condition affecting the skin can alter an individual's appearance, often resulting in a greater risk of mental health issues compared to other illnesses (5. Consequently, skin disorders can increase vulnerability to anxiety, depression, relationship difficulties, and sexual dysfunction [22].

Women with skin diseases frequently experience anxiety and depression for several reasons, including negative societal attitudes, stigma associated with their condition, prolonged treatment regimens, and dietary restrictions intended to improve their skin issues [5, 55, 56]. Moreover, the use of antidepressants to lift mood, along with the psychomotor symptoms that may accompany

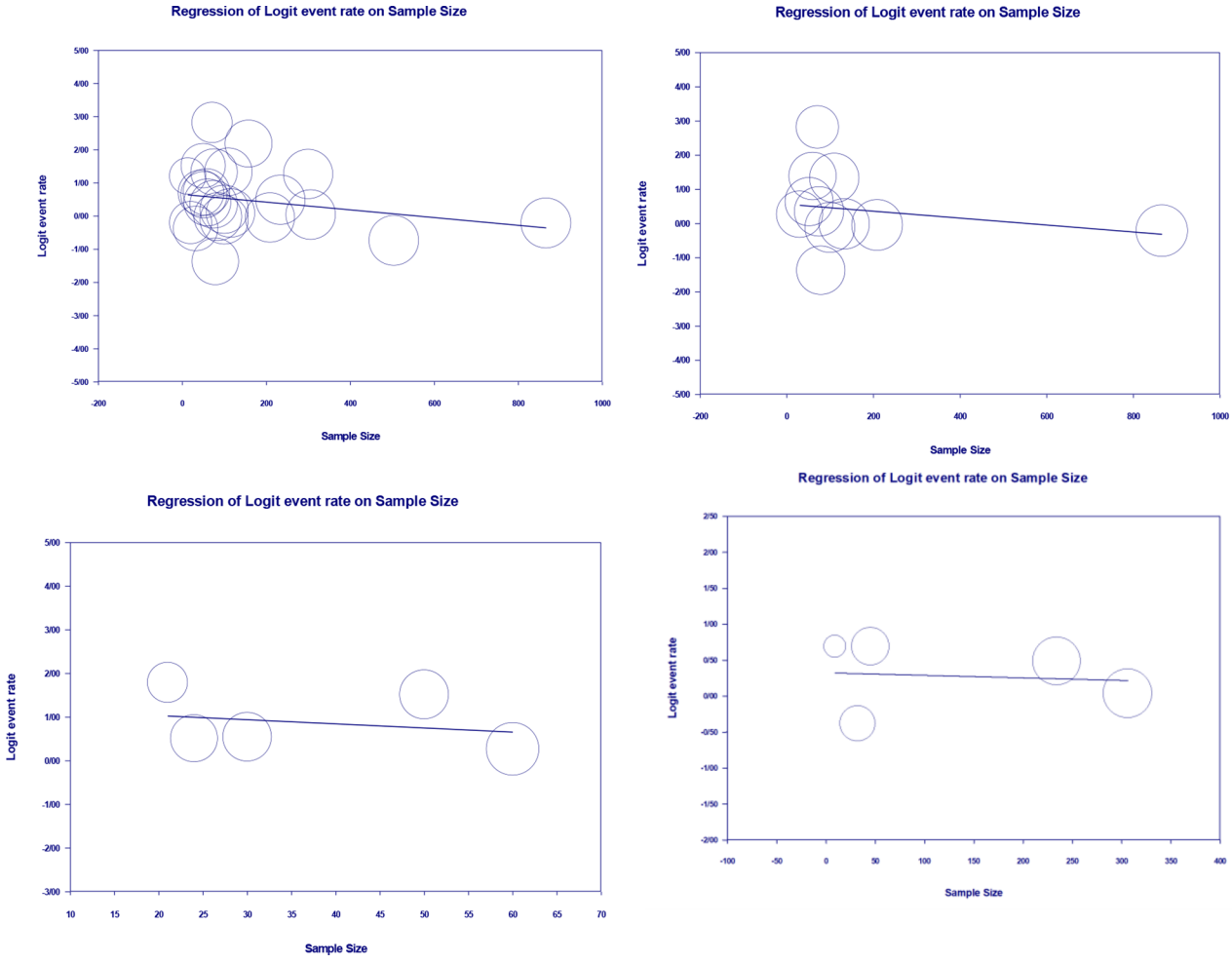

Fig. 8 Meta-regression of the relationship between sample size and global prevalence of FSD in women with dermatological disorders (psoriasis, vitiligo, and hidradenitis suppurativa)

depression, can significantly contribute to the onset or worsening of female sexual dysfunction [57]. Other studies suggest that body image concerns, fear of pain or discomfort during intercourse, certain medications, and the worry about transmitting the disease to others can also profoundly affect the sexual function of individuals with specific skin conditions [38, 58]. Some studies have specifically addressed the issue of sexual dysfunction in women with skin disorders [15, 22, 48].

Hassanin et al. reported a prevalence of female sexual dysfunction (FSD) in women with chronic skin conditions of 55% [33]. Similarly, El-Ammawi et al. found an FSD prevalence of 62.5% in Egyptian women with acne [15], aligning closely with the results of this study. Other research indicated that the prevalence of FSD among Brazilian and Egyptian women with psoriasis was 58.6% and 56.7%, respectively [37, 49]. In a study by Sukan and Maner, 62.5% of women with vitiligo met the diagnostic criteria for FSD [44], while Khaled et al. reported a similar prevalence of about 63% in women with vitiligo [37]. Cross-sectional studies on Dutch and Spanish women with hidradenitis suppurativa documented FSD prevalence rates of 62% and 51%, respectively [38, 39].

Notably, one study reported that 80% of patients with keratosis pilaris and 80% of women with urticaria experienced FSD concurrently [15]. Vittrup et al. found an FSD prevalence of 90% in their cross-sectional study of Danish women with lichen sclerosus [45]. Additionally, approximately 94% of French women with psoriasis were identified as FSD patients [31], indicating a higher prevalence than observed in the present study. Aside from the high prevalence of FSD among women with skin diseases noted in these studies, there is also a significant likelihood of other psychological complications, such as anxiety, depression, and social isolation, among patients with skin conditions [59]. Encouraging affected individuals to participate in support groups and to share their experiences can be highly beneficial for promoting mental health [60]. Furthermore, patients with skin diseases may reduce psychological distress by engaging in counseling

and psychotherapy. These approaches not only enhance quality of life but also provide coping strategies for the challenges they face [59]. In other words, counseling and psychotherapy can help decrease the prevalence of FSD in affected women by improving their overall well-being and addressing psychological issues related to sexual health.

In some studies, the prevalence of female sexual dysfunction (FSD) among individuals with certain skin disorders is reported as low [30, 41]. For instance, Sorour et al. found that about 25% of women with chronic urticaria experience FSD, while rates were 29.07% in those with alopecia areata and 24.59% for atopic dermatitis [30]. Another study noted a 20.3% prevalence of FSD in women with psoriasis [41].Sexual dysfunction is a significant health issue influenced by various factors [19]. Research suggests that both physical and psychological conditions impact sexual function [21, 25], along with age [25], lifestyle, job status, stress, and relationships [26]. Risk factors for FSD include longer marriage duration, lower partner compatibility, and a partner's chronic illness. Differences in findings among studies may arise from variations in participant characteristics, measurement tools, and the type and severity of skin conditions reported.

Various tools have been developed to assess Female Sexual Dysfunction (FSD), each with unique characteristics. The Female Sexual Function Index (FSFI) evaluates sexual functioning over the past 30 days, while the Asexuality Scale (ASEX) focuses on the previous 7 days [61]. The Dermatology Life Quality Index (DLQI) is a 10-item questionnaire assessing the impact of skin diseases on life, including sexual health, particularly through item 9, which addresses sexual functioning [31, 62]. This research included studies evaluating FSD using these tools and performed a subgroup analysis to differentiate them.

Most studies focused on women with FSD in Africa, especially Egypt, with limited research in Asia due to cultural taboos surrounding sexual discussions. These barriers lead to fewer women participating or reporting FSD, resulting in a lack of reliable data in these regions. Cultural differences [63] and social norms influence reporting rates and research volume, as stigma and misconceptions about skin diseases can cause low self-esteem and depression, disrupting sexual health [55, 59, 64]. Given the role of physical and psychological factors in FSD [21, 25], a multidisciplinary approach involving healthcare providers, psychologists, and sexual dysfunction therapists can enhance treatment [61, 65]. Collaboration among dermatologists, psychologists, and gynecologists can create a supportive environment, improving the quality of life and sexual relationships for women with skin diseases.

In this context, it can be said that psychological interventions can enhance the quality of life for patients and even improve their sexual function. While most patients with skin diseases may not require psychological changes, they can benefit from effective communication between doctors and patients, emphasizing empathy and positive attention [66]. Assisting patients in psychosocial adapting to the changes brought on by skin conditions can be helpful [67]. Additionally, numerous studies have explored various adjunctive psychotherapy techniques, such as meditation, psycho-biofeedback therapy, and relaxation therapy for conditions like psoriasis, atopic dermatitis, and acne vulgaris, which have shown successful results [68–70].

A limitation of this study was its focus on English-language publications, which led to the exclusion of some relevant studies. Another limitation was the lack of random sampling in some studies and the variability in study methods, which may have affected the findings. To report the overall prevalence of female sexual dysfunction (FSD) in women with skin diseases, we included various types of skin conditions, such as acne and atopic dermatitis, in our analysis. However, despite recognizing that these conditions, along with urticaria, are quite common, the number of available studies on them was relatively limited. This scarcity of data made it difficult to conduct meaningful subgroup analyses with sufficient statistical power.

Conclusion

Given the high prevalence of FSD among women with skin disorders, it is essential for health policymakers to focus on this patient population and implement effective measures to prevent such disorders. Timely awareness-raising and education for affected individuals could help reduce the incidence of FSD and its associated complications, thereby lessening the burden of these disorders.

Practical recommendations

Dermatologists and other healthcare professionals are encouraged to take active steps to improve the sexual health of women who are dealing with Female Sexual Dysfunction, commonly referred to as FSD. To achieve this, it is important for these professionals to carry out thorough and consistent screenings during patient visits, ensuring they ask the right questions and gather useful information. Additionally, staying updated on the latest research and developments in the field of FSD is crucial, as it allows healthcare workers to provide the best possible care.

Working closely with psychologists and gynecologists can also greatly enhance the support offered to these women, as a team approach often leads to better outcomes. Furthermore, keeping detailed records of any

findings and observations during these consultations is important, as this documentation can help in understanding the condition over time and tailoring treatment plans to meet the specific needs of each patient. By taking these steps, healthcare personnel can play an essential role in addressing and improving the sexual health challenges faced by women dealing with FSD.

Abbreviations

FSD	Female sexual dysfunction
WoS	Web of Science
MeSH	Medical Subject Headings
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
JBI	Joanna Briggs Institute

Supplementary Information

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Supplementary Material 1

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Author contributions
All authors were involved in the conceptualization of the project and reviewed and edited the manuscript. P.H. and A.J. led the study and were responsible for data curation, formal analysis, methodology, data visualization, and drafting the original manuscript. A.J., and P.H. were responsible for data analysis. All authors have reviewed the final manuscript.

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Data availability
The author confirms that all data generated or analyzed during this study are included in this published article.

Declarations

Ethics approval and consent to participate
In order to conduct this study, all the ethical issues of the Declaration of Helsinki were observed from the search for articles to the publication of the results. This study is the result of research project No. 50004966 approved by the Student Research Committee of Kermanshah University of Medical Sciences. Ethical committee of Kermanshah University of Medical Sciences approved this study (IR.KUMS.REC.1403.488).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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