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Non-pharmacological interventions for female sexual dysfunction in low- and middle-income countries

A scoping review

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Abstract

Background: Sexual function is a multidimensional phenomenon affected by many different physical, physiological, and mental factors. Sexual dysfunction (SD) can affect the different aspects of personal and familial health. Non-pharmacological interventions for SD management have received great attention in recent years, though SD is still mostly managed using pharmacological interventions.

Methods: In this scoping review, we searched the PubMed/Medline, Web of Science, Scopus, and Google Scholar databases to find relevant studies published between January 2014 and February 2024.

Results: Twenty articles were included in the review. Non-pharmacological interventions such as cognitive-behavioral therapy, sexual education and counseling based on theories and models, mindfulness-based cognitive-behavioral sex therapy, phytotherapy and vaginal electrical stimulation, multimedia applications, and sexual health education programs can improve women's sexual function.

Conclusion: Given the effectiveness of non-pharmacological interventions and the heavy costs of pharmacological interventions, non-pharmacological interventions can be used for SD management in low- and middle-income countries.

Abbreviations: FSD = Female Sexual dysfunction, FSDS = Female Sexual Distress Scale, FSDS-3 = Female Sexual Distress Scale-3, FSDS-R = Female Sexual Distress Scale-Revised, FSDS-R = Revised Female Sexual Distress Scale, FSFI = Female Sexual Function Index, FSFI-6 = Female Sexual Function Index-Short Form, HISD = Halbert Index of Sexual Desire, MBCST = mindfulness-based cognitive-behavioral sex therapy, PLISSIT = Permission, Limited Information, Specific Suggestions, Intensive Therapy, SD = sexual dysfunction.

Keywords: intervention, low- and middle-income countries, non-pharmacological, sexual dysfunction

1. Introduction

Sexual dysfunction (SD) is one of the most prevalent problems in marital life and can cause different problems for couples.[1,2] The World Health Organization defines SD as adult syndromes caused in gaining sexual satisfaction during sexual activity.[3] The American Psychiatric Association also defines SD as "a group of disorders that are typically characterized by a clinically significant disturbance in a person's ability to respond sexually or experience sexual pleasure."[4] The global prevalence of SD is 30% to 50% among all women and 45% among married women of reproductive age. Its prevalence among married women of reproductive age is also 40% in developed countries and 62% in developing countries.[5–8]

Women's sexual function has 4 main dimensions, namely desire, arousal, orgasm, and pain.[2,7,9] Healthy sexual function has pivotal role in satisfactory marital relationships and pleasurable sexual encounters. SD in the 4 dimensions of sexual

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health is characterized by the reduction or absence of desire or arousal during sexual activity. Various factors can influence sexual function, including contextual factors such as culture, religion, and duration of marital life, biological factors such as hormones, health status, and medications, and psychological factors such as the history of sexual abuse and psychological disorders.[10–12]

SD has significant negative effects on interpersonal relationships, sexual comfort and satisfaction,[10–12] marital life, physical, mental, and social health,[7,13–15] quality of life,[10–12,16] and well-being.[16] A study in the United States reported that SD significantly reduced physical and emotional satisfaction and general happiness among women.[17] Another study in Turkey reported sexual health as an important component in improving quality of life and overall life satisfaction.[18] Moreover, a study in Japan showed that optimal sexual function is essential to improve sexual and physical satisfaction.[19] Therefore, employing effective interventions to manage SD and improve sexual health is essential.[7,13–15]

There are different approaches to manage female SD (FSD), including cognitive-behavioral therapy and counseling, psychotherapy, sexual-behavioral therapy, physiotherapy, and medication therapy.[20,21] Some studies recommended pharmacological interventions such as topical injection of botulinum neurotoxin, administration of anxiolytic agents, and management of muscular spasm for SD management.[22] However, these interventions are not evidence-based and further studies are necessary to confirm their effectiveness and safety.[7,23] For example, although evidence shows that botulinum neurotoxin is a safe and effective treatment option for women with SD, its mechanism and side effects are still poorly known and deserve further investigation.[24] Moreover, anxiolytic and antidepressant agents such as alprazolam, diazepam, lorazepam, and clonazepam may reduce sexual desire and orgasm.[25]

The various side effects of pharmacological interventions for SD management necessitate the use of non-pharmacological interventions. Non-pharmacological interventions such as electrical stimulation or biofeedback can improve sexual function among patients with urinary incontinence or hypertonic pelvic floor.[26–28] Educational and counseling interventions can also improve sexual function,[29] while some studies reported their ineffectiveness.[30]

In the field of sexual function disorders, it's important to note that drug therapy alone is not sufficient, and behavioral interventions are also necessary. Women, due to reproductive hormones, may experience reduced satisfaction, pleasure, and orgasm during sexual activity. To effectively treat sexual dysfunctions, it's crucial to understand the interplay between behavioral, psychological, and physiological processes. In developing countries, cultural factors often prevent women from seeking treatment for sexual dysfunction and adhering to medication. Limited access to certain medicines also hinders the medical treatment of this disorder in developing countries. In general, behavioral techniques can be used alone or in combination with drug therapy to effectively address this issue and produce positive results.[31,32]

Previous studies into the effects of non-pharmacological interventions had different limitations, including small sample size and unequal follow-up period and reported different results respecting the effectiveness of these interventions.[33] Moreover, to the best of our knowledge, no review study has yet reviewed the effects of non-pharmacological interventions on SD in low- and middle-income countries. This study sought to narrow these gaps. The aim of the study was to evaluate the effects of non-pharmacological interventions on FSD in low- and middle-income countries.

2. Methods

This systematic scoping review was conducted between January 2014 and February 2024. Scoping review is a precise and structured method for synthesizing and analyzing the published literature and identifying knowledge and research gaps.[34] This method has 5 stages, namely identifying the research question, identifying relevant studies, study selection, charting the data, and collating, summarizing, and reporting the results. In recent years, attempts have been made to improve the methodology of scoping review in the area of global health and this method has been used in the areas of neglected tropical diseases,[35] maternal health,[36] and breast screening in low- and middle-income countries.[37,38] In this study, we used a recently published guidance and method for performing systematic scoping reviews.[39] We aimed at reviewing the published studies respecting the effects of non-pharmacological interventions on FSD to assess their acceptability in low- and middle-income countries as well as to determine current research gaps and prospective research priorities. Our research question was, "Do non-pharmacological interventions improve FSD?" This review was conducted based on the guidance laid out in the PRISMA Extension for Scoping Reviews.[40]

2.1. Search strategy

We searched the PubMed/Medline, Web of Science, Scopus, and Google Scholar databases to find relevant studies published between January 2014 and February 2024. Search keywords were woman, women, cognitive-behavioral therapy, cognitive therapy, therapy, health education, education, sexual education, counseling, intervention, non-pharmacological intervention, psychological intervention, sexual function, female sexual function, sexual dysfunction, female sexual dysfunction, and randomized controlled trial (Table S1, Supplemental Digital Content, https://links.lww.com/MD/O862).

2.2. Inclusion and exclusion criteria

Inclusion criteria were a sample of women of reproductive age with SD, a design of clinical trial, a setting of low- or middle-income countries according to the World Bank reports, publication in English, non-pharmacological interventions, and no affliction of participants by chronic physical problems or history of surgeries. Studies on pregnant, postpartum, or menopausal women were not included.

2.3. Data extraction

Two of the authors (i.e., M.K. and E.E.) independently assessed the titles and the abstracts for the eligibility of the retrieved articles and then, assessed the full-texts of the potentially eligible articles. A third author (i.e., Z.B.) helped resolve any disagreement between them. Study data were extracted using a checklist with items on the first author, publication date, study population, study type, outcomes, follow-up duration, intervention duration, intervention type, Key findings, and outcome assessment instruments.

2.4. Study selection

In total, 784 articles were retrieved. The characteristics of them were entered into the EndNote software and 295 articles were omitted due to duplication. Then, the titles and the abstracts of the remaining articles were assessed and 412 articles were omitted due to irrelevance to study aim. Finally, the full-texts of 77 articles were assessed and 57 articles were excluded due to unclear data about intervention type, target population, or study type, and twenty articles were included in the study (Fig. 1).

2.5. Findings

Twenty articles published in 2014 to 2024 on non-pharmacological interventions for FSD management in low- and middle-income countries were reviewed. All studies were interventional and most of them had assessed the effects of educational interventions and some of them had assessed the effects of electrical stimulation, physical exercises, and multimedia applications. Table 1 shows their characteristics.

Non-pharmacological interventions in the reviewed studies fell into 6 main categories, namely cognitive-behavioral therapy, sexual education and counseling based on theories and models, mindfulness-based cognitive-behavioral sex therapy, phytotherapy and vaginal electrical stimulation, multimedia applications, and sexual health education programs.

2.6. Cognitive-behavioral therapy

A study into the effects of cognitive-behavioral therapy provided cognitive-behavioral counseling in four two-hour group sessions and found it effective in significantly improving all dimensions of sexual function, namely arousal, orgasm, sexual desire, lubrication, dyspareunia, and sexual satisfaction.[29] Two other studies also reported the effectiveness of cognitive-behavioral therapy in significantly improving sexual function and its arousal, sexual desire, and sexual satisfaction dimensions and reducing dyspareunia.[48,49] These findings imply that cognitive-behavioral therapy is an appropriate approach for improving women's sexual function and managing FSD, though further studies are necessary to produce firmer evidence in this area.

2.7. Sexual education and counseling based on theories and models

A study showed that group education based on the rapport building, exploring, decision making, and implementing the decision model significantly improved the mean scores of sexual knowledge, attitude, and function among young women.[53] Another study reported that counseling based on the PLISSIT model which focused on sexual dysfunctional beliefs and consisted of sex therapy for sexual disorders significantly improved sexual satisfaction and reduced ineffective sexual dysfunctional beliefs.[46] Moreover, a study showed that both

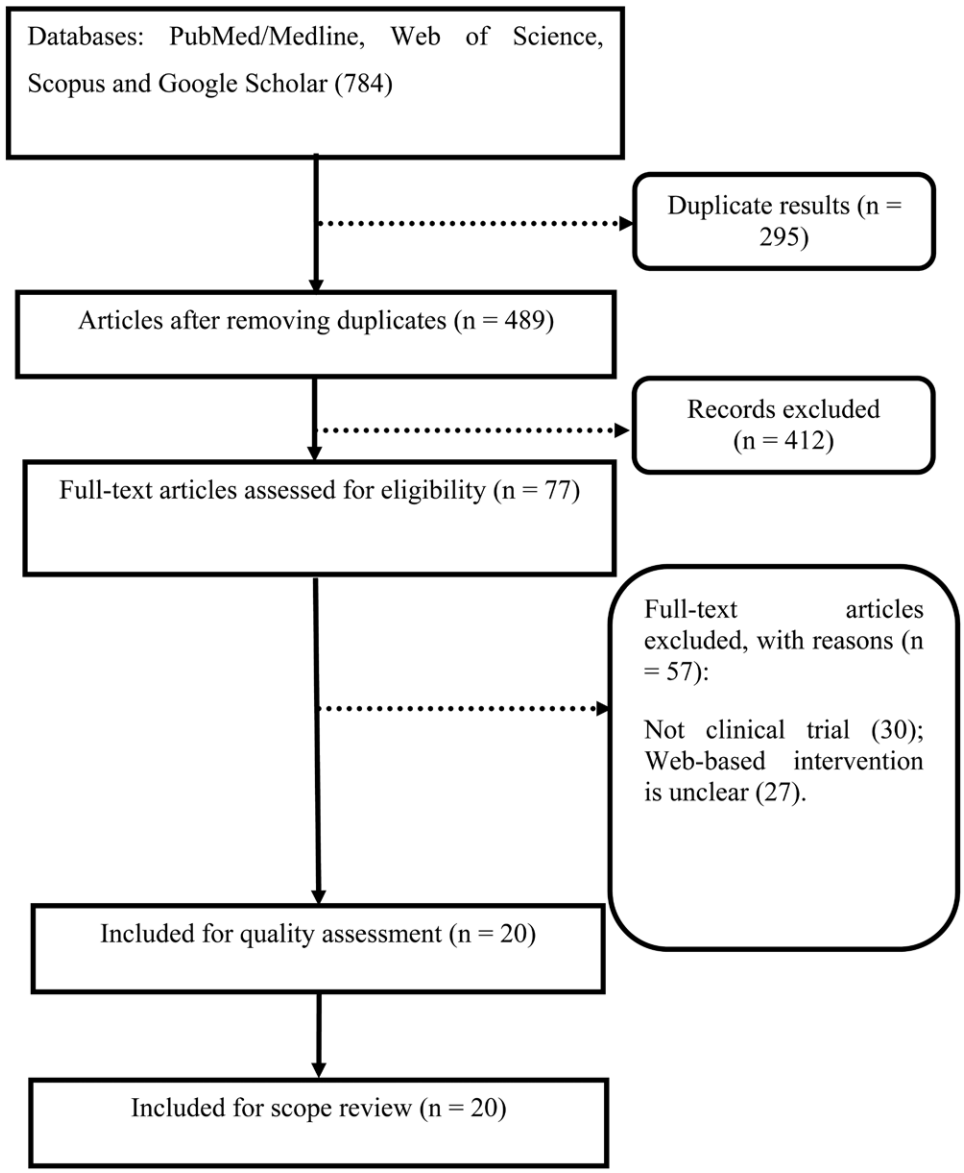

Figure 1. Flow chart showing the selection process.

Table 1

The characteristics of the reviewed studies.

First author, publication date, country	Study type	Study population	Intervention type	Intervention duration	Follow-up assessment	Outcome	Outcome assessment instruments	Key findings
Farnam F, 2014,[12] Iran	RCT	60 women aged 20–52 years	PLISSIT group: 6-hour personal counseling in 1–2 weeks Sexual Health Model group: Two 3-hour group education sessions with a 1-month interval	4 weeks	10 and 28 weeks after the intervention onset	Sexual function and sexual distress	(BISF-W and FSDS)	The intervention significantly decreased sexual distress and significantly improved sexual composite.
Brotto LA, 2014,[41] Columbia	RCT	95 women aged 19–65 years	Four ninety-minute group sessions consisted of mindfulness meditation, cognitive therapy, and education	8 weeks	For 6 months	Sexual desire, sexual arousal, lubrication, sexual satisfaction, and overall sexual function	SIDI, FSDS, FSFI, and BDI	The intervention significantly improved sexual desire, sexual arousal, lubrication, sexual satisfaction, and overall sexual function
Aydın S, 2014,[42] Turkey	RCT	42 women	Vaginal electrical stimulation with an alternating medium-frequency (50 Hz) current for 5 seconds followed by a 5-second rest in twenty-minute weekly sessions	8 weeks	1 week after the intervention	Sexual function and pelvic floor muscle strength	PFM and FSFI	The intervention significantly improved sexual function and all its dimensions
Behboodi-Moghadam Z, 2015,[43] Iran	RCT	90 married women	4 weekly educational sessions	4 weeks	8 weeks after the intervention	Sexual function	FSFI and BDI	The intervention significantly improved sexual function and all its dimensions
Sabbaghan M, 2017,[30] Iran	RCT	124 Iranian women	One-hour weekly educational sessions for 3 weeks	3 weeks	For 4 weeks after the intervention	Sexual function and genital self-image	FSFI and Genital Self-image Scale	The intervention had no significant effect on genital self-image and sexual function.
Babakhani N, 2018,[29] Iran	RCT	198 women aged 15–45 years	Four two-hour sessions of group cognitive-behavioral therapy	4 weeks	4 weeks after the intervention	Sexual function	FSFI	The intervention improved all dimensions of sexual function.
Sabeti F, 2018,[44] Iran	RCT	130 women	Two ninety-minute educational focus group discussions	2 weeks	For 3 months after the intervention	Sexual function	FSFI	Sexual health education significantly improved sexual function
Alimohammadi L, 2018,[45] Iran	RCT	96 newly married women aged 20–35 years	Six 1.5-hour weekly group counseling sessions based on Bandura's self-efficacy theory	6 weeks	8 weeks after the intervention	Sexual function and sexual satisfaction	FSFI and SSQ	The intervention significantly improved sexual function but had no significant effect on sexual satisfaction.
Mohammadzadeh-Moghaddam M, 2019,[46] Iran	RCT	61 married women	One group and 3 personal weekly counseling sessions based on the PLISSIT model	4 weeks	4 weeks	Sexual function and sexual satisfaction	FSFI, Sexual Dysfunctional Beliefs Questionnaire, and Hudson's Index of Sexual Satisfaction	The intervention corrected sexual dysfunctional beliefs.
Marvi N, 2019,[47] Iran	RCT	108 women with infertility	Three 1.5-hour weekly sexual education sessions	1 week	For 1 month after the intervention	Sexual function	FSFI	The intervention had significant positive effect on sexual function.
Sahraeian M, 2019,[48] Iran	RCT	52 women with infertility aged 20–45 years	Six weekly sessions of sexual counseling based on cognitive-behavioral therapy	6 weeks	For 4 weeks after the intervention	Sexual function	FSFI	The intervention had significant positive effect on sexual function.
Mirzaee F, 2020,[49] Iran	RCT	70 women aged above 25 years	Psycho-educational and cognitive-behavioral counseling in 8 biweekly sessions	4 weeks	4 weeks	Sexual function	FSFI	The intervention significantly improved sexual function.

(*Continued*)

Table 1

(*Continued*)

First author, publication date, country	Study type	Study population	Intervention type	Intervention duration	Follow-up assessment	Outcome	Outcome assessment instruments	Key findings
Aalaie B, 2020,[50] Iran	RCT	22 women	Electrical stimulation (one group) and biofeedback (one group) in 100-minute sessions held biweekly in 6 consecutive weeks followed by fifteen-minute thrice-weekly sessions of Kegel exercise for 6 weeks	12 weeks	For 2–3 months after the intervention	Sexual function	FSFI	Biofeedback was more effective than electrical stimulation in improving sexual function.
Rezaei N, 2021,[51] Iran	RCT	103 women	Four weekly sexual health education sessions in 8–10-person groups	4 weeks	For 4 weeks after the intervention	Sexual female attitude, sexual function	Sexual Female Attitude Questionnaire and FSFI	The intervention had significant positive effect on sexual attitude and function.
Rashedi S, 2022,[52] Iran	RCT	70 women of reproductive age	Four 1.5–2-hour weekly sessions of sexual education, mindfulness-based exercises, and cognitive-behavioral therapy	4 weeks	4 and 12 weeks after the intervention	Sexual desire, sexual distress, sexual self-disclosure, and sexual function	HISD, FSDS-R, SSD, and FSFI	The intervention had significant positive effect on sexual desire, sexual distress, sexual self-disclosure, and sexual function
Karami Z, 2023,[53] Iran	RCT	80 women aged 18–30 years	An intervention based on the REDI model in four 1–1.5-hour weekly sessions	4 weeks	4 weeks after the intervention	Sexual knowledge, attitude, and function	SKAS and FSFI	The intervention significantly improved sexual knowledge, attitude, and function.
Yekefallah L, 2023,[54] Iran	RCT	60 married women and men	A multimedia package to promote sexual indices sent through the virtual network	1 month	1 month after the intervention	Sexual desire, sexual function, and sexual satisfaction	LSSQ, HISD, IIEF, and FSFI	The intervention significantly improved sexual function, sexual desire, and sexual satisfaction.
Maasoumi R, 2023,[55] Iran	RCT	140 newly married women	Six-week psychosexual intervention using mobile applications	6 weeks	8 weeks after the intervention	General help- seeking, actual help-seeking, and sexual function	GHSQ, AHSQ, and FSFI-6	The intervention significantly promoted sexual help-seeking behavior.
Farahi Z, 2024,[56] Iran	RCT	80 women	Online and group sexual counseling based on the Good Enough model	4 weeks	3 months after the intervention	Sexual desire, sexual satisfaction, and sexual function	SIDI-F, FSFI, and DSCS	The intervention significantly improved sexual desire and overall health status.
Barut S, 2024,[57] Iran	RCT	106 women aged 15–49 years	Weekly Reiki sessions	4 weeks	4 weeks of the intervention.	Sexual distress, sexual function, and sexual self confidence	FSDS-R and SSS	The intervention had significant positive effect on sexual distress, sexual self-confidence, and sexual function.

AHSQ = Actual Help-Seeking Questionnaire, BDI = Beck Depression Inventory, BISF-W = Brief Index of Sexual Functioning for Women, DSCS = Dyadic Sexual Communication Scale, FSDS = Female Sexual Distress Scale, FSDS-R = Female Sexual Distress Scale-Revised, FSDS-R = Revised Female Sexual Distress Scale, FSFI = Female Sexual Function Index, FSFI-6 = Female Sexual Function Index-Short Form, GHSQ = General Help-Seeking Questionnaire, HISD = Halbert Index of Sexual Desire, HISD = Hurlbert Index of Sexual Desire, IIEF = International Index of Erectile Function, LSSQ = Larson Sexual Satisfaction Questionnaire, PFM = Pelvic Floor Muscle, SIDI = Sexual Interest and Desire Inventory, SIDI = Sexual Interest and Desire Inventory, SIDI-F = Sexual Interest and Desire Inventory–Female, SKAS = Sexual Knowledge and Attitude Scale, SSD = Sexual Self-Disclosure, SSQ = Satisfaction Questionnaire, SSS = Sexual Self-confidence Scale.

6-hour personal education based on the PLISSIT model and 6-hour group education based on the Sexual Health Model significantly improved sexual function and reduced sexual distress, and the latter intervention was more cost-effective.[12] Similarly, a study on women with infertility reported that sexual education based on the Sexual Health Model significantly improved the mean scores of all aspects of sexual function.[47] Another study into the effects of personal and group education and counseling provided through the question and answering, role playing, video presentation, and experience sharing methods in six ninety-minute sessions significantly improved self-confidence and sexual function and facilitated participants' engagement in group discussions.[45] Similarly, a study found that education based on the Good Enough Sex model improved the parameters of women's sexual health including sexual desire, sexual satisfaction, sexual function, sexual distress, and sexual relationship, and reduced sexual dysfunctional beliefs.[56] These findings confirm that education and counseling based on models and theories can modify individuals' attitudes and knowledge about the different aspects of life, including sexual function, and thereby, modify their behaviors and improve their sexual function.

2.8. Mindfulness-based cognitive-behavioral sex therapy

A study in Columbia on eighty women with decreased sexual desire and arousal found that four ninety-minute group sessions of mindfulness-based therapy, consisted of cognitive therapy, mindfulness meditation, and education, significantly improved all dimensions of sexual function and reduced sexual distress.[41] Another study in Iran found that mindfulness-based cognitive-behavioral sex therapy had significant positive effects on women's sexual desire, self-disclosure, distress, and function.[52] Mindfulness-based cognitive-behavioral therapy can modify individuals' attitudes and functions. More studies are still needed in the area of the effects of mindfulness-based cognitive-behavioral therapy on sexual health and dysfunction.

2.9. Physiotherapy and vaginal electrical stimulation

Physical exercises and vaginal electrical stimulation are also among the non-pharmacological interventions with positive effects on FSD. A study in Iran reported that both electrical stimulation and biofeedback provided in twelve 100-minute sessions in 6 weeks significantly improved total sexual function, although the effect of biofeedback was significantly greater than electrical stimulation.[50] A study in Turkey also reported that vaginal electrical stimulation significantly improved sexual function, except for its pain and lubrication dimensions.[42] Another study in Turkey found Reiki exercises in forty-minute weekly sessions held for 4 weeks had significant positive effects on sexual discomfort, sexual function, and sexual self-confidence.[57] These findings indicate the effectiveness of physiotherapy and physical exercises in improving sexual function and reducing SD among women.

2.10. Multimedia applications

A study in Iran found that a multimedia sexual index promotion package sent through virtual network was effective in significantly improving sexual function, sexual satisfaction, and sexual desire.[54] Another study in Iran reported that a 6-week smartphone-based psychosexual intervention significantly improved the mean scores of general and actual help-seeking and sexual function among women, though the effects of the intervention on sexual function disappeared 8 weeks after the intervention.[55] These findings highlight the significant positive effects of smartphone-based interventions on sexual function and hence, these interventions can be used to provide sexual education to women.

2.11. Sexual health education programs

A study in Iran showed that sexual education about the physiology and anatomy of the genital system, sexual response cycle, sexually-transmitted diseases, and sexual disorders in two ninety-minute sessions significantly improved all aspects of sexual function.[44] Another study reported that sexual health education in four one-hour sessions significantly improved sexual attitudes and function and reduced dyspareunia.[51] Moreover, a study found that sexual health education about the physiology and anatomy of the genital system, factors influencing sexual cycle, sexual disorders, lifestyle modification, communication skills, and conflict management in four sixty-minute sessions in 4 weeks significantly improved sexual function.[43] However, a study found that sexual education in three one-hour weekly sessions had no significant effects on sexual function and genital self-image.[30] These contradictory results highlight the necessity of further investigations respecting the effects of sexual education on sexual outcomes.

3. Discussion

This study reviewed non-pharmacological interventions for FSD in low- and middle-income countries. Findings showed that cognitive-behavioral therapy, sexual education and counseling based on theories and models, mindfulness-based cognitive-behavioral sex therapy, phytotherapy and vaginal electrical stimulation, multimedia applications, and sexual health education programs can significantly improve sexual health and reduce FSD.

Improvement of sexual knowledge and awareness has significant role in improving sexual desires. Although couples like to talk about their sexual desires, they feel embarrassed and avoid it. Therefore, sexual counseling is necessary to facilitate sexual relationships and talking about sexual desires and concerns and improve sexual function and understanding about sexual relationships. Appropriate sexual relationships can in turn improve sexual pleasure and intimacy. Moreover, physical and educational exercises, low sexual distress, and great self-confidence can increase the motivation for engagement in sexual activities and improve sexual health.[58] Mental, sexual, and behavioral counseling can lead to more flexible sexual behaviors and improve self-confidence and thereby, improve sexual function.[59,60] A review study and an interventional study also introduced cognitive-behavioral therapy as a successful treatment for FSD.[61,62] Two review studies also showed that group psychotherapies had significant positive effects on women's sexual function, and noted that group cognitive-behavioral therapy reduces anxiety, fosters positive attitude towards sexual health, and improves sexual function.[7,63] Mindfulness-based group therapy is also one of the most effective interventions for the management of problems in sexual desire and arousal. Women with SD usually have dysfunctional beliefs and thoughts about body during sexual activity and hence, mindfulness-based interventions can reduce their symptoms. Cognitive, behavioral, and emotional awareness helps individuals focus on their sexual feelings during sexual activities and thereby, improves sexual function.[64,65] Given the effectiveness of education and counseling in improving sexual function, sexual education and counseling, psychotherapy, behavioral therapy, and cognitive therapy can be used to reduce fear and embarrassment over sexual relationship and improve sexual function among women.

We also found physical exercises and physiotherapy as effective interventions for improving sexual function. One of the main causes of sexual dysfunction is the disorders of the pelvic floor muscles. In response to potentially threatening situations,

such as sexual relationship, pelvic floor muscles go into spasm as a defense mechanism and thereby, sexual relationship may lead to pain. Fear of pain and the involuntary spasm of the muscles surrounding the vagina may require women to avoid sexual relationship. The rehabilitation of the pelvic floor muscles through interventions such as vaginal electrical stimulation may reduce these problems. In vaginal electrical stimulation, women with floor muscle spasm learn to relax their pelvic floor muscles during electrical stimulation and thereby, can relax their muscles and experience less pain during sexual relationship. Surface electromyography may also reduce dyspareunia. Low-frequency electrical stimulation leads to the local release of endorphins and progressive desensitization to pain. Consequently, physiotherapy and electrical stimulation can improve sexual function through reducing pain and spasm in pelvic floor muscles.[66,67]

We also found that multimedia applications may significantly improve sexual function. A study found that a brief motivational intervention significantly improved adolescents' use of sexual health services.[68] Another study reported that a multimedia intervention increased the probability of patients' talk to physicians about sexual issues by 40%.[69]

Various studies have been conducted in the field of utilizing internet platforms to enhance knowledge, awareness, and modify attitudes regarding sexual health.[70–72] New technologies like virtual reality and augmented reality are increasingly being utilized in the field of health promotion. These platforms facilitate the exchange of knowledge, attitudes, and successful approaches between individuals and experts. In the area of sexual health, these technologies can enable communication and online counseling services for women with specialists without the need for them to physically visit a clinic, which is especially beneficial for those living in remote areas. An additional advantage is the ability to receive services anonymously without the need to disclose personal information, which can help overcome cultural barriers and reluctance to seek help. Overall, the use of these applications in sexual health can lower costs, reduce cultural barriers, improve knowledge and awareness, and provide accessible treatment for sexual dysfunctions[70–72]

4. Limitations

Most of the studies reviewed in the present study were from Iran and hence, the results of this review may not easily be generalizable to women in some low- and middle-income countries in Africa, Asia, and America. Moreover, the findings may not be generalizable to women with physical problems that can contribute to SD such as diabetes mellitus and vulvodynia. It is worth noting that we did not include studies published before 2014 in our review.

5. Conclusion

This study concludes that non-pharmacological interventions such as counseling, education, behavioral therapy, physiotherapy, and multimedia applications can significantly improve women's sexual function. Given the easy accessibility, low cost, and limited complications of non-pharmacological interventions, these interventions can be used to manage FSD and improve sexual function. Further investigations are necessary to provide firmer evidence regarding the effects of non-pharmacological interventions on FSD and sexual function.

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References

[1] Fadul R, Garcia R, Zapata-Boluda R, et al. Psychosocial correlates of vaginismus diagnosis: a case-control study. J Sex Marital Ther. 2019;45:73–83.
[2] Maseroli E, Scavello I, Rastrelli G, et al. Outcome of medical and psychosexual interventions for vaginismus: a systematic review and meta-analysis. J Sex Med. 2018;15:1752–64.
[3] World Health Organization. ICD-11 Reference guide 2019. https://icdwho int/icd11refguide/en/index html. 2020. Accessed July, 2020.
[4] Cortés AS. Diagnostic and Statistical Manual of Mental Disorders, Text Revision (DSM-5-TR). American Psychiatric Association, 2022. https://doi.org/10.1176/appi.books.9780890425787. Psicooncología. 2022;19:339.
[5] McCool-Myers M, Theurich M, Zuelke A, Knuettel H, Apfelbacher C. Predictors of female sexual dysfunction: a systematic review and qualitative analysis through gender inequality paradigms. BMC Womens Health. 2018;18:1–15.
[6] Oindi FM, Murage A, Lema VM, Mukaindo AM. Association of female sexual dysfunction and fertility: a cross sectional study. Fertil Res Pract. 2019;5:1–11.
[7] Weinberger JM, Houman J, Caron AT, Anger J. Female sexual dysfunction: a systematic review of outcomes across various treatment modalities. Sex Med Rev. 2019;7:223–50.
[8] McCool ME, Zuelke A, Theurich MA, Knuettel H, Ricci C, Apfelbacher C. Prevalence of female sexual dysfunction among premenopausal women: a systematic review and meta-analysis of observational studies. Sex Med Rev. 2016;4:197–212.
[9] Pacik PT, Geletta S. Vaginismus treatment: clinical trials follow up 241 patients. Sex Med. 2017;5:e114–23.
[10] Rosen NO, Dube JP, Corsini-Munt S, Muise A. Partners experience consequences, too: a comparison of the sexual, relational, and psychological adjustment of women with sexual interest/arousal disorder and their partners to control couples. J Sex Med. 2019;16:83–95.
[11] Clayton AH, Kingsberg SA, Goldstein I. Evaluation and management of hypoactive sexual desire disorder. Sex Med. 2018;6:59–74.
[12] Farnam F, Janghorbani M, Raisi F, Merghati-Khoei E. Compare the effectiveness of PLISSIT and sexual health models on Women's sexual problems in Tehran, Iran: a randomized controlled trial. J Sex Med. 2014;11:2679–89.
[13] DeRogatis LR, Burnett AL. The epidemiology of sexual dysfunctions. J Sex Med. 2008;5:289–300.
[14] Yilmaz BA, Sonmez Y, Sezik M. Prevalence and risk factors for sexual dysfunction in reproductive-aged married women: a cross-sectional epidemiological study. J Obstet Gynaecol Res. 2020;46:507–16.
[15] Yaraghi M, Ghazizadeh S, Mohammadi F, et al. Comparing the effectiveness of functional electrical stimulation via sexual cognitive/behavioral therapy of pelvic floor muscles versus local injection of botulinum toxin on the sexual functioning of patients with primary vaginismus: a randomized clinical trial. Int Urogynecol J. 2019;30:1821–8.
[16] Oksuz E, Malhan S. Prevalence and risk factors for female sexual dysfunction in Turkish women. J Urol. 2006;175:654–8; discussion 658.
[17] Zhang H, Fan S, Yip PS. Sexual dysfunction among reproductive-aged Chinese married women in Hong Kong: prevalence, risk factors, and associated consequences. J Sex Med. 2015;12:738–45.
[18] Hatzimouratidis K, Hatzichristou D. Sexual dysfunctions: classifications and definitions. J Sex Med. 2007;4:241–50.

[19] Hisasue S, Kumamoto Y, Sato Y, et al. Prevalence of female sexual dysfunction symptoms and its relationship to quality of life: a Japanese female cohort study. Urology. 2005;65:143–8.
[20] Kleinplatz PJ. History of the treatment of female sexual dysfunction (s). Annu Rev Clin Psychol. 2018;14:29–54.
[21] Alcántara Montero A, Sánchez Carnerero CI. Female sexual dysfunction: drug treatment options. Semergen. 2016;42:e33–7.
[22] Karp BI, Tandon H, Vigil D, Stratton P. Methodological approaches to botulinum toxin for the treatment of chronic pelvic pain, vaginismus, and vulvar pain disorders. Int Urogynecol J. 2019;30:1071–81.
[23] Melnik T, Hawton K, McGuire H. Interventions for vaginismus. Cochrane Database Syst Rev. 2012;12:CD001760.
[24] Dick B, Natale C, Reddy A, Akula KP, Yousif A, Hellstrom WJ. Application of botulinum neurotoxin in female sexual and genitourinary dysfunction: a review of current practices. Sex Med Rev. 2021;9:57–63.
[25] Zoroufchi BH, Doustmohammadi H, Mokhtari T, Abdollahpour A. Benzodiazepines related sexual dysfunctions: a critical review on pharmacology and mechanism of action. Rev Int Androl. 2021;19:62–8.
[26] Morin M, Carroll MS, Bergeron S. Systematic review of the effectiveness of physical therapy modalities in women with provoked vestibulodynia. Sex Med Rev. 2017;5:295–322.
[27] Rivalta M, Sighinolfi MC, De Stefani S, et al. Biofeedback, electrical stimulation, pelvic floor muscle exercises, and vaginal cones: a combined rehabilitative approach for sexual dysfunction associated with urinary incontinence. J Sex Med. 2009;6:1674–7.
[28] Rosenbaum TY. Physiotherapy treatment of sexual pain disorders. J Sex Marital Ther. 2005;31:329–40.
[29] Babakhani N, Taravati M, Masoumi Z, Garousian M, Faradmal J, Shayan A. The effect of cognitive-behavioral consultation on sexual function among women: a randomized clinical trial. J Caring Sci. 2018;7:83–8.
[30] Sabbaghan M, Malakouti J, Mirghafourvand M, Hakimi S, Ranjbar F. The effect of training package on genital self-image and sexual function: a randomized controlled clinical trial. Iran Red Crescent Med J. 2017;19:1.
[31] Hatzimouratidis K, Amar E, Eardley I, et al; European Association of Urology. Guidelines on male sexual dysfunction: erectile dysfunction and premature ejaculation. Eur Urol. 2010;57:804–14.
[32] Bancroft J. The medicalization of female sexual dysfunction: the need for caution. Arch Sex Behav. 2002;31:451–5.
[33] Staccini L. Psychological treatment of female sexual dysfunction: a critical review of the literature. Riv Psichiatr. 2015;50:265–73.
[34] Arksey H, O'Malley L. Scoping studies: towards a methodological framework. Int J Soc Res Methodol. 2005;8:19–32.
[35] Mitchell E, Kelly-Hanku A, Krentel A, et al. Community perceptions and acceptability of mass drug administration for the control of neglected tropical diseases in Asia-Pacific countries: a systematic scoping review of qualitative research. PLoS NeglTrop Dis. 2022;16:e0010215.
[36] Ansu-Mensah M, Danquah FI, Bawontuo V, Ansu-Mensah P, Kuupiel D. Maternal perceptions of the quality of Care in the Free Maternal Care Policy in sub-Sahara Africa: a systematic scoping review. BMC Health Serv Res. 2020;20:1–11.
[37] O'Donovan J, Newcomb A, MacRae MC, Vieira D, Onyilofor C, Ginsburg O. Community health workers and early detection of breast cancer in low-income and middle-income countries: a systematic scoping review of the literature. BMJ Glob Health. 2020;5:e002466.
[38] O'Donovan J, O'Donovan C, Nagraj S. The role of community health workers in cervical cancer screening in low-income and middle-income countries: a systematic scoping review of the literature. BMJ Glob Health. 2019;4:e001452.
[39] Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. Int J Evid Based Healthc. 2015;13:141–6.
[40] Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med. 2018;169:467–73.
[41] Brotto LA, Basson R. Group mindfulness-based therapy significantly improves sexual desire in women. Behav Res Ther. 2014;57:43–54.
[42] Aydın S, Arıoğlu Aydın C, Batmaz G, Dansuk R. Effect of vaginal electrical stimulation on female sexual functions: a randomized study. J Sex Med. 2015;12:463–9.
[43] Behboodi Moghadam Z, Rezaei E, Khaleghi Yalegonbadi F, et al. The effect of sexual health education program on women sexual function in Iran. J Res Health Sci. 2015;15:124–8.
[44] Sabeti F, Sadat-Tavafian S, Zarei F. The effect of educational intervention on sexual function of women referred to Health center of southern Tehran. Nurs Pract Today. 2018;5:280–9.
[45] Alimohammadi L, Mirghafourvand M, Zarei F, Pirzeh R. The effectiveness of group counseling based on Bandura's self-efficacy theory on sexual function and sexual satisfaction in Iranian newlywed women: a randomized controlled trial. Appl Nurs Res. 2018;42:62–9.
[46] Mohammadzadeh Moghaddam M, Moradi M, Mirzaii Najmabadi K, Ramezani MA, Shakeri MT. Effect of counseling on the sexual satisfaction level of women with sexual dysfunction using PLISSIT model focused on dysfunctional sexual beliefs. Evid Based Care. 2019;9:49–57.
[47] Marvi N, Golmakani N, Miri HH, Esmaily H. The effect of sexual education based on sexual health model on the sexual function of women with infertility. Iran J Nurs Midwifery Res. 2019;24:444–50.
[48] Sahraeian M, Lotfi R, Qorbani M, Faramarzi M, Dinpajooh F, Ramezani Tehrani F. The effect of cognitive behavioral therapy on sexual function in infertile women: a randomized controlled clinical trial. J Sex Marital Ther. 2019;45:574–84.
[49] Mirzaee F, Ahmadi A, Zangiabadi Z, Mirzaee M. The effectiveness of psycho-educational and cognitive-behavioral counseling on female sexual dysfunction. Rev Bras Ginecol Obstet. 2020;42:333–9.
[50] Aalaie B, Tavana B, Rezasoltani Z, Aalaei S, Ghaderi J, Dadarkhah A. Biofeedback versus electrical stimulation for sexual dysfunction: a randomized clinical trial. Int Urogynecol J. 2021;32:1195–203.
[51] Rezaei N, Taheri S, Tavalaee Z, Rezaie S, Azadi A. The effect of sexual health education program on sexual function and attitude in women at reproductive age in Iran. J Educ Health Promot. 2021;10:140.
[52] Rashedi S, Maasoumi R, Vosoughi N, Haghani S. The effect of mindfulness-based cognitive-behavioral sex therapy on improving sexual desire disorder, sexual distress, sexual self-disclosure and sexual function in women: a randomized controlled clinical trial. J Sex Marital Ther. 2022;48:475–88.
[53] Karami Z, Soltani F, Ahmadpanah M, Kazemi F, Aghababaei S. Effect of group counseling on sexual knowledge, attitude, and function of young women with sexual dysfunction: a randomized controlled clinical trial. Avicenna J Nurs Midwifery Care. 2023;31:198–207.
[54] Yekefallah L, Namdar P, Mohammadi S, Dost Mohammadi S, Minaei Moghaddam S, Mafi MH. Effect of multimedia sexual index promotion package on sexual function, desire, and satisfaction of married people: a randomized clinical trial. Health Educ Health Promot. 2023;11:117–24.
[55] Maasoumi R, Sabetghadam S, Keramat A, Talebi SS, Aghayan SS. The effect of a mobile app-based psychosexual intervention on promoting help-seeking behaviors for sexual health issues among Iranian newly married women: a randomized controlled clinical trial. Sex Res Soc Policy. 2024;21:465–75.
[56] Farahi Z, HashemZadeh M, Farnam F. Sexual counseling for female sexual interest/arousal disorders: a randomized controlled trial based on the "good enough sex" model. J Sex Med. 2024;21:153–62.
[57] Barut S, Sabancı Baransel E, Uçar T. The effect of reiki on sexual function and sexual self-confidence in women with sexual distress. Sex Disabil. 2024;42:53–65.
[58] Metz ME, McCarthy BW. The "Good-Enough Sex" model for couple sexual satisfaction. Sex Relat Ther. 2007;22:351–62.
[59] Mallory AB, Stanton AM, Handy AB. Couples' sexual communication and dimensions of sexual function: a meta-analysis. J Sex Res. 2019;56:882–98.
[60] Erbil N. Relationship between sexual myths and sexual function of women. Int J Caring Sci. 2019;12:1570–9.
[61] Pereira VM, Arias-Carrión O, Machado S, Nardi AE, Silva AC. Sex therapy for female sexual dysfunction. Int Arch Med. 2013;6:37–9.
[62] Bakhtiari M, Sheydaei H, Bahreynian SA, Nori M. The effect of cognitive-behavioral therapy on low sexual desire and marital satisfaction. Thoughts Behav Clin Psychol. 2015;10:7–16.
[63] Jaderek I, Lew-Starowicz M. A systematic review on mindfulness meditation–based interventions for sexual dysfunctions. J Sex Med. 2019;16:1581–96.
[64] Brotto LA, Nagoski E. Better Sex through Mindfulness: How Women can Cultivate Desire. Greystone Books Vancouver; 2018.
[65] Rosen NO, Corsini-Munt S, Dubé JP, Boudreau C, Muise A. Partner responses to low desire: associations with sexual, relational, and psychological well-being among couples coping with female sexual interest/arousal disorder. J Sex Med. 2020;17:2168–80.
[66] Seo JT, Choe JH, Lee WS, Kim KH. Efficacy of functional electrical stimulation-biofeedback with sexual cognitive-behavioral therapy as treatment of vaginismus. Urology. 2005;66:77–81.

[67] Schmitt JJ, Singh R, Weaver AL, et al. Prospective outcomes of a pelvic floor rehabilitation program including vaginal electrogalvanic stimulation for urinary, defecatory, and pelvic pain symptoms. Female Pelvic Med Reconstr Surg. 2017;23:108–13.
[68] Miller MK, Catley D, Adams A, et al. Brief motivational intervention to improve adolescent sexual health service uptake: a pilot randomized controlled trial in the emergency department. J Pediatr. 2021;237:250–7.e2.
[69] Reese JB, Sorice KA, Pollard W, et al. Efficacy of a multimedia intervention in facilitating breast cancer patients' clinical communication about sexual health: results of a randomized controlled trial. Psychooncology. 2021;30:681–90.
[70] Lafortune D, Lapointe VA, Dubé S, Brotto LA. Virtual reality therapy for sexual dysfunctions: a scoping review. Curr Sex Health Rep. 2023;15:261–79.
[71] Karim H, Choobineh H, Kheradbin N, Ravandi MH, Naserpor A, Safdari R. Mobile health applications for improving the sexual health outcomes among adults with chronic diseases: a systematic review. Digit Health. 2020;6:2055207620906956.
[72] Vila A, Ardoy-Cuadros J, Romero-Moreno R, et al. Body, emotions, and sexuality in the metaverse: a randomized control trial exploring the use of second life for an avatar-based intervention to support women with female orgasmic disorder. Comput Hum Behav. 2024;161:108390.