

Herbal medicines and sexual satisfaction of women: A systematic review and meta-analysis

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Abstract

Introduction: Sexual dysfunction is one of the most common frequent problems of women and affects their standards of living. Concerns about the side effects of chemical drugs and the tendency to use complementary medicine have led to the introduction of herbal medicines as an alternative option to improve this disorder. Therefore, this study planned to systematically investigate the outcome of herbal medicine on sexual function and sexual satisfaction of reproductive females.

Method: All related articles that were published in English or Persian from 2000 to February 28, 2022, were reviewed. Search the international databases Google Scholar, Science Direct, PubMed, Web of Science, Scopus, Cochrane Library, and the Persian database SID. Then, the articles were reviewed by two independent researchers. Study data were combined using meta-analysis and the random effect model.

Results: The findings of 12 studies that entered the meta-analysis showed that in the group of herbal medicines, the overall score of female sexual function significantly improved, 0.95 (%95CI: 0.803-1.097) (P=0.001). Also, the sex satisfaction score was higher in the group of medicinal plants, 0.84 (%95CI: 0.476-1.21) and this difference was significant (P=0.001).

Conclusion: Herbal medicines have positive effects on sexual function and sexual satisfaction of reproductive women and can be an effective and safe treatment for women with sexual dysfunction. However, for definitive conclusions, more studies with a higher sample size in women of reproductive age are needed.

Keywords: Herbal medicine, Sexual dysfunction, Sexual satisfaction, Systematic review

Introduction

Sexual dysfunction is any dissatisfaction with the sexual function that leads to distress (1). According to the Diagnostic and Statistical Manual of Mental Disorders (DSM), female sexual dysfunction (FSD) includes sexual desire/arousal, orgasm, and genito-pelvic pain/penetration disorders (2). These disorders root in vascular, nervous, hormonal, or psychological causes (3). 41% of fertile women in the world mention sexual dysfunction as a common medical problem (4). There is a powerful link between sexual dysfunction and quality of life, and it is known as a common health problem in the world (5). Sexual dysfunction can have devastating effects on the self-respect of women, a sense of being total and complete, and interactive relationships while also contributing to mental disorders. Sexual dysfunction in women can cause conflicts and ultimately lead to divorce or negatively affect fertility (6). Women's sexual life and fertility are strongly affected by their sexual disorders, while various biological, psychological, and social factors contribute to the prevalence of sexual disorders. Persistently notable risk factors for sexual dysfunction include disability, mental disorder, tension, miscarriage, urogenital problems, female genital mutilation, miserable relationship, and sexual harassment and rape (7).

Many treatments, including chemical drugs, have been investigated to improve the sexual dysfunction of women. However, complementary medicine has been proposed as a suitable alternative for the improvement of sexual function disorders due to concerns about the side effects of chemical drugs (8). Hence, many affected people often seek alternative treatments such as herbal medicines despite the development of new drug therapies for sexual dysfunction (3). The mechanism of action of these drugs is not fully known, but according to recent research, the medicinal substances in these plants can enhance sexual performance through their effects on the brain, endocrine system, and gonads. Herbal medicines have also antioxidant effects and anti-inflammatory properties that may improve sexual function (9). However, there is no effective herbal or even chemical treatment approved by the US Food and Drug Administration (FDA) for women's sexual dysfunction so far, or the therapeutic effects have been limited to placebo and trial and error. Accordingly, new studies continue to prove the medical efficacy of herbs and find effective herbal remedies (10).

Chemical drugs have many side effects. If the effect of herbal medicines on improving the sexual function and sexual satisfaction of women is investigated and confirmed, these medicines can be used instead of chemical medicines. Therefore, considering the high outbreak of fertile women with sexual dysfunction and the tendency of the affected people to use complementary medicine, This systematic review aims to investigate the effect of herbal medicine on the sexual function and satisfaction of fertile women.

Methodology

Search Strategy

The research population of the current systematic review included all randomized clinical trial studies on the effect of herbal medicines on sexual function and satisfaction of women of reproductive age. The researchers searched on Google Scholar, Web of Science, Scopus, Science Direct, PubMed, Cochrane Library, and also in the national SID database. A manual search was also carried out to find the articles that could not be retrieved in the electronic search. This study examined only English or Persian language articles. All relevant articles published from 2000 to February 28, 2022, were reviewed by two independent researchers. The following keywords were selected using the MeSH tool to find related articles in the databases: "sexual function", "sexual dysfunction", "sexual health", "sexual disorders", "sexual disorder", "sexual satisfaction", "herbal medicine", "herbal treatment", "herb", "women" and "female", which were combined with Boolean operators OR and AND. The search in the mentioned databases resulted in the retrieval of 1120 articles, which were then entered into the Endnote software. Accordingly, 148 duplicate articles were identified and removed using the Endnote

software, followed by the examination of the title and abstract of 977 articles. Of the remaining articles, 939 were removed because they were not related to the objectives of the present study, after which the full text of the remaining 38 articles was studied. The corresponding author was contacted and asked to provide the full file of the article when it was not available online. A manual search was also performed in related articles to obtain a bigger sample. Finally, 21 articles were included in the study (Figure 1) after reviewing the inclusion criteria, and their quality was evaluated by two independent authors using the Verhagen checklist.

Inclusion and Exclusion Criteria

The inclusion criteria included randomized controlled clinical trial studies published in English or Persian, performed on a sample of women aged 15-51 years without depression, investigated sexual function or satisfaction, and the control group received herbal medicines. Papers whose full text was not available and also observational, qualitative, and review studies, article abstracts, and letters to the editor were excluded.

Data Extraction

A researcher-made form was used to extract data from the text of the selected articles. The form included details such as the name of the author, The year in which a publication was issued, the location of research, study design, sample size, age of participants, type of intervention, side effects, data collection tools, findings, and results of the evaluation of the article quality.

Evaluating the Quality of the Articles

Evaluation of the quality of the articles was carried out using Verhagen's checklist, which is designed to measure the quality of randomized clinical trial studies. The instrument consists of eight items that examine the following: method of randomization and latent allocation, the similarity of prognostic factors at baseline, specification of eligibility criteria, blinding of evaluators, providers, and participants, presentation of point estimates for outcome measures, and intention-to-treat analysis. For each question, the yes and no/don't know answers were given 1 and 0 points, respectively (11). Articles with a score of ≥ 3 were included in the study.

Findings

This study examined all published articles in electronic databases according to the research objectives. A total number of 1120 articles (Google scholar=737; Cochrane library=37; Web of science=23; Scopus=169; Science direct=112; PubMed=24; SID=18) were extracted through primary search using relevant keywords. Finally, 21 articles with a total sample size of 1625 were evaluated after the removal of duplicate articles by a review of the titles, abstracts, and then the full texts (Figure 1). 2 studies were excluded due to lack of access to the full text and 1 study was excluded due to re-reporting of the results in a new study. All articles were randomized controlled clinical trials published during 2014-2022. Among the included studies, only one had a cross-sectional, and others followed a parallel design. Most of the studies were conducted in Iran (17 studies), 2 in America, and 1 in each Bulgaria, Brazil, Australia, India, and South Korea. In this review, there were 4 articles on Russian olive, 2 on Chaste tree, 2 on Bindii, 2 on Ginseng, 1 on carrot seed, 1 on Fenugreek, 1 on Saffron, 1 on rose flower, 1 on palm pollen, 1 on Celery seed, 1 on winter cherry, 1 on the Lemon balm, 1 on pomegranate peel, 1 on Squill bulb, and 1 on a mixture of oak gall, pomegranate peel, and fenugreek seed. All studies used a placebo control group, except for one study in which the control group did not receive any medication. All the studies used the Female Sexual Function Index (FSFI) (Table 1). A summary of the studies included in the systematic review and the herbs used in the studies is provided in the following.

Carrot Seed (*Daucus Carota*)

In the study of Sadeghi et al. (2020), carrot seed improved the overall score of sexual function (7.329 ± 0.830 , $P < 0.001$), desire (4.1 ± 0.7 , $P < 0.001$), moisture (4.7 ± 0.8 , $P = 0.019$), arousal (0.8 ± 4.1 , $P < 0.001$), satisfaction (1.1 ± 4.8 , $P < 0.001$), orgasm (0.9 ± 3.9 , $P < 0.001$), and pain (1 ± 5.4 , $P = 0.001$) (12).

Chaste tree (*Vitex agnus-castus*)

According to the study of Dalil Heirati et al. (2020), there was no statistically important difference between the two groups in terms of the overall mean score of sexual function and its areas after one month of interference ($P \geq 0.05$), and only the score of orgasm showed an improvement in the comparison of intragroup scores ($P = 0.02$) (13). The results of another study conducted by Dalil Heirati et al. (2021) showed no significant differences between the areas of sexual function after 16 weeks of intervention. However, there was a statistically significant difference in the overall score of sexual function, according to which the vitagnus group had a higher score than the placebo after 2 months ($P < 0.05$) (14).

The Herbal composition of Oak Gall (*Quercus infectoria*), pomegranate peel (*Punica Granatum L.*) and Fenugreek Seeds (*Trigonella foenum-graecum*)

As shown by Ghavami et al. (2020), the orgasm area scores were significantly higher in the group taking herbal composition compared to the control group ($P < 0.001$), but the two groups are the same in terms of sexual satisfaction ($P = 0.14$) (15).

Russian olive (*Elaeagnus Angustifolia*)

There were 4 studies on the Russian olive. In the study conducted by Zeinalzadeh et al. (2017), sexual desire disorder dropped significantly from 53.7 to 19.5 after the intervention ($P = 0.001$). However, there were no significant differences between the two groups in terms of sexual satisfaction score (0.89 vs. 0.96), and mean androgenic levels pre and post-intervention ($P > 0.05$) (16). Another study carried out by Zeinalzadeh et al. (2019), the number of sexual urge/excitement was 53.7%, 50%, and 66.7% in the Russian olive, Sildenafil Citrate, and control groups, in the order given, before the intervention ($P = 0.269$), but these values were 19.5%, 33.3%, and 52.4%, respectively, after the intervention ($P = 0.007$). Therefore, Russian olive and Sildenafil Citrate were effective in improving sexual desire/arousal (17). As shown by Jafari et al. (2021), the mean sexual pain score was 4.3 ± 0.8 in the first intervention group, 4.7 ± 0.7 in the second intervention group, and 4.0 ± 0.8 in the control group post-intervention. The intervention led to a significant increase only in the second intervention group ($P < 0.05$). The average score of sexual satisfaction was 4.2 ± 0.7 in the first intervention group, 4.7 ± 0.9 in the second intervention group, and 3.8 ± 0.5 in the control group. According to the results of the intragroup test, the intervention led to a significant only in the second intervention grouping ($P < 0.001$) (18). In a research was done by Akbarzadeh et al. (2019), the frequency of orgasm disorder was 41.5%, 40.5%, and 57.1% in the Russian olive, Sildenafil Citrate, and control groups, before the intervention ($P = 0.23$), but these values were 29.3%, 16.7%, and 50%, respectively, post-intervention ($P = 0.004$). In post-intervention, sexual satisfaction was significantly different compared to pre-intervention between the two groups ($P = 0.003$). Also, the greatest decrease in changes after the intervention (58.82%) was detected in the Sildenafil Citrate group. According to these findings, the extract of Russian olive and sildenafil citrate were both effective in reducing the frequency of orgasm disorders in women (19).

Bindii (*Tribulus Terrestris*)

In the study of Vale et al. (2018), the overall scores of sexual function ($P < 0.001$) and the areas of desire ($P < 0.001$), sexual awakening ($P = 0.005$), moisture ($P = 0.001$), orgasm ($P < 0.001$), painful sex ($P = 0.030$), and sexual pleasure ($P = 0.001$) improved in the group treated with Bindii, while placebo treatment did not improve the moisture and pain scores. According to the QS-F (Sexual Quotient Female Version) scores, patients who used Bindii experienced an improvement in terms of sexual desire ($P = 0.012$), arousal/moisture ($P = 0.002$), pain

($P=0.031$), orgasm ($P=0.004$), and satisfaction ($P=0.001$), while women receiving placebo treatment did not show any improvements. The levels of free ($P=0.046$) and bioavailable ($P<0.048$) testosterone increased in women who received Bindii (20). The study outcome by Akhtari et al. (2014) revealed that the patients of the Bindii group had a significant improvement in the overall score of sexual function ($P<0.001$) and the areas of desire ($P<0.001$), arousal ($P<0.037$), moisture ($P<0.001$), satisfaction ($P<0.001$), and pain ($P<0.041$) at the end of the fourth week (21).

Fenugreek (*Trigonella foenum-graecum* seed or *Libifem*)

Rao et al. (2015) found a considerable rise in free testosterone ($P=0.043$), estradiol ($P=0.013$), and desire and arousal ($P=0.026$) in the intervening group. Also, the intervention group reported a significantly higher frequency of intercourse compared to the placebo ($P=0.013$) after two months of intervention. According to their results, fenugreek extract may be a therapeutic item to increase women's arousal and desire (22).

Saffron or *Colchicum autumnale* (*Saffron crocus*)

Rahmati et al. (2017) compared two intervention and control groups four weeks after the start of the intervention and found a significant difference between their excitement and sexual desire ($P<0.05$). However, 2 months after the administering saffron and placebo, both groups were significantly different in the overall score of sexual function and all its areas except moisture and statistically ($P<0.05$). It was, therefore, concluded that Saffron could improve sexual function and its areas in women (23).

Rose (*Rosa damascena*)

The findings of Motaharinezahad et al. (2021) showed that the rose oil group has bettered sexual function of women significantly ($P<0.001$) 2 months after the intervention (26.5 ± 7.13) compared to before the intervention (20.90 ± 3.34) and control group ($P=0.320$). The average score of sexual function of the two groups was statistically significant finally. ($P<0.001$) (24).

Date palm pollen (*Phoenix dactylifera* L.)

Jahromi et al. (2022) reported that the total score of sexual function increased significantly from 21.06 ± 2.58 to 27.31 ± 2.59 in the intervention group ($P<0.0001$). sexual (arousal, orgasm, moisture, dyspareunia, satisfaction) increased considerably in the intervention group ($P<0.0001$) (25).

Celery seed (*Apium graveolens* L. Fruit)

In a study conducted by Hessami et al. (2021), the improvement in the overall score of sexual function was significantly elevated in the Celery seed group than in the placebo group at the final of the sixth week ($P<0.001$). The increase in the total score of sexual function was mainly due to the improvement of sexual urge or desire ($P<0.001$), arousal ($P<0.001$), moisture ($P<0.001$), and painful sex ($P=0.033$) at the end of the study (26).

Korean ginseng (*Panax ginseng*) and Siberian ginseng (*Eleutherococcus senticosus*)

Ghamari et al. (2020) showed that the entire grade of sexual function and its areas changed significantly in both intervention and control groups. However, ginseng and vitamin E supplementation (100 units of vitamin E, 67 mg of Korean ginseng, and 40 mg of Siberian ginseng) only improved the domains of desire ($P=0.030$) and sexual satisfaction ($P=0.028$) (27). In the study of Chung et al, (2015). the total score of sexual function increased after treatment with Korean red ginseng (from 20.13 ± 2.87 to 23.98 ± 4.10 , $P=0.015$) and placebo (from 20.06 ± 2.64 to 23.78 ± 3.28 , $P=0.003$). However, this interchange has not been considered significantly between the two groups ($P=0.702$). Medication with Korean red ginseng also significantly improved the areas of desire, arousal, orgasm, and satisfaction, but there were no therapeutic effects compared to the placebo (28).

Winter cherry (*Ashwagandha* or *Withania somnifera*)

The study of Dongre et al. (2015) showed that treatment with winter cherry root extracts significantly improved the overall grade of sexual function ($P<0.001$) and the scores of arousal ($P<0.001$), moisture ($P<0.001$), orgasm ($P=0.004$), satisfaction ($P<0.001$), and also the score of FSDS (Female Sexual Dysfunction Scale) ($P<0.001$) and the number of successful coitus ($P<0.001$) (29).

Lemon balm (*Melissa officinalis*)

Darvish-Mofard- Kashani et al. (2018) reported a statistically significant increase in desire ($P<0.001$), arousal ($P<0.001$), moisture ($P<0.005$), orgasm ($P<0.001$), satisfaction ($P<0.001$), pain ($P<0.002$), and the total score of sexual function ($P<0.001$) in the intervention than the placebo group (30).

Pomegranate peel (*Punica Granatum L.*)

In a study conducted by Mohammadzadeh et al. (2019), there was a statistically significant improvement in the average score of the orgasm and sexual satisfaction areas in the intervening group compared to the placebo group after 4 and 8 weeks ($P<0.001$) (31).

Squill (*Drimia maritima*)

As shown by Abbasi-Pirouz et al. (2018), Squill bulb oil could improve significantly women's sexual function in areas of desire, moisture, orgasm, and arousal compared to the placebo after 1 month of administrating oil. ($P<0.0001$) (32).

Meta-analysis

The findings of 12 studies were combined in a meta-analysis. Considering that the I-SQUARED was $>50\%$ (85.6%) in the case of the sexual function total score, and given the data heterogeneity, the random effect was used instead of the fixed effect to integrate the data. According to the meta-analysis results, the difference in the mean score of the two groups was 0.95 at a confidence level of (95% CI: 0.803-1.097), which was significant ($z=12.64$, $P=0.001$) and revealed an improvement in the total score of female sexual function in the intervention group (Figure 2).

The publication bias was checked using the Funnel plot and Begg and Egger methods (Table 2 and Figure 3). The results of both Begg ($z=0.14$, $P=0.891$) and Egger tests showed the absence of publication bias ($t=0.17$, $P=0.867$), but the slope of the line was significant ($t=7.25$, $P=0.000$).

Considering that the I-SQUARED was $>50\%$ (83.2%) in the case of sexual satisfaction, and given the data heterogeneity, the random effect was used instead of the fixed effect to integrate the data. According to the meta-analysis results, the difference in the mean score of the two groups was 0.84 at a confidence level of (95% CI: 0.476-1.21), which was significant ($z=4.5$, $P=0.001$) and revealed an improvement in the total score of women's sexual satisfaction in the intervention group (Figure 4).

The publication bias was checked using the Funnel plot and Begg and Egger methods (Table 3 and Figure 5). The results of both Begg ($z=0.55$, $P=0.583$) and Egger tests showed the absence of publication bias ($t=0.187$, $P=0.089$), but the slope of the line was significant ($t=24.96$, $P=0.000$).

Discussion

Most of the articles included in the present study reported positive effects on the sexual function of fertile. Also, the majority of studies investigated the side effects of herbal medicines and the reported side effects, which were insignificant or absent. However, this evidence is not conclusive and more research is required. In addition,

few studies have investigated the effect of herbal medicines on the sexual function and satisfaction of fertile women, most of which have been conducted in Iran. Thus, it is crucial to do more research with wider and various sample sizes in different regions of the world. The majority of studies were conducted on Russian olive (4 studies), followed by Bindii, ginseng, and vitagnus each with two studies. The findings of the studies conducted on Russian olive showed that it could improve some areas of sexual function, including desire, arousal, satisfaction, and orgasm in women. Russian olive, vitagnus, palm pollen (13), fenugreek, pomegranate peel (15), etc. are among plants with phytoestrogen properties.

Phytoestrogens are compounds with estrogenic properties and are found in plants with estrogenic and anti-estrogenic properties. The exact mechanism of the effect of these compounds is not still known, but it seems that phytoestrogens affect the hypothalamus-pituitary axis. As a result, they cause a decrease in the secretion of FSH and prolactin, regulate the secretion of LH, and increase sex hormones such as estrogen and androgen, which can increase sexual desire, arousal, efficiency, and orgasm (13).

Sha'ari et al. (2021) organized a systematic review of the beneficial consequence of natural products on female sexual dysfunction. Their study showed that Korean ginseng and Bindii had significant positive effects in improving women's sexual function, while other natural products did not improve women's sexual dysfunction significantly compared to the placebo (33). This study only included English-language articles, whose samples were all women ≥ 18 years. However, none of the two articles reviewed in our study reported a significant positive effect of ginseng on the sexual performance score of women in the intervention compared to the placebo group. The findings of a systematic review by Martimbianco et al. (2020), which desig to assess the consequence of Bindii on women's sexual dysfunction, indicated a significant increase in sexual function scores in premenopausal and postmenopausal women treated with this herb (34). The findings of this study were consistent with the results of the current research.

Jurado et al. (2020) conducted a systematic review to study the effect of natural products on sexual dysfunction in women of all age groups. They concluded that despite the low quality of many studies, the large amount of herbal product interventions seemed to upgrade sexual dysfunction, especially hyposexuality disorders, including the primary and medicine-induced types (35). However, our study examined only women of reproductive age with primary sexual dysfunction.

One restriction of this study was the selection of articles only in English and Persian, which led to the exclusion of non-English or non-Persian articles. In addition, the majority of studies were conducted in Iran, making it difficult to generalize the data to other countries. Among the strengths of the present study was the search in databases by two independent authors and the use of manual in addition to electronic search, which resulted in the retrieval of more articles. Also, there was no limitation to the form of intervention used, in the articles selected, including oral, inhaled, topical, etc. In this research, all clinical trials used the Female Sexual Function Index (FSFI) questionnaire, which is a valid and reliable tool; however, some studies did not clearly explain the randomization and blinding methods. It is suggested to conduct future clinical trials with a better design.

Conclusion

It seems that herbal medicines have positive effects on the sexual function and satisfaction of women of reproductive age and can be an effective and safe treatment for women with sexual dysfunction. However, as there are few clinical trial studies on each plant and its side effects in this population, more research is required with a larger sample of women of reproductive age.

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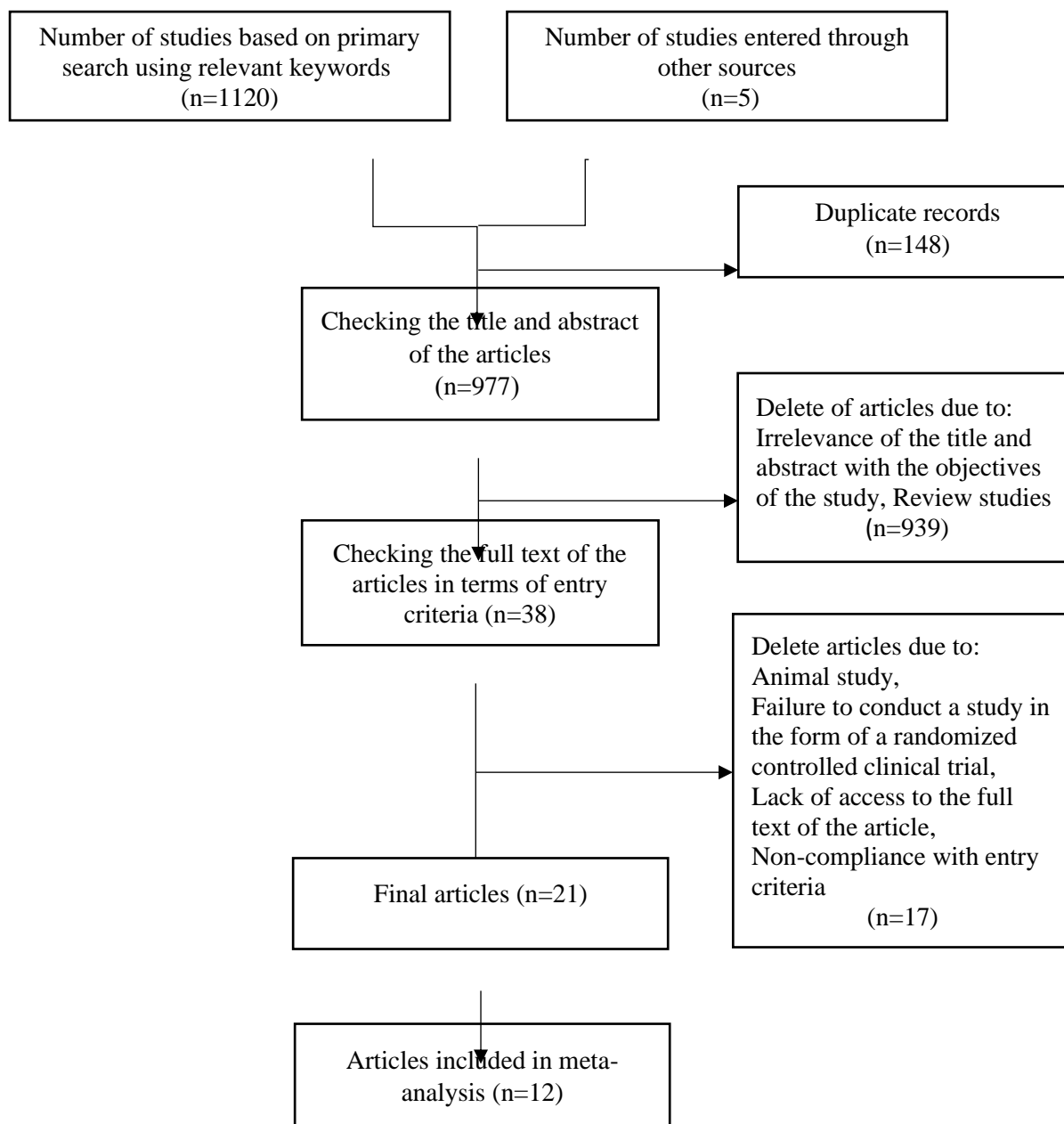


Figure 1. PRISMA flow diagram of article selection progress

Table 1. Summary of the articles included in this study

Study	Author Year	Country	Design	Sample size (intervention/control)	Age	Type of intervention	Control group	Duration	Side effects	Questionnaire	Results	Quality assessment
1. Evaluation of the effect of carrot seed (<i>Daucus Carota</i>) in women of fertile age with hypoactive sexual desire disorder: A randomized double-blind clinical trial (12)	Sadeghi, S et al 2020	Iran	randomized double-blind clinical trial, parallel	30/30	18-45	carrot seed capsule 500 mg 3 times a day	Placebo	12 weeks	No adverse effect	FSFI	Compared to placebo, carrot seed improved the total score of sexual function and domains of desire, lubrication, arousal, satisfaction, orgasm and pain ($p < 0.001$). In the intervention group, the total score of sexual function increased from 19.2 ± 4.1 to 27.5 ± 3.6 . Sexual satisfaction also increased from 3 ± 1.3 to 4.8 ± 1.1 .	7
2. The effect of <i>Vitex agnus-castus</i> plant on sexual function of women of reproductive age (13)	Dalil Heirati SF 2020	Iran	randomized double-blind clinical trial, parallel	51/51	15-44	3.2–4.8 mg dried extract <i>Vitex agnus-castus</i> once a day	Placebo	4 weeks	Nausea (1 sample)	FSFI	There was no statistically significant difference between the two groups in terms of the overall score of sexual function and its dominion ($p \geq 0.05$) and comparing the scores within the group, only the domain of the orgasm score improved ($p = 0.02$). The average score of the total sexual function before the intervention was 24.04 ± 6.20 and after the intervention was 24.30 ± 6.06 . The average difference before and after the intervention in the vitagnus group was -0.25 ± 1.13 . The score of sexual satisfaction reached from 4.55 ± 1.25 to 4.60 ± 1.14 . The mean difference before and after the intervention was -0.04 ± 0.39 .	7



3. The 4-month effect of <i>Vitex agnus-castus</i> plant on sexual function of women of reproductive age: A clinical trial (14)	Heirati SFD, et al 2021	Iran	randomized double-blind clinical trial, parallel	51/51	15-44	3.2–4.8 mg dried extract <i>Vitex agnus-castus</i> once a day	Placebo	16 weeks	Nausea (n= 1)	FSFI	The total score of sexual function in the vitagnus group was significantly higher than the placebo group ($p<0.05$), but the difference between the two groups in each domain was not significant ($p\geq0.05$). The total score of sexual function in the intervention group increased from 24.04 ± 6.20 to 26.52 ± 4.70 . The sexual satisfaction score reached from 4.55 ± 1.25 to 4.99 ± 0.79 .	7
4. Effect of herbal composition (Oak Gall, pomegranate peel and Fenugreek Seeds) on sexual satisfaction of women at reproductive age (15)	Ghavami Z, et al 2020	Iran	randomized double-blind clinical trial, parallel	30/30	15-45	Vaginal suppository 150 mg herbal composition (Oak Gall, pomegranate peel and Fenugreek Seeds) 1 to 2 hours before sexual relationship, 2 days a week	Placebo	1 month	No adverse effect	FSFI Larson sexual satisfacti on question naire	The orgasm domain score was significantly higher in the herbal suppository composition group ($p<0.001$), but the two groups did not have a significant difference in terms of sexual satisfaction ($p=0.14$). In the intervention group, the orgasm range score increased from 2.85 ± 0.92 to 4.80 ± 0.56 . The sexual satisfaction score went from 42.20 ± 1.95 to 44.47 ± 1.69 .	7
5. Comparison of the effect of <i>Elaeagnus angustifolia</i> flower capsule and sildenafil citrate tablet female sexual interest/arousal disorder in clinical trial study (17)	Zeinalza deh S, et al 2019	Iran	randomized double-blind clinical trial, parallel	G 1: 41 G 2: 42 G 3: 42	18-40	Group 1: 4.5 g <i>Elaeagnus angustifolia</i> flower in two divided doses (2 capsules every 12 hours) for 35 days Group 2: 50 mg sildenafil citrate tablets for 4 weeks one hour before sexual relationship	Group 3: Placebo for 35 days	Group 1 and group 3: 35 days Group 2: 4 weeks	-	FSFI	Both interventions were effective in improving sexual interest/arousal ($p=0.007$). The score of the sexual desire domain in the <i>Elaeagnus angustifolia</i> flower and sildenafil citrate groups increased from 2.98 ± 0.99 and 3.15 ± 0.94 to 3.79 ± 0.76 and 3.51 ± 0.88 , respectively. The frequency of sexual interest/arousal before the intervention was 53.7%, 50%, and 66.7% in the <i>Elaeagnus angustifolia</i> , sildenafil citrate, and control groups, respectively ($p=0.269$). But after the intervention, these values were 19.5%, 33.3% and 52.4%, respectively ($p=0.007$).	4



6. Investigation of the effect of <i>Elaeagnus angustifolia</i> flower capsule on sexual satisfaction and levels of androgenic hormones in 18-40 year old married women with low sexual desire (16)	Zeinalzadeh S, et al 2017	Iran	randomized double-blind clinical trial, parallel	42/42	18-40	<i>Elaeagnus angustifolia</i> flower 4 capsules a day (2 capsules every 12 h)	Placebo	35 days	-	FSFI Enrich marital satisfaction questionnaire	<i>Elaeagnus angustifolia</i> significantly reduced the frequency of sexual desire disorder from 53.7% to 19.5% (p=0.001), but did not improve the level of sexual satisfaction and androgenic hormones (p>0.05). (The average scores of sexual desire and sexual satisfaction are not mentioned).	3
7. Efficacy of <i>Tribulus Terrestris</i> for the treatment of premenopausal women with hypoactive sexual desire disorder: a randomized double-blinded, placebo-controlled trial (20)	Vale FBC, et al 2018	Brazil	randomized double-blind clinical trial, parallel	20/20	18-44	750 mg/day (250 mg in 3 pills per day) of <i>Tribulus terrestris</i>	Placebo	120 days	No adverse effect	FSFI QS-F (Sexual Quotient Female Version)	<i>Tribulus Terrestris</i> improved the total score of sexual function and the domains of desire, arousal, lubrication, orgasm, pain and satisfaction. In the intervention group, the total score of sexual function increased from 15.44 to 23.27 (p<0.001). Sexual satisfaction improved from 3.02 to 4.36 (p=0.001).	7
8. Influence of a Specialized <i>Trigonella foenumgraecum</i> Seed Extract (<i>Libifem</i>), on Testosterone, Estradiol and Sexual Function in Healthy Menstruating Women, a RCT with Placebo (22)	Rao A, et al 2015	Australia	randomized double-blind clinical trial, parallel	40/40	20-49	<i>Libifem</i> capsule 300 mg, twice a day	Placebo	8 weeks	exacerbation of migraines (n= 2), indigestion/reflux (n = 2)	1. FSFI 2. DISF-SR	Fenugreek seed improved desire and arousal compared to placebo. A significant change between group was observed in the arousal domain score (p=0.026), but no significant change between group was observed in the total score of FSFI and other domains (average scores not mentioned). The frequency of sex in the intervention group increased significantly from 1-2 times a month to 1 time a week (p=0.013). A significant rise in the level of free testosterone and estradiol was noted in the intervention group (p<0.05)	5
9. The effect of saffron on sexual dysfunction in women of reproductive age (23)	Rahmati M, et al 2017	Iran	randomized double-blind	35-34	18-39	15 mg saffron extract capsule twice a day	Placebo	8 weeks	-	FSFI	Saffron significantly improved the total score of sexual function and all its areas except humidity and dyspareunia (p<0.001). After 8 weeks, the frequency of people with	6



			clinical trial, parallel								sexual dysfunction in the intervention group decreased by 34.3%. (Average grades not mentioned).	
10. The effect of soft oral capsule of rose oil on sexual dysfunction in women of reproductive age (24)	Motahari nezhad M, et al 2021	Iran	randomized triple-blind clinical trial, parallel	37/35	15-49	2 soft capsules containing 15 mg of rose oil daily	Placebo	8 weeks	No adverse effect	1. FSFI 2. Beck Depression Inventory (BDI)	The difference in the mean total score of sexual function between the case and control groups at the end of the 8 th weeks was statistically significant ($p<0.001$). The average score of sexual function in the rose oil group improved significantly from 20.90 ± 3.34 to 26.7 ± 5.13 ($p<0.001$). The average score of sexual satisfaction in the intervening group improved from 3.70 ± 0.93 to 4.65 ± 0.95 ($p<0.001$).	8
11. The effect of date palm on sexual function in infertile couples: a double-blind controlled clinical trial (25)	Jahromi AR, et al 2022	Iran	randomized double-blind clinical trial, parallel	64/64	15-49	date palm pollen capsule 300 mg once a day	Placebo	30 days	No adverse effect	FSFI	The overall score of sexual function in the intervention group significantly rise from 21.06 ± 2.58 to 27.31 ± 2.59 in the intervention group ($p<0.0001$). Also, the score of other domains (arousal, orgasm, lubrication, pain during intercourse, satisfaction) in the intervention group increased significantly compared to the control group, which was statistically significant ($p<0.0001$). The sexual satisfaction score in the intervention group improved from 4.49 ± 0.61 to 5.46 ± 0.67 ($p<0.0001$).	8
12. The effect of <i>Elaeagnus angustifolia</i> flower essence inhalation on dyspareunia and sexual satisfaction of women at reproductive age: A randomized clinical trial (18)	Jafari B, et al 2021	Iran	randomized clinical trial, parallel	G 1: 30 G 2: 31 G 3: 33	18-45	Group 1: <i>Elaeagnus angustifolia</i> flower essence inhalation 3 times a day for 20 minutes each time for 4 weeks, Group 2: <i>Elaeagnus angustifolia</i> flower essence once only 20 minutes before	Group 3: No intervention	4 weeks	No adverse effect	FSFI	The average score of pain ($p=0.004$) and sexual satisfaction ($p<0.001$) had a statistically significant difference in the three groups. But the mean score of pain and sexual satisfaction increased significantly only in intervention group 2. The average score of sexual pain in the first intervention group, the second intervention group, and the	4



						intercourse as inhalation					control group were 4.0±3.8, 4.0±2.9, 4.0±0.8 before the intervention and 4.0±3.8, 4.0±7.7 and 4.0±0.8 after the intervention, respectively. Sexual pain was significantly improved only in the second intervention group (p<0.05). The average score of sexual satisfaction in the first intervention group, the second intervention group, and the control group were 4.0±1.7, 4.0±2.7, 3.0±8.5 before the intervention and 4.0±2.7, 4.7±0.9 and 3.8±0.5 after the intervention, respectively. Based on the results of the intragroup test, sexual satisfaction increased significantly only in the second intervention group (p<0.001).	
13. Treatment of women’s sexual dysfunction using <i>Apium graveolens L. Fruit</i> (celery seed): A double-blind, randomized, placebo-controlled clinical trial (26)	Hessami K, et al 2021	Iran	randomized double-blind clinical trial, parallel	40/40	18-44	500 mg of celery seed 3 times a day	Placebo	6 weeks	No adverse effect	FSFI	The improvement of the total sexual function score in the intervention group was significantly higher than the placebo group (p<0.001) and in the intervention group it increased from 14.72±2.88 to 23.02±3.10, this increase is mainly due to the improvement of sexual desire, arousal, lubrication and pain. The sexual satisfaction score in the intervention group increased from 3.08±1.42 to 3.50±1.47 and no statistically significant difference was observed between the two groups (p=0.281).	8
14. Vitamin E and ginseng supplementation to enhance female sexual function: a randomized, double-blind, placebo-controlled, clinical Trial (27)	Ghamari K, et al 2020	Iran	randomized double-blind clinical trial, parallel	31/31	18-45	vitamin E and ginseng supplement (100 IU vitamin E, 67 mg Korean ginseng, and 40 mg Siberian ginseng) 1 tablet a day	Placebo	6 weeks	The undesirable effects in groups were of no clinical concern.	FSFI	Changes in the total score of sexual function and its domains in each group were significant (both p<0.001), but there was no statistically significant difference between the two groups (p=0.153). In the intervention group, the total score of sexual function increased from 13.87 ± 2.76 to 22.40.	8



											The supplement only improved the domains of desire (p=0.030) and satisfaction (p=0.028) compared to the placebo, and the satisfaction score in the intervention group increased from 1.97±0.88 to 3.89. Regarding the score of other territories, there was no notable difference between the treatment groups.	
15. Efficacy and Safety of <i>Ashwagandha</i> (<i>Withania somnifera</i>) Root Extract in Improving Sexual Function in Women (29)	Dongre S, et al 2015	India	randomized double-blind clinical trial, parallel	25/25	21-50	<i>Ashwagandha</i> root extract capsule 300 mg twice a day	Placebo	8 weeks	No adverse effect	FSFI FSDF Sexual Activity Record (SAR)	Compared to placebo, winter cherry root significantly improved the total score of sexual function (p<0.001) and the score of arousal (p<0.001), lubrication (p<0.001), orgasm (p=0.004), satisfaction (p<0.001), the FSDF score (p<0.001) and the number of successful sexual encounters (p<0.001). In the intervention group, the total sexual satisfaction score increased from 13.63 to 23.86 and the sexual satisfaction domain score increased from 2.35 to 3.79.	6
16. Effect of <i>Melissa officinalis</i> (Lemon balm) on Sexual Dysfunction in Women (30)	Darvish-Mofrad-Kashani Z, et al 2018	Iran	randomized double-blind clinical trial, parallel	22/21	18-50	500 mg of aqueous extract of <i>M. officinalis</i> , 2 times a day	Placebo	4 weeks	No serious side effect (diarrhea 4.5% and Constipation 4.5%)	FSFI	Increased desire (p<0.001), arousal (p<0.001), lubrication (p<0.005), orgasm (p<0.001), satisfaction (p<0.001), pain (p<0.002) and total sexual function score (p<0.001) in the lemon balm group was significantly higher than the placebo group. In the intervention group, the overall sexual function points improved from 18.5±4.2 to 27.9±6.0 and the sexual satisfaction score improved from 3.30±0.86 to 5.18±0.77.	7
17. The Effect of Korean Red Ginseng on Sexual Function in Premenopausal Women (28)	Chung HS, et al 2015	South Korea	randomized double-blind clinical trial,	12/11	31-51	capsule of Korean Red Ginseng 1 g 3 times a day	Placebo	Step 1: 8 weeks, Washout	mild gastric discomfort (n=1)	FSFI	Mean total score of sexual function after treatment with ginseng (from 20.13 ± 2.87 to 23.98 ± 4.10, P=0.015) and control group	7



			crossover					period: 2 weeks, Step 2: 8 weeks			(from 20.06 ± 2.64 to 23.78 ± 3.28 , $P=0.003$) increased. But this treatment is the same in two groups ($P=0.702$). Ginseng significantly improved the domains of desire, arousal, orgasm, and satisfaction, however, there was no therapeutic effect compared to placebo. Sexual satisfaction in the intervention group improved from 3.40 ± 0.50 to 4.00 ± 0.85 ($P=0.027$), There is no change between 2 groups ($P=0.894$).	
18. <i>Tribulus terrestris</i> for treatment of sexual dysfunction in women (21)	Akhtari E, et al 2014	Iran	randomized double-blind clinical trial, parallel	30/30	Intervention group: 36 ± 6.24 Control group: 36.13 ± 5.88	<i>terrestris extract</i> 7.5 mg a day	Placebo	4 weeks	grade 1 abdominal cramp (n=1)	FSFI	Compared to placebo, <i>Tribulus terrestris</i> significantly improved the total score of sexual function ($p<0.001$) and the domains of desire ($p<0.001$), arousal ($p=0.037$), lubrication ($p<0.001$), satisfaction ($p<0.001$) and pain ($p=0.041$). In the intervention group, the total score of sexual function improved from 22.41 ± 2.87 to 26.80 ± 3.03 and the sexual satisfaction score improved from 3.44 ± 1.15 to 4.61 ± 0.93 .	6
19. The effect of pomegranate peel gel on orgasm and sexual satisfaction of women in reproductive age: A triple-blind randomized, controlled clinical trial (31)	Moham madzadeh F, et al 2019	Iran	randomized triple-blind clinical trial, parallel	49/49	18-45	Pomegranate peel vaginal gel 1 applicator 15 minutes before sexual relationship, three times a week	Placebo	8 weeks	The itching was similar in both groups	FSFI	The average score of orgasm and sexual satisfaction in the intervention group compared to the placebo group showed a statistically significant increase ($p<0.001$). The sexual satisfaction score in the intervention group improved from 3.92 ± 0.91 to 5.33 ± 0.70 , which was statistically significant ($p<0.001$).	8
20. Comparison of <i>Elaeagnus angustifolia</i> Extract and Sildenafil Citrate on Female Orgasmic Disorders (19)	Akbarzadeh M, et al 2014	Iran	randomized clinical trial, parallel	G 1: 41 G 2: 42 G 3: 42	18-40	Group 1: 4.5 g <i>E. angustifolia</i> extract in two divided doses for thirty five days Group 2: 50 mg sildenafil citrate	Group 3: placebo in similar packages to <i>E.</i>	35 days	-	FSFI	Both <i>E. angustifolia</i> extract and sildenafil citrate were effective in reducing the frequency of orgasmic disorders in women ($p=0.004$). The orgasm score in the group of <i>E. angustifolia</i> and sildenafil before the intervention was 3.31 ± 1.0 and	4



						tablets for 4 weeks 1 hour before sexual relationship	<i>angustifolia</i> capsules				3.48±0.94, respectively, and after the intervention it increased to 4.03±1.01 and 4.15±0.89. There was a significant difference between the two groups in terms of sexual satisfaction after the intervention (p=0.03) compared to the beginning of the study, and both interventions caused a significant improvement in sexual satisfaction. The sexual satisfaction score in the group of <i>E. angustifolia</i> and sildenafil before the intervention was 3.82±1.31 and 4.25±0.8, respectively, and after the intervention it increased to 4.75±1.2 and 4.73±0.78.	
21. Effect of Squill on the sexual function among women of reproductive age (32)	Abbasi Pirouz M, et al 2018	Iran	randomized double-blind clinical trial, parallel	30/30	15-45	0.5 cc of squill oil 5 minutes before sexual relationship topically on the clitoris, 1 to 3 times a week	Placebo	4 weeks	No adverse effect	FSFI	Squill oil improved the total score of sexual function and the domains of desire, lubrication, orgasm, pain and arousal compared to placebo (p<0.001). The total score of sexual function in the intervention group improved from 8.8±0.7 to 33.2±4.4.	7

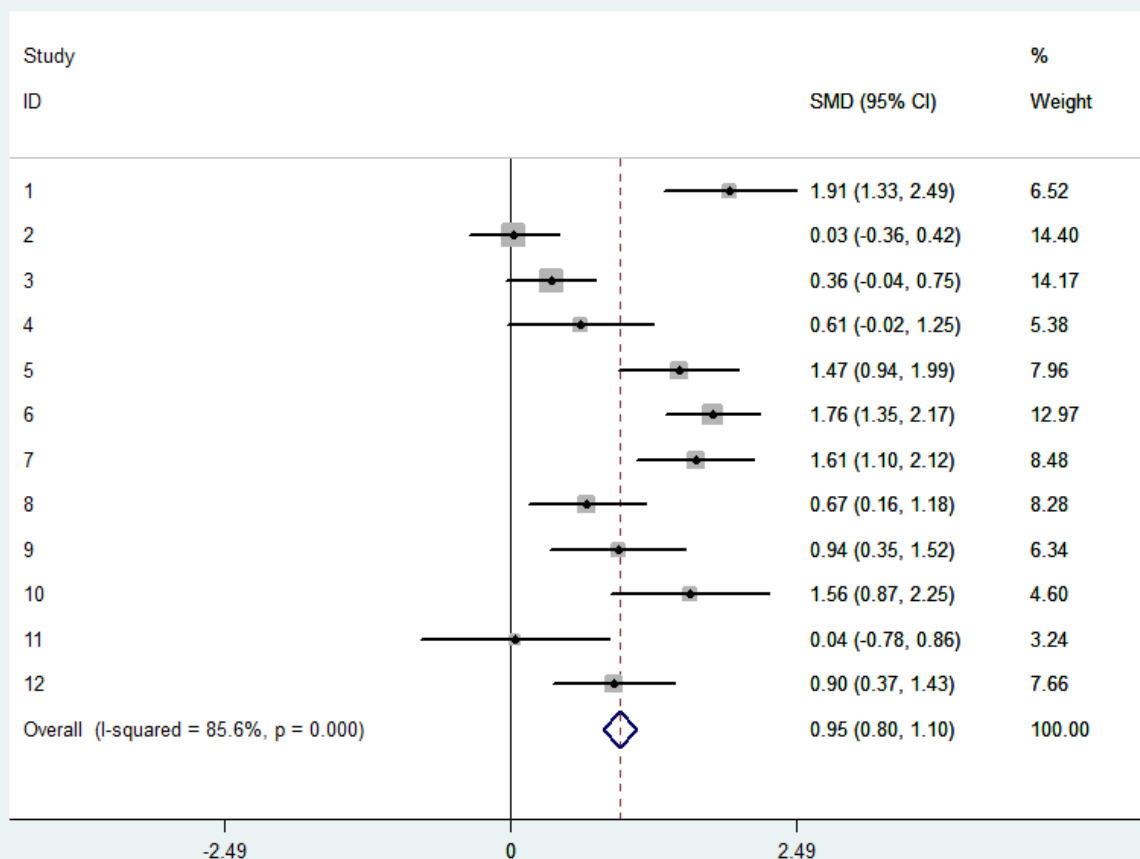


Figure 2. Forest plot of the effect of herbal medicines on the total score of female sexual function based on the random effect model

Table 2. Egger's test related to the publication bias of the effect of herbal medicines on the total score of female sexual function

Std_Eff	Coef	Std. Err	t	P> t	[95% Conf. Interval]
Slope	.2741103	.0378233	7.25	0.000	.1898347 _ .3583859
Bias	.0784932	.4551406	0.17	0.867	-.9356233 _ 1.09261

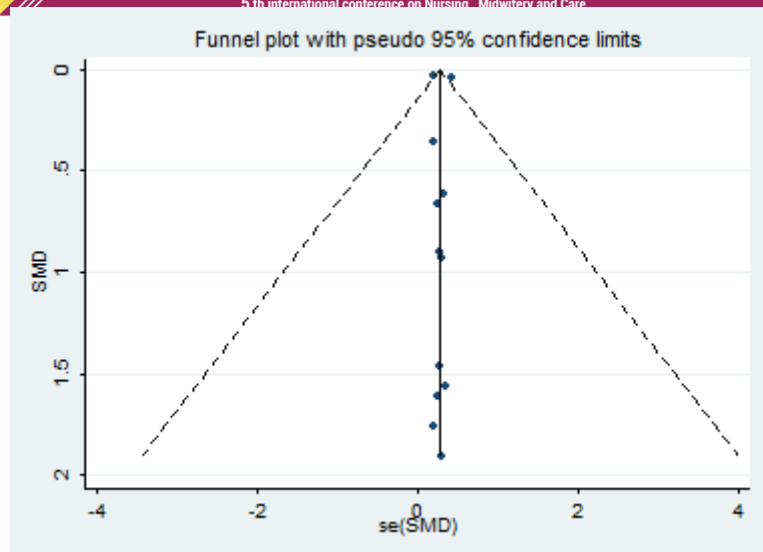


Figure 3. Funnel plot related to the publication bias of the effect of herbal medicines on the total score of sexual function

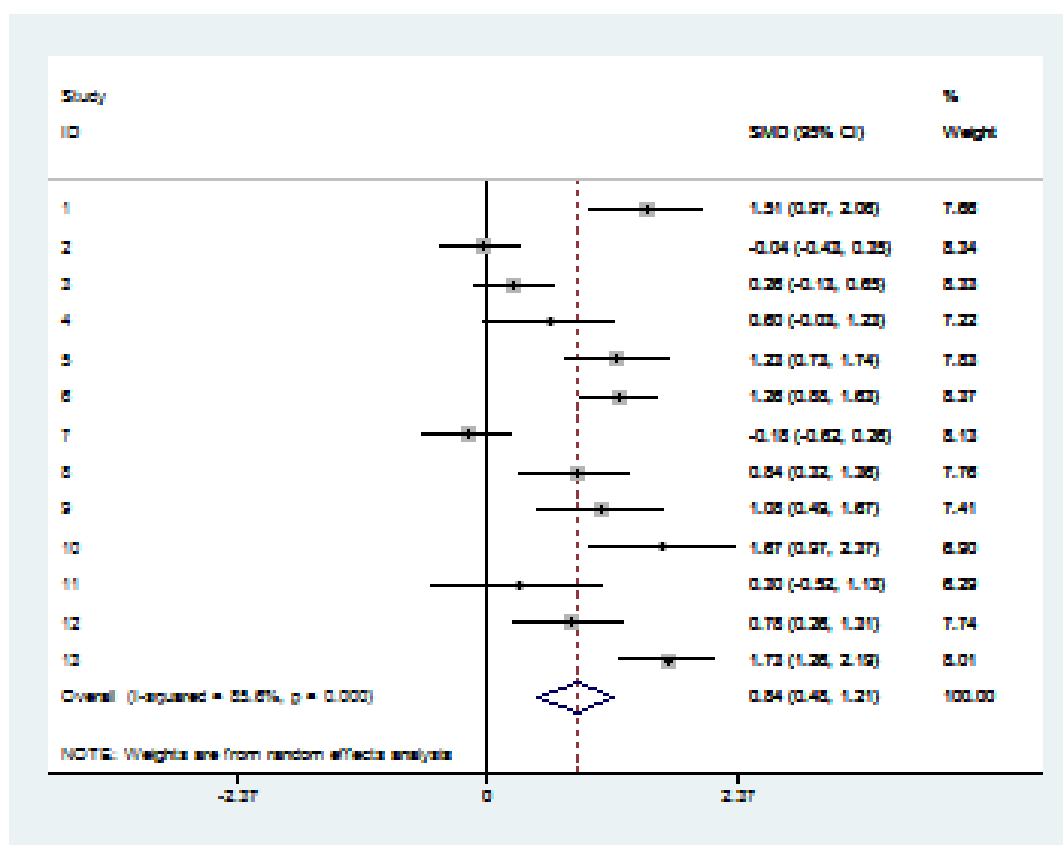


Figure 4. Forest plot of the effect of herbal medicines on sexual satisfaction based on the random effect model

Table 3. Egger's test related to the publication bias of the effect of herbal medicines on sexual satisfaction

Std_Eff	Coef	Std. Err	t	P> t	[95% Conf. Interval]
Slope	.2067544	.0082847	24.96	0.000	.1885199 _ .2249889
Bias	.1079386	.0578633	1.87	0.089	-.0194177 _ .2352949

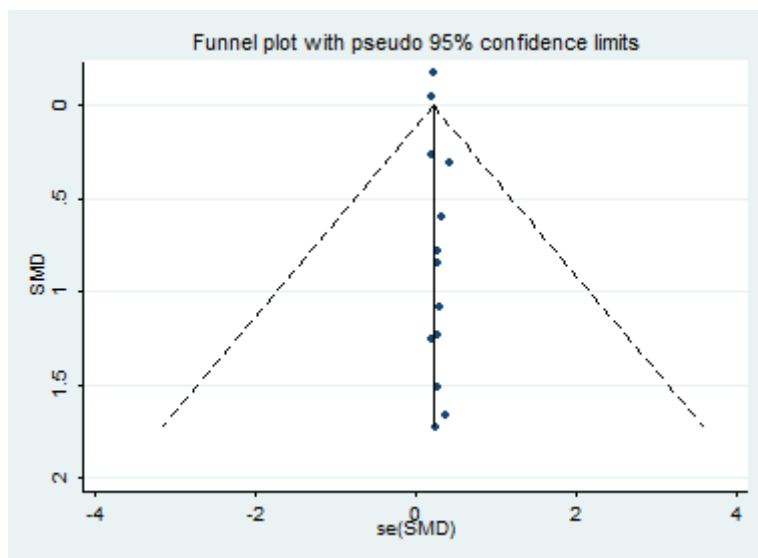


Figure 5. Funnel plot related to the publication bias of the effect of herbal medicines on sexual satisfaction

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