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The sexual dysfunction in women with thyroid disorders: a meta-analysis

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Abstract

Background Thyroid disorders are common endocrine conditions impacting multiple organs, including the reproductive system and often lead to sexual dysfunction. These effects can vary by gender; for example, women with hypothyroidism frequently experience reduced libido. Low thyroid hormone levels are also linked to vaginal dryness, causing discomfort, especially during intercourse. This study aims to assess the global prevalence of sexual dysfunction in women with thyroid disorders.

Methods Systematic searches were performed across electronic databases, including PubMed, Scopus, Web of Science, Embase, ScienceDirect and Google Scholar, to retrieve studies reporting the prevalence of sexual dysfunction in patients with thyroid disorders up to February 8, 2024. Inclusion criteria comprised studies that reported on the prevalence of female sexual dysfunction (FSD) in patients with thyroid disorders and studies published in English available full text. Exclusion criteria included case studies, intervention studies, studies with incomplete information, repeated studies and those not written in English. Cross-sectional studies were the primary study design included. Data were analyzed using the Comprehensive Meta-Analysis software (Version 2).

Results Analysis of nine studies, involving a total sample size of 1013, found an overall prevalence of sexual dysfunction in women with thyroid disorders to be 44.8% (95% CI: 33.8–56.2). Given the substantial reporting of sexual dysfunction among women with either hypothyroidism or hyperthyroidism, subgroup analyses were conducted. The prevalence of sexual dysfunction was 41.8% (95% CI: 26.3–59) among women with hypothyroidism and 59.6% (95% CI: 50.5–68.1) among those with hyperthyroidism.

Conclusion The notable prevalence of sexual dysfunction in women with thyroid disorders highlights the for increased awareness among this population. Targeted awareness initiatives may help mitigate the occurrence of sexual dysfunction and its adverse effects, improving overall quality of life for affected women.

Clinical trial number Not applicable.

Keywords Female sexual dysfunction, FSD, Thyroid, Meta-analysis

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Background

Thyroid disorders are among the most common endocrine gland conditions, often stemming from iodine deficiency or other contributing factors [1]. These disorders encompass a range of conditions, including goiters, thyroid cancer, Hashimoto's thyroiditis, Graves' disease, hypothyroidism and hyperthyroidism [2]. Broadly, thyroid disorders can be categorized into hypothyroidism and hyperthyroidism, characterized by decreased or increased thyroid hormone levels, respectively [1, 3]. The thyroid gland produces hormones that influence nearly every cell, organ, and bodily system [2–5]. Consequently, thyroid disorders can significantly affect sexual health, with both men and women experiencing reduced sexual desire or impaired sexual function due to common symptoms of hypothyroidism, such as fatigue and depression [2–5]. In women, thyroid disorders often have unique manifestations. Hypothyroidism is commonly associated with decreased libido and low levels of thyroid hormone are linked to vaginal dryness, which can cause discomfort, particularly during intercourse [2–5].

Thyroid disorders are prevalent worldwide with significant variability in prevalence rates across different populations [4, 5]. One study reported the prevalence of thyroid disorders to range from 2 to 6% globally [6]. However, rates differ by region, with figures reaching 6.6% in European and American adults and up to 24.3% in a state in Sudan [7–9].

According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), sexual dysfunction is diagnosed when an individual experiences persistent distress or difficulties in sexual activity for at least six months, independent of substance use [10]. While sexual dysfunction can affect both genders, it is more commonly observed in women [11]. FSD encompasses a range of issues, including low sexual desire, arousal difficulties, orgasmic disorders, and pain or reduced sexual satisfaction [12]. Multiple factors can contribute to FSD, including religion, lifestyle, psychological issues and other medical conditions [11, 13].

Several studies have highlighted the association between thyroid disorders and FSD [14–16]. For instance, research conducted in Romania reported a 33.2% prevalence of FSD among women with autoimmune thyroid disorders, while a Spanish study found a 31.6% prevalence among women with hypothyroidism [14, 15]. In the Netherlands, the prevalence of FSD as 81% in women with hyperthyroidism due to Graves' disease and 47% in women with hyperthyroidism associated with goiter [16, 17].

Given the significant impact of FSD on personal relationships and quality of life, as well as the varying prevalence rates of FSD in women with thyroid disorders reported across different studies, this study aims to systematically review existing literature to determine the global prevalence of FSD in women with thyroid disorders.

This review will address the inconsistencies in reported data and provide a clearer understanding of the burden of FSD among women affected by thyroid disorders, offering valuable insights for healthcare professionals and policymakers aiming to mitigate the consequences of these conditions.

Methods

This systematic review and meta-analysis were conducted following the PRISMA guidelines. Comprehensive searches were performed across multiple databases, including Web of Science, Scopus, ScienceDirect, PubMed, Embase and Google Scholar, using a combination relevant keywords such as "sexual disorders," "sexual dysfunction," "female sexual dysfunction," "FSD," "dyspareunia," "orgasm disorder," "females," "women," "thyroid," "hyperthyroidism," "hypothyroidism," and "thyroiditis," combined with logical operators (AND, OR). A manual search of bibliographies from relevant articles was also conducted to identify studies published up to February 8, 2024.

Search strategy in PubMed

(((((((((Prevalence[Title/Abstract]) AND (Sexual disorders[Title/Abstract])) OR (Sexual dysfunction[Title/Abstract])) OR (dyspareunia [Title/Abstract])) OR (orgasm disorder [Title/Abstract]))OR (Female sexual dysfunction[Title/Abstract])) OR (FSD [Title/Abstract])) OR (women sexual dysfunction[Title/Abstract])) AND (Thyroid disorders[Title/Abstract])) OR (Thyroid diseases[Title/Abstract])) OR (Hyperthyroidism[Title/Abstract] OR (hypothyroidism [Title/Abstract]))))))))

Inclusion criteria

1. Studies reporting the prevalence of FSD in patients with thyroid disorders.
2. Studies with full-text availability.
3. Studies published in English.
4. Cross-sectional studies.

Exclusion criteria

1. Case studies.
2. Interventional studies.
3. Studies with incomplete information.
4. Duplicate studies.
5. Studies not written in English.

Study selection

Articles were transferred to EndNote software for management. Two researchers independently screened the studies, removed duplicate articles and reviewed the titles and abstracts of the remaining articles. Irrelevant articles were excluded based on the exclusion criteria, while studies meeting the inclusion criteria proceeded to full-text review. Two researchers independently reviewed the full texts and discrepancies were resolved by a third researcher who provided guidance when consensus was not reached.

Qualitative evaluation of the studies

The STROB tool was employed to assess the quality of observational studies. This tool evaluates studies based on six domains: title, statement of the problem, study objectives, study type, study population, sampling method, sample size, and study variables. The checklist comprises 22 questions, some with subcategories, leading to a scoring range of 0 to 32. Articles scoring below 16 were classified as low quality, whereas those scoring 16 or higher were considered moderate to high quality [18].

Data extraction

A standardized checklist was designed to extract essential information, including authors' names, year of publication, study type, study location, sample size, prevalence of FSD in women with thyroid disorders, participant age range and the assessment tool used for evaluating FSD.

Statistical analysis

Data analysis was performed using Comprehensive Meta-Analysis software (Version 2). Study heterogeneity was evaluated using the I^2 test and publication bias was assessed with the Egger test at a significance level of 0.05. Additionally, a funnel plot was used to visually assess publication bias.

Results

Based on the systematic search, 756 studies were initially identified as relevant to the research objective of determining the global prevalence of sexual dysfunction in women with thyroid disorders. An additional 2 studies were manually included. After removing duplicates, 552 studies remained. Following the screening of abstracts and titles and the application of the defined inclusion and exclusion criteria, 530 studies were excluded resulting in 22 studies for further examination. A detailed review of the full texts of these 22 articles led to the exclusion of 10 due to insufficient information, such as the absence of sample size details and prevalence reporting. Additionally, three studies were excluded during the quality assessment phase for scoring below 16. Ultimately, nine studies met the criteria for analysis (Fig. 1; Table 1).

In total, these nine studies encompassed a sample size of 1013 individuals. Among them, the study by Luo et al. and the study by Hong et al. reported the lowest and highest prevalence of sexual dysfunction among women with thyroid disorders, respectively [19, 20]. Luo et al.'s study, conducted in China in 2018, reported a prevalence of 21.4% for sexual dysfunction among women with hypothyroidism [20]. In contrast, the cross-sectional study by Hong et al., conducted in Korea in 2015, found that 67.4% of Korean women with hypothyroidism were diagnosed with sexual dysfunction using the Female Sexual Function Index (FSFI) [19]. The most commonly used tools for assessing sexual dysfunction in women with thyroid disorders were the Female Sexual Function Index (FSFI) [16, 19, 21–24], Women's Sexual Function (WSF) [14], FSFI-6 [15] and the Chinese version of the FSFI [20] (Table 1).

In the analysis of the nine studies, encompassing a total sample size of 1013 individuals, the heterogeneity test I^2 indicated substantial heterogeneity ($I^2=91.2\%$). Therefore, a random-effects model was applied for the meta-analysis. The global prevalence of Female Sexual Dysfunction (FSD) in women with thyroid disorders was estimated to be 44.8% (95% CI: 33.8–56.2) (Fig. 2). Additionally, the assessment of publication bias using the Egger test showed no significant evidence of publication bias ($p=0.235$) (Fig. 3).

An analysis of the factors contributing to heterogeneity among the studies, including the effect of sample size, indicated that as a sample size increased, the reported prevalence of FSD in patients with thyroid disorders decreased ($p<0.05$) (Fig. 4). Additionally, the prevalence of FSD in patients with thyroid disorders was found to decrease with more recent study years ($p<0.05$) (Fig. 5).

Subgroup analysis based on thyroid disorder types

According to the subgroup analysis based on the type of thyroid disorder, the global prevalence of FSD in patients with hyperthyroidism was higher, reported at 59.6 (95% CI: 50.5–68.1) (Table 2).

Discussion

Thyroid disorders are among the most prevalent diseases globally, with a higher incidence in women compared to men [4]. Early detection is common, often due to the availability of diagnostic tools [2]. Although not all thyroid disorders necessitate treatment, studies have demonstrated their potential impact on sexual function. This effect is likely due to thyroid hormones influencing sex hormone levels, thereby affecting sexual activity in individuals with thyroid disorders [2, 10]. Several studies have reported on the prevalence of sexual dysfunction among women with thyroid disorders [14, 16]. The objective of this study was to determine the global prevalence

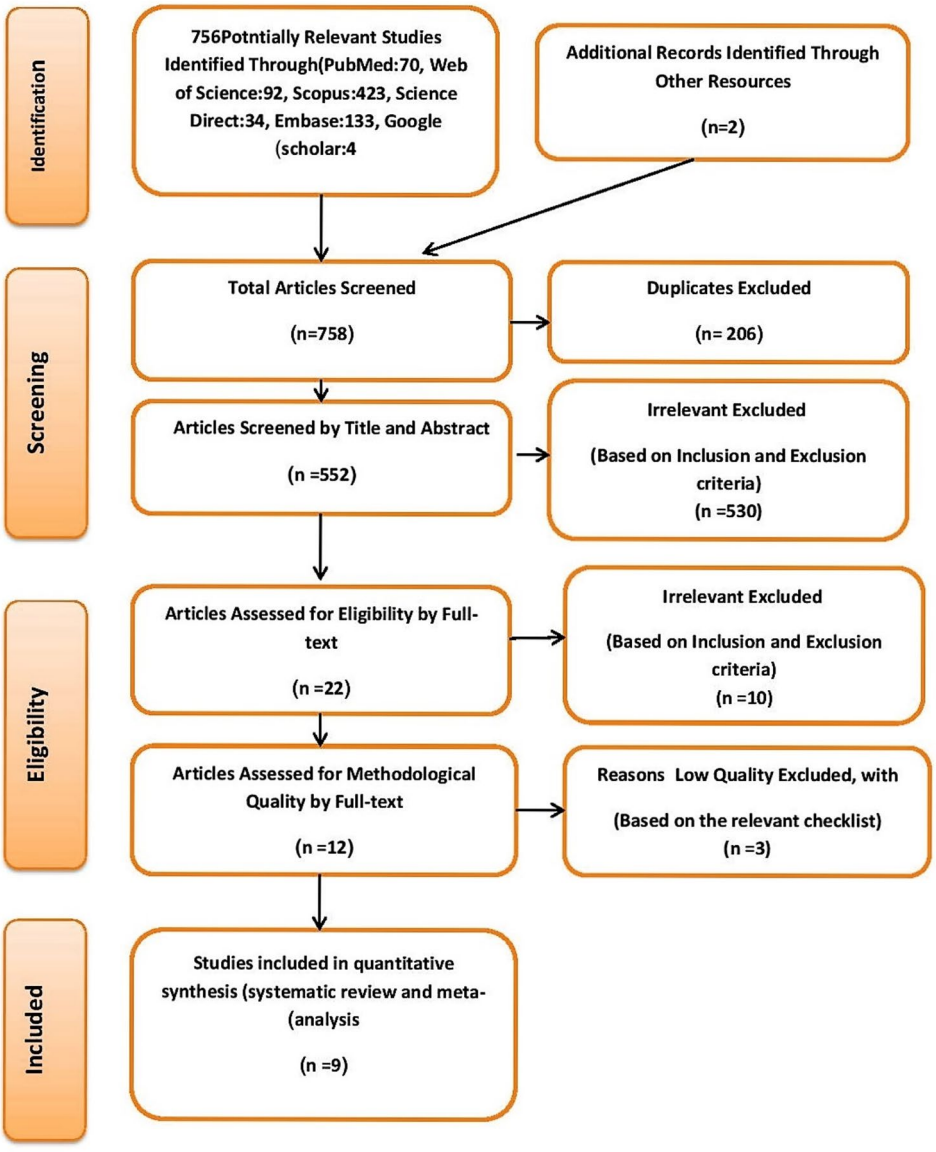

Fig. 1 The flowchart on the stages of including the studies in the systematic review and meta-analysis (PRISMA 2009)

of Female Sexual Dysfunction (FSD) in patients with thyroid disorders.

The analysis conducted in this study revealed an overall prevalence of 44.8% for sexual dysfunction among women with thyroid disorders. While various thyroid disorders exist [2], evidence shows that hypothyroidism and hyperthyroidism are more common in iodine-rich regions [4]. Based on the findings from multiple studies [14, 16, 20], the prevalence of sexual dysfunction in women with hypothyroidism and hyperthyroidism was calculated separately, showing rates of 41.8% and 59.6%, respectively.

In a study conducted in Italy, the overall prevalence of sexual dysfunction in women with thyroid disorders was 46.1%, with a 41% prevalence among women with hypothyroidism [21]. Similarly, research from the Netherlands reported a 41% prevalence of sexual dysfunction among Dutch women with hypothyroidism [24]. A cross-sectional study conducted from Turkey found that 60% of women with hyperthyroidism met the diagnostic criteria for sexual dysfunction [23]. Another study indicated that 47% of Dutch women with hyperthyroidism due to toxic adenoma exhibited signs of sexual dysfunction [16]. These findings align with the prevalence reported in the present study.

Some studies have reported significantly higher or lower prevalence rates than those calculated in this study [16, 19, 20]. For example, a study among Korean women with hypothyroidism found that 67.4% experienced sexual dysfunction [19]. Conversely, only 21.4% of

Table 1 Summary of characteristics of included studies of prevalence of FSD in patient with thyroid disorders

Author	Year	Qualitative Evaluation	country	Sample Size	Prevalence of FSD in Patient (%)	Age	Instrument	Type of Disorder
Atis et al [22]	2010	Moderate	Turkey	50	44%	38.09 ± 6.20	FSFI	Hypothyroidism
Atis et al [23]	2011	Moderate	Turkey	40	60%	37.3 ± 11.8	FSFI	Hyperthyroidism
Pasquali et al [21]	2013	Moderate	Italy	104	43.27%	41.7 ± 10.3	FSFI[1]	hyperthyroidism, hypothyroidism, Hashimoto's thyroiditis, nodular goiter
Hong et al [19]	2015	Moderate	Korea	138	67.40%	47 to 56	FSFI	Hypothyroidism
Krysiak et al [24]	2016	Moderate	Poland	50	46%	30.33 ± 4.66	FSFI	Hashimoto's thyroiditis, nonautoimmune subclinical hypothyroidism, autoimmune subclinical hypothyroidism
Luo et al [20]	2018	High	China	168	21.40%	39.2 ± 7.6	CVFSFI[2]	hypothyroidism
Krysiak et al [16]	2019	High	Poland	61	64%	30.5 ± 6	FSFI	overt hyperthyroidism induced by Graves' disease, overt hyperthyroidism caused by toxic multinodular goiter or toxic adenoma
Romero-Gómez et al [14]	2020	High	Spain	152	31.60%	36.58 ± 9.96	WSF[3]	Hypothyroidism
Bortun et al [15]	2021	High	Romania	250	33.20%	20 to 45	FSFI-6	Thyroid Autoimmune Disease

[1] The Female Sexual Function Index

[2] Chinese Version of the FSFI

[3] Women's Sexual Function

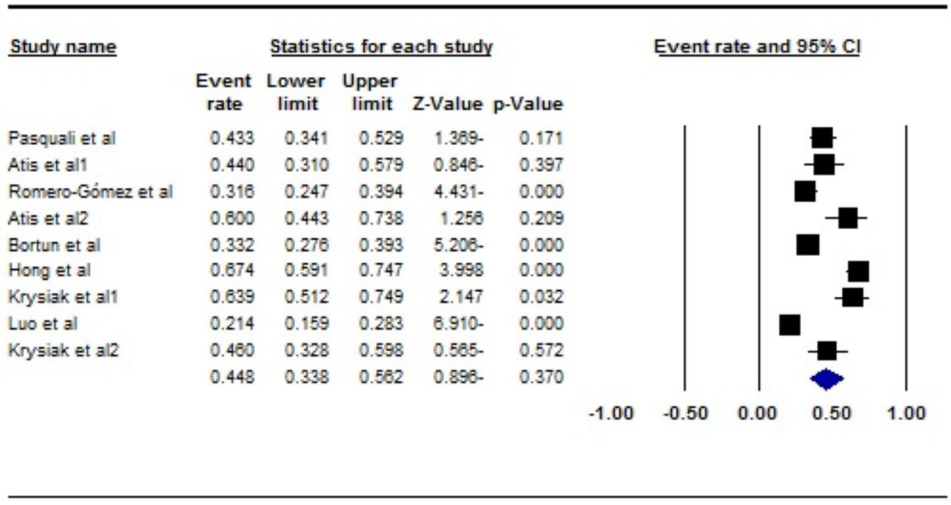

Fig. 2 Forest plot of the global prevalence of FSD in patients with thyroid disorders based on the random-effects model

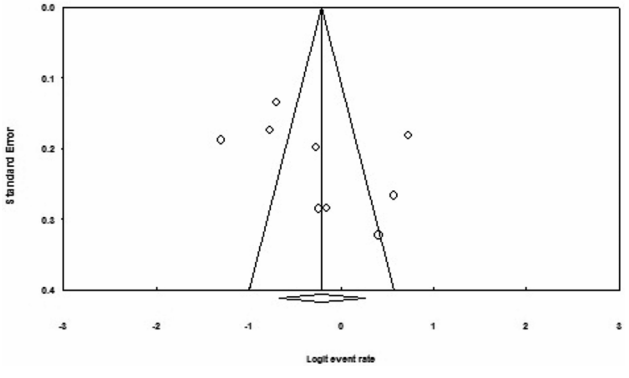

Fig. 3 Funnel plot assessing publication bias in the reviewed studies

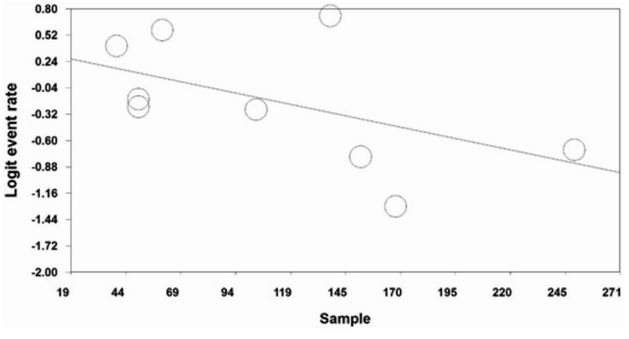

Fig. 4 Meta-regression of the effect of sample size on the prevalence of FSD in patients with thyroid disorders

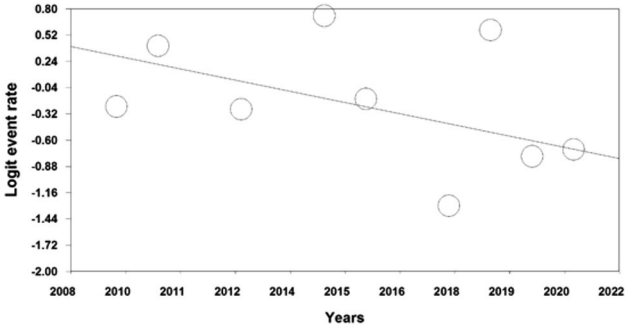

Fig. 5 Meta-regression of the effect of study year on the prevalence of FSD in patients with thyroid disorders

Table 2 Subgroup analysis based on types of thyroid disorders

Thyroid disorders	*N*	Sample size	I^2	Egger test	Prevalence (95% CI)
Hyperthyroidism	3	119	6.6 (Fixed effects method)	0.052	59.6 (95%CI: 50.5–68.1)
Hypothyroidism	6	564	92.5	0.842	41.8 (95%CI: 26.3–59)

168 Chinese women with hypothyroidism were reported to have sexual dysfunction [20]. Additionally, research from the Netherlands indicated that 81% of women with hyperthyroidism due to Graves' disease experienced sexual dysfunction [21].

Sexual dysfunction is a multifaceted disorder influenced by various factors [25]. Biological factors, socioeconomic status, education, psychological disorders and chronic physical conditions can all impact sexual function [25, 26]. Cultural and social norms in certain regions may lead to underreporting of sexual dysfunction [27]. Moreover, insufficient information on sexual health and the presence of chronic illnesses in partners can negatively affect sexual function [27]. These contributing factors, along with thyroid disorders, may explain the variability in reported prevalence rates. The results of this study can guide healthcare providers in enhancing the quality of life for women with thyroid disorders. This study offers comprehensive information to inform policy decisions related to diagnostic and treatment strategies available to gynecologists and endocrinologists. Future research should focus on intervention measures, as observational studies have shown that women with thyroid diseases have a higher prevalence of FSD compared to control groups [21].

The primary limitations of this study include the limited number of articles available and the small sample size in some studies. Additionally, the variability in contributing factors across the examined studies may have impacted the measurement of FSD prevalence.

Conclusion

Given the relatively high prevalence of Female Sexual Dysfunction (FSD) in patients with thyroid disorders, particularly hyperthyroidism and the negative impact of sexual disorders on marital life and relationship continuity, it is imperative for policymakers to address the needs of this patient group.

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Author contributions

NS and PH and MM contributed to the design, MM statistical analysis, and participated in most of the study steps. MM and PH and FB prepared the manuscript. MM and FM and FJ and SS and MN assisted in designing the study, and helped in the, interpretation of the study. All authors have read and approved the content of the manuscript.

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Data availability

Datasets are available through the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethics approval was received from the ethics committee of deputy of research and technology, Kermanshah University of Medical Sciences (IR.KUMS.REC.1403.072).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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