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The efficacy and safety of plant-based interventions in improving mental health outcomes among women during menopause – A systematic review

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Review Article

Abstract

Introduction: Menopause is often accompanied by psychological disturbances such as Anxiety, Depression and Stress, which can adversely affect a woman's quality of life. Plant based interventions are increasingly explored as alternatives to hormonal therapies due to their perceived safety and accessibility.

Objective: This study aims to examine the potential therapeutic benefits and safety of herbal interventions for menopause associated psychological symptoms such as Depression, Anxiety, Stress and Overall Quality of Life.

Methods: A systematic search was conducted in PubMed, Web of Science and Google Scholar for studies published between 2020 and 2025 using the keywords Menopause, Depression, Anxiety and Plant Medicine. PRISMA guidelines were followed. Of 1380 records screened, 25 studies met the inclusion criteria. All included studies were human clinical studies, with no in vivo (animal) or in vitro studies identified. Exclusion criteria included Insufficient Data, Irrelevance and Lack of Full Text Access.

Results: Eighteen plant-based interventions were identified, including *Crocus sativus* (Saffron), *Rosa damascena* (Damask Rose), *Vitex agnus-castus* (Chaste tree), *Salivia officinalis* (Sage), *Lavandula angustifolia* (Lavender), *Matricaria chamomilla* (Chamomile), *Panax ginseng* (Ginseng), *Melissa officinalis* (Lemon Balm), *Nigella sativa* (Black seed) and several polyherbal formulations. The human clinical evidence demonstrated reduction in Depression, Anxiety and Stress with improvements in quality of life. *Crocus sativus* (Saffron) demonstrated the most consistent improvements in both Anxiety and Depression with favorable safety profiles. Conversely, *Elaegnus angustifolia* (Russian olive) and *Rheum ribes* (Rhubarb) showed no significant psychological benefits. Additional promising effects were reported for *Cimicifuga racemosa* (Black Cohosh), *Trigonella foenum-graecum* (Fenugreek), *Humulus lupulus* (Hops), *Valeriana officinalis* (Valerian), *Passiflora species* (Passion Flower) and *Glycine max* (Soy isoflavines) which improved mood and Anxiety symptoms with minimal adverse effects.

Conclusion: Evidence from human clinical studies suggests that several plant-based therapies may alleviate menopause related psychological symptoms, particularly Anxiety and Depression. However, interpretation of the findings is hindered by modest sample sizes and variability in methodological heterogeneity. More rigorous clinical trials are required to confirm efficacy, establish standardized dosages and ensure safe clinical use.

Key Words: Menopause, Anxiety, Depression, Plant Medicine, Mental Health

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Introduction

Menopause represents a significant and unavoidable psychological transition in women's lives [1], most commonly occurring between 45 and 55 years of age. It is characterized by the decline in ovarian function and the gradual or sudden reduction in estrogen production, leading to hormonal imbalance within the hypothalamic-pituitary-ovarian axis. This transition results in irregular menstrual cycles, ultimately culminating in the permanent cessation of menstruation [1]. The interplay between reduced levels of estradiol and compensatory increases in Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) underlies the physiological and psychological changes experienced during this phase [2]. The symptomatic burden of menopause can be substantial, with over 80% of women experiencing symptoms for 1 year, 50% reporting persistence for 4-5 years, and approximately 10% enduring them for more than 15 years [3].

The spectrum of menopausal symptoms encompasses vasomotor disturbances, sleep disruptions, mood fluctuations, anxiety, depressive episodes, cognitive impairment, and sexual dysfunction. Among these, mental health concerns such as anxiety and depression are particularly significant, as they can profoundly impair quality of life, interpersonal relationships, occupational performance, and long-term physical health. Depressive symptoms in post-menopausal women often involve difficulties in social engagement, loss of pleasure in daily activities, disrupted sleep patterns, altered appetite, fatigue and extreme situations, thoughts of self-harm [4]. Furthermore, mood disorders during this stage have been linked to sexual dysfunction [5], while the hormonal changes of menopause particularly Estrogen deficiency, is recognized as the major contributor to Osteoporosis and reduced bone mineral density [6]. Thus, the diagnosis and effective management of mental health challenges in menopausal women remain a pressing priority for healthcare systems worldwide [7].

Conventional management strategies, particularly Hormone Replacement Therapy (HRT) [1], have been widely utilized to mitigate menopausal symptoms by compensating for declining estrogen levels. HRT has demonstrated substantial efficacy in reducing vasomotor symptoms, improving sleep quality, alleviating genitourinary syndrome of menopause and preserving bone mineral density. Several large scale observational studies and reanalysis have suggested that, when initiated in early menopause and prescribed at appropriate doses, HRT may confer a favorable benefit-risk profile, including potential reductions in all-cause mortality and cardiovascular risk in selected populations. Moreover, estrogen therapy has been shown to exert beneficial effects on mood and overall wellbeing in some postmenopausal women. However, concerns regarding the long term safety of HRT persist, particularly following reports linking its use to increased risk of breast cancer, cardiovascular disease, thromboembolism and other adverse effects on hormone dependent cancers in certain subgroups [1]. Subsequent studies have challenged the generalizability of these findings, emphasizing the importance of factors such as age at initiation, duration of therapy, formulation and route of administration. This evolving and sometimes contradictory body of evidence highlights the need for individualized risk-benefit assessment and

underscores that HRT may not be suitable or acceptable for all women, especially those with contraindications or personal preferences against its use. This has fueled a global search for safer, evidence-based alternatives capable of addressing both the physical and psychological dimensions of menopause [1].

Plant-based interventions, particularly herbal medicines and phytoestrogen-rich formulations, have gained increasing attention as promising alternatives. Phytoestrogens such as flavonoids, isoflavonoids, stilbenes, lignins [5] and phytosterols share a structural resemblance to endogenous estrogens, allowing them to interact with estrogen receptors and produce effects similar to Selective Estrogen Receptor Modulators (SERMs) [5]. Historically, ancient civilizations across Iran, China, India, Greece, Rome, and Egypt recognized the therapeutic properties of botanicals derived from roots, seeds, flowers, leaves, and barks in restoring balance to the mind and body [2]. Modern research continues to explore these traditional remedies, with the World Health Organization (WHO) formally acknowledging the role of complementary and herbal medicine in alleviating menopausal symptoms [5].

Given the high prevalence of mental health concerns among postmenopausal women and the limitations of conventional therapies, evaluating the role of plant-based interventions in improving psychological well-being is of critical importance. This systematic review therefore aims to synthesize current evidence on the efficacy and safety of plant-derived therapies in managing mental health outcomes, including Depression, Anxiety, Stress, and overall Quality of Life, during the menopausal transition.

This study aims to systematically review and synthesize existing evidence on the effectiveness and the role of plant-based interventions in improving mental health outcomes among women during menopause.

The specific objectives are to identify plant-based interventions including herbal medicines, phytoestrogens and dietary supplements that have been investigated for their role in managing mental health during menopause and to examine the effectiveness of specific interventions in improving mental health outcomes, including Depressive symptoms, Anxiety and Mood Disturbances in women undergoing menopause.

Methods

A systematic review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) guidelines. Randomized Controlled Trials (RCTs), Clinical Trials, Review Articles, Case Study and Observational Studies that assess the role of herbal medicine interventions in mental health during menopause were included in the review.

The studies with insufficient data and Lack of full text access, Irrelevance, Animal studies, Editorials, Commentaries and non-English publications were excluded. The selected studies described a variety of interventions such as herbal medicine-based interventions including whole plant or plant part extracts, standardized herbal preparations and phytoestrogen containing formulations administered in any form. (Oral, Topical, Fumigation)

Selection Process

A rigorous study selection and screening process was performed in line with PRISMA 2020 standards. All identified records were searched in hand for duplicates and removed prior to screening. Two reviewers independently assessed all titles and abstracts to determine which studies were relevant to the research focus.

Full text articles were further scrutinized against pre-defined eligibility criteria, which included RCT's, Clinical Trials, Review Articles, Case studies and Observational Studies that assessed the role of herbal medicine based interventions in mental health during menopause. Studies were excluded if they involved duplication, insufficient data and lack of full text availability, irrelevance to the study objectives, non-human/pre-clinical research, animal models, editorials and commentaries.

During both screening stages discrepancies between reviewers were resolved through consensus or by consulting a third reviewer. The total number of studies included is illustrated in a PRISMA flow diagram (Figure 1), showing records identified, screened, excluded and incorporated into the qualitative analysis.

Outcomes:

Primary – Mental health concerns such as Depression, Anxiety, Mood disturbances are measured using validated subjective self-report and clinician administered instruments including, Menopause Rating Scale (MRS) questionnaires, Beck Depression Inventory (BDI), Greene Climacteric Scale (GCS), Positive and Negative Affect Schedule (PANAS), Short Form Survey (SF-36), State-Trait Anxiety Inventory (STAI), Edinburgh Postnatal Depression Scale (EPDS) assessment tool, Depression, Anxiety, Stress Scale-21 (DASS-21), Hamilton Depression Rating Scale (HDRS), Blatt-Kupperman Index, Treatment Satisfaction Questionnaire (MS-TSQ) and other structured questionnaires.

Where applicable clinician-rated assessment tools such as HDRS and Blatt-Kupperman Index were considered as objective or semi-objective measures, as they are administered and scored by trained professionals using standardized criteria.

Secondary – Quality of life and functional well-being assessed using validated instruments such as Cervantes Scale, Menopause Specific Quality of Life Questionnaire (MENQOL), Utian Quality of Life Scores, Female Sexual Function Index (FSFI) and menopause symptom severity assessed by structured Likert-based scales. Reported adverse events and safety outcomes related to herbal interventions were also extracted and analyzed.

Nature of outcome assessment giving a psychological focus on the review, the majority of included studies relied on validated subjective and clinician-assessed outcome measures, which are widely accepted and recommended for evaluating mental health outcomes in menopausal populations. No laboratory-based biomarkers or neuroimaging outcomes were consistently reported across studies.

Language and timeframe: Studies published in English 2020-2025.

For dichotomous outcomes (presence or absence of clinically significant symptoms, treatment response rates), Risk Ratio (RR) with 95% CI was planned for use. If

adequate data were unavailable for pooled statistical synthesis, a narrative synthesis approach was applied and results were presented in descriptive form.

3. Information Sources

A thorough literature search was performed using PubMed/MEDLINE, Web of Science and Google Scholar.

4. Search Criteria

A structured search strategy was developed using free text terms related to "menopause", "plant medicine", and "anxiety", "depression "with Boolean operators (AND, OR). Also, the same terms put into each database and hand searching manually the references of publications were performed.

5. Data Extraction

A standardized data extraction method was employed to systematically collect relevant information from each included study. Extracted data comprised study characteristics (author, year of publication, country, and study design), participant characteristics (sample size, age, and menopausal stage), and intervention details (type of herbal formulation, dosage, duration, and mode of administration). Additionally, data were gathered on assessed mental health outcomes and the measurement tools used, along with the main findings and any reported adverse effects.

6. Data Quality Assurance

To ensure data accuracy and reliability, several quality assurance measures were implemented. All data extractors received prior training to maintain consistency in the extraction process. A double data entry approach was used and entries were cross verified to identify and correct discrepancies. Data cleaning procedures including checks for missing values, duplicates and inconsistencies were conducted before analysis. Validation rules were applied within the database to prevent entry errors and ensure logical consistency. Inter-rater reliability checks were performed to confirm agreement between reviewers. Additionally, extract data were crossed checked with the original source to ensure correctness and completeness.

7. Ethical Considerations

Ethical approval was not required because the study utilized only data already available in published sources.

8. Risk of Bias Assessment

Risk of bias for randomized controlled trials (RCTs) was evaluated using the Cochrane Collaboration Risk of Bias 2 (RoB 2) tool across four domains: (1) the randomization process; (2) deviations from intended interventions; (3) measurement of outcomes; and (4) selection of the reported results. Each domain was independently assessed by two reviewers and rated as "Low Risk," "Some Concerns," or "High Risk," with disagreements resolved through discussion. Non-randomized evidence (e.g., case series) and review articles were appraised separately using appropriate methodological considerations. Risk-of-bias judgments were based on the information available in the included study reports and corresponding trial publications.

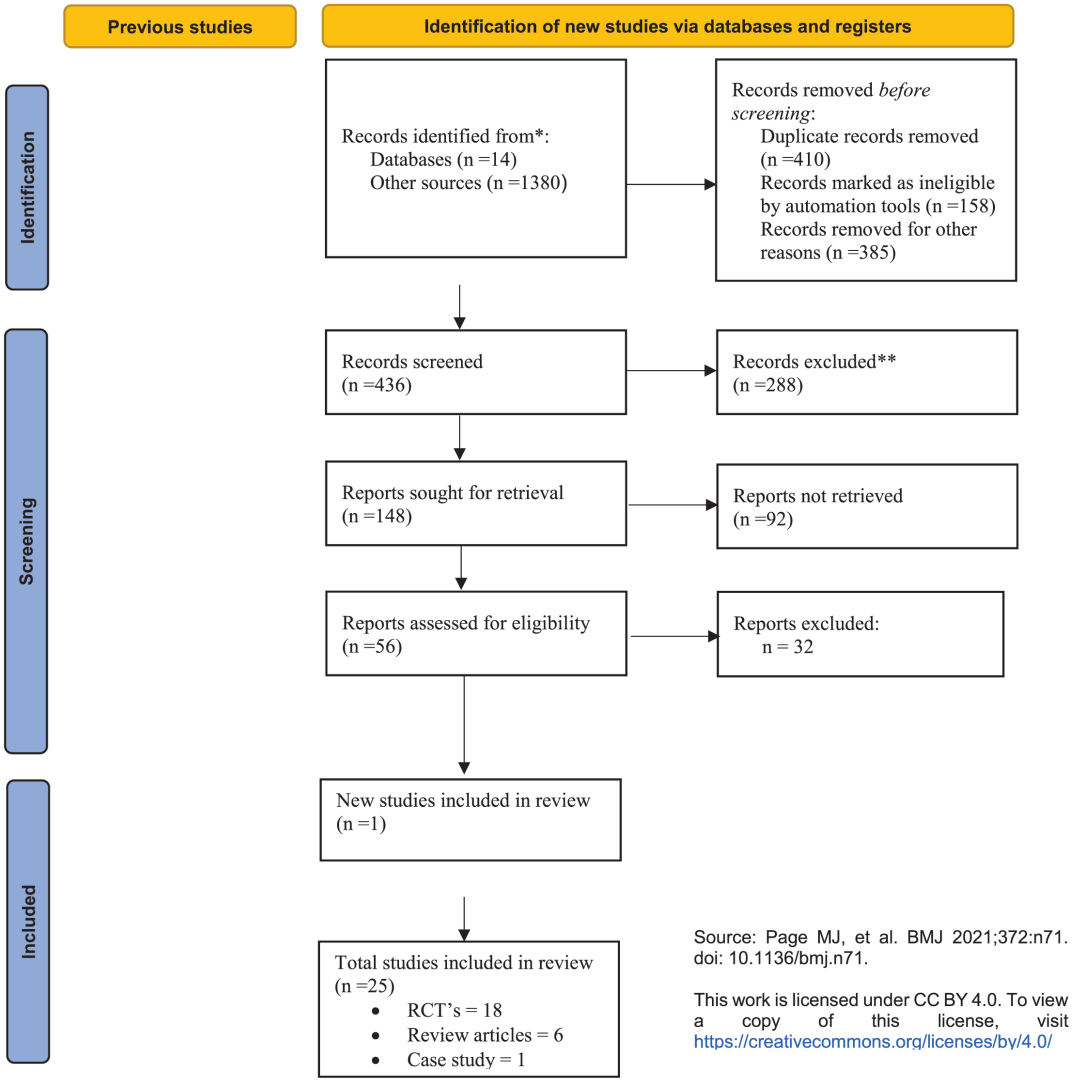

Figure 1. The PRISMA flow diagram represents the study selection process as per PRISMA 2020 guidelines.

Results

A total of 25 studies were included in this systematic review after the screening and eligibility process. Among them, 18 were RCT's, 6 were review articles, and one was a case study. The predominance of RCTs provides a relatively strong evidence base, although the presence of review articles and a single case study highlight the diversity of available literature.

Risk of Bias Assessment

Of the 18 RCT's included, the majority were randomized and placebo-controlled and

used validated psychometric instruments to measure mental health outcomes, which reduced measurement bias. However, reporting of key trial methods (sequence generation, allocation concealment, blinding procedures, and attrition details) was inconsistent across studies; therefore most RCTs were judged to have 'Some Concerns' overall. One trial using an open 'no-intervention' control was judged at 'High' risk due to likely performance and detection bias.

In conclusion, the risk of bias for the RCT's included in this review was systematically assessed using the Cochrane RoB 2 tool, with two independent reviewers evaluating each domain and resolving discrepancies through consensus. The majority of RCT's were rated as having "Some Concerns", mainly because of incomplete details regarding randomization and blinding, whereas several trails were considered "Low Risk" overall and one study was classified as "High Risk" due to deviations from intended interventions and insufficient blinding.

For the six review articles and the single case study included, formal RoB 2 assessment was not applicable. Instead, these sources were narratively appraised based on clarity of methodology, transparency in evidence synthesis, and relevance to the review question. Although these studies contributed valuable contextual information, they were considered lower in methodological rigor compared with the RCTs. Together, these evaluations ensured a transparent and comprehensive assessment of study quality and helped contextualize the strength of the evidence synthesized in this review.

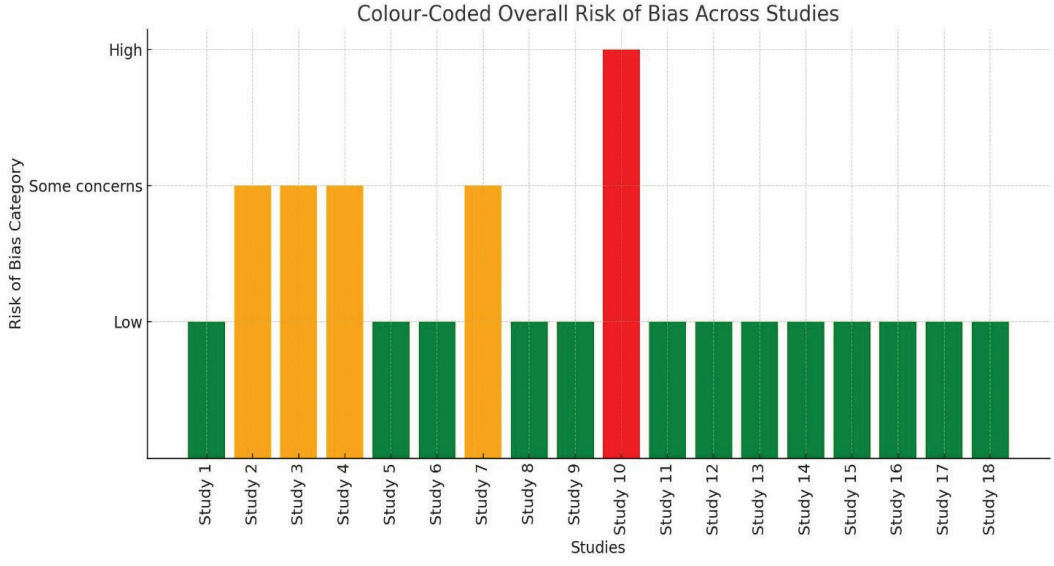

Figure 2. Risk of Bias Assessment Summary (Cochrane RoB 2.0).

Table 1. The overall summary of the RCT's

Serial No.	Study (Author, Year)	Brief Methodology (Type of intervention, Duration, No. of Participants, Measurement Tools)	Key Findings
1.	Emamminia F, Arezou R, Badehnoosh B, Ramezani R, Shabani M. (2020, Jan)	14mg of standardized *Crocus sativus* (Saffron) extract derived from stigmas administered twice daily for 12 weeks. 86 GCS, PANAS, SF-36	33% reduction in Anxiety 32% reduction in Depression CI 95% GCS (p=0.032) PANAS (p=0.043) No major adverse effects.
2.	Gudise VS, Dasari MP, Kuricheti SS (2024 April)	250mg of *Asparagus racemosa* (Asparagus) aqueous root extract administered twice daily for 8 weeks. 70 Utian Quality of Life Scores, DASS-21, Menopausal Symptoms by five-point Likert Scale, Serum Estradiol and Progesterone, MS-TSQ.	Anxiety, Depression, Quality of Life improved CI 95% P<0.0001 No reported adverse effects.
3.	Bagheriani N, Bahrami M, Kamalinejad M, Rampisheh Z, Kashanian M, Akhtari E. (2023)	15g of *Elaeagnus angustifolia* whole fruit (dried and powdered) administered twice daily 10 weeks. 58 Serum Estradiol, Progesterone, FSH and LH hormones	No significant effect on improving mental health during menopause CI 95% P>0.05 No Reported Adverse Effects
4.	Kamalifard M, Farshbaf Khalili A, Namadian M, Herizchi S, Ranjbar Y. (2017 July)	500mg of the root of *Rheum ribes* (Rhubarb) dried, powdered and encapsulated administered twice daily for 8 weeks. 90 Blatt- Kupperman Index.	No significant effect on improving mental health during menopause. CI 95% P<0.0001 No Reported Adverse Effects
5.	Gholinezhad Z, Karimi FZ, Rakhshandeh H, Mazloum SR. (2025 Aug)	500mg of *Rosa damascena* (Damask rose) aqueous extract administered twice daily for 8 weeks. 82 DASS-21	Depression, Anxiety, Stress improved. CI 95% P>0.05 No Reported Adverse Effects
6.	Sharifpour Z, Hasanpoor S, Mirghafourvand M. (2025 June)	Leaves of *Ocimum basillicum* grinded into a fine powder and soaked in 70% of hydroalchoholic solution for 3-5 days to obtain the leaf extract. After removing solvent and filtering a powder is made. (500mg) administered twice daily for 4 weeks. 60 MRS, Personal Characteristics Questionnaire	Depression, Quality of life improved. CI 95% P<0.05 No Reported Adverse Effects
7.	López-Ríos L, Barber MA, Wiebe J, Machín RP, Vega-Morales T, Chirino R. (2021 July)	Combination of isoflavine extract (100mg), *Aframomum melegueta* seed dry extract (50mg), *Punica granatum* dry skin (100mg) administered twice daily for 8 weeks. 57 Cervantes Scale	Quality of life improved. CI Not Reported P=0.05 No Adverse Effects Reported.

8.	Kamalifard M, Farshbaf Khalili A, Namadian M, Herizchi S, Ranjbar Y. (2017 July)	500mg of dried and powdered Lavender flower and 500mg of dried and powdered Bitter orange skin administered twice daily for 8 weeks. 156 Beck Depression Inventory	Depression improved. CI 95% P<0.001 Nausea (4.2%), Palpitations (4.2%), Headache (2.1%) Caused by bitter orange, Nausea (8.2%), Palpitations (4.4%), Headache (4.4%) Caused by Lavender flower.
9.	Sharifpour Z, Hasanpoor S, Mirghafourvand M. (2025 June)	250mg of dried and powdered Ginseng capsules twice daily for 8 weeks. 66 FSFI, GCS, BDI	Depression improved. CI 95% P<0.001 No Adverse Effects Reported
10.	Bazrafshan MR, Masmouei B, Soufi O, Delam H. (2022 July)	2g of dried Lavender leaves and 2g of dried Chamomile leaves boiled in 300ml of water for 10-15min. twice daily for 2 weeks. 96 BDI, STAI, Demographic Characteristic Checklist	Depression and Anxiety improved. CI 95% P<0.001 No Adverse Effects Reported
11.	Tayebi N, Emamghoreishi M, Akbarzadeh M. (2021)	3.2-4.8mg of dried fruit extract of *Vitex agnus-castus* powder as capsules thrice daily for 3 months. 60 EPDS	Depression improved CI Not Reported P<0.05 No Adverse Effects Reported.
12.	Jokar M, Delam H, Bakhtiari S, Paki S, Askari A, Bazrafshan MR, Shokrpour N. (2020)	2% Lavender essential oil per night for 20min. to inhale for 4 weeks. 46 BDI, STAI	Depression and Anxiety improved. CI Not Reported P=0.001 No Adverse Effects Reported
13.	Tayebi N, Emamghoreishi M, Akbarzadeh M. (2025 April)	250mg of *Salvia officinalis* extract thrice daily for 8 weeks. 60 EPDS, Demographic Characteristic Questionnaire, MRS	Depression improved. CI 95% P<0.001 No Major Adverse Effects
14.	Mahdavian M., Mirzaii Najmabadi K. Hosseinzadeh H., Mirzaeian S, Badiee Aval S, Esmaeeli H. (2019 Sept.)	Herbal aqueous extract of Fennel (120ml), Chamomile (1000mg), Saffron (60mg) orally daily for 12 weeks. 108 MRS	Depression and Anxiety improved. CI Not Reported P<0.001 No Adverse Effects Reported.
15.	Kenda M, Kočevar Glavač N, Nagy M, Sollner Dolenc M; (2021 Dec)	500mg of *Melissa officinalis* L. aqueous extract capsules once daily for 8 weeks. 60 MENQOL	Quality of life improved. CI 95% P<0.001 No Adverse Effects Reported.
16.	Sharifpour Z, Hasanpoor S, Mirghafourvand M. (2025 June)	30mg of dried stigmas of Saffron boiled on 300ml water for 10-15min. as herbal tea daily for 6 weeks. 72 Oxford Happiness questionnaire	Depression improved. CI 95% P=0.053 No Adverse Effects Reported.

17.	Li J, Li H, Yan P, (2020 July)	1000mg of Nigella sativa oil capsule at night after meals daily for 8 weeks. 72 Demographic Characteristic Questionnaire, GCS	Anxiety, Depression improved. CI 95% P=0.019 Vaginal bleeding, Stomachache, Enlargement of breasts, Increased libido as adverse effects.
18.	Karalis S, Karalis T, Malakoudi F, Thanasas I, Kleisiari AS, Tzeli Z, Papavasiliou E, Karalis DT (2023 April)	Combination of *Hypericum perforatum* (500mg) and *Vitex agnus-castus*(500mg) powder once daily for 16 weeks. 93 GCS, Hamilton Depression Inventory Scores, Utian Quality of Life Scale	Depression improved. CI 95% P<0.001 No Adverse Effects Reported.

The included studies examined a wide range of plant-based interventions such as phytoestrogens, herbal extracts, dietary supplements, herbal capsules, herbal combinations, herbal teas, essential oils and traditional medicinal plants for their potential impact on mental health outcomes during menopause. The most frequently studied outcomes were Mood Disturbances, Anxiety, Depressive symptoms and overall Quality of Life.

Overall, the findings indicate that plant-based interventions may provide beneficial effects in alleviating menopausal mental health symptoms, particularly in reducing anxiety and depressive manifestations. However, the extent of efficacy varied depending on the type of plant intervention, dosage, control group, no. of participants, key findings, adverse effects, duration of administration and methodological quality of the studies. Some RCTs reported significant improvements compared to placebo, while others demonstrated only modest or non-significant effects, suggesting heterogeneity across interventions.

1. Study Characteristics

The included RCT's evaluated a range of plant-based interventions for mental health outcomes among menopausal women. The duration of interventions varied from 2 weeks to 16 weeks, with participant numbers ranging from 46 to 156. Control groups were most often given placebo (capsules, powders, or liquids), while one study used tablet "Citalopram" as an active comparator. The primary outcomes assessed included Depression, Anxiety, Stress, and Quality of Life, measured using standardized psychometric scales.

2. Interventions with Positive Mental Health Outcomes

Several interventions demonstrated statistically significant improvements in mental health outcomes: Saffron extract (12 weeks, n=86) showed a 33% reduction in Anxiety and 32% reduction in Depression, with no major adverse effects. Rosa damascena extract (8 weeks, n=82) significantly improved Depression, Anxiety, and stress scores. Ocimum basilicum leaf extract (1 month, n=60) led to improvements in Depression and Quality of Life. Vitex agnus-castus capsules (3 months, n=60) reduced Depressive symptoms, measured by EPDS. Salvia officinalis extract (8 weeks, n=60) improved Depression, with no significant adverse effects. Lavender essence (inhalation) (1 month, n=46) and lavender–chamomile herbal tea (2 weeks,

n=96) improved both Depression and Anxiety.

Polyherbal formulations such as, Fennel Chamomile-Saffron extract (12 weeks, n=108) improved Depression and Anxiety. *Hypericum perforatum* + *Vitex agnus-castus* (16 weeks, n=93) improved Depression. *Isoflavone* + *Aframomum melegueta* + *Punica granatum* (8 weeks, n=57) improved Quality of Life.

Ginseng powder (8 weeks, n=66) and *Melissa officinalis* extract (8 weeks, n=60, compared with tablet "citalopram") were associated with improved Quality of Life and reduced Depressive symptoms. *Nigella sativa* oil capsules (8 weeks, n=72) demonstrated improvement in Anxiety and Depression but were associated with hormonal and gastrointestinal side effects. Saffron tea (stigmas) (6 weeks, n=72) improved Depression scores.

3. Interventions with No Significant Effect

Not all interventions were found to be effective, *Elaeagnus angustifolia* whole fruit (10 weeks, n=58) did not improve Depression, Anxiety, or overall mental health outcomes. Encapsulated *Rheum ribes* (Rhubarb) powder (8 weeks, n=90) also failed to show significant benefits for mental health symptoms.

4. Measurement Tools

Across the trials, a variety of validated measurement tools were used, including: Depression/Anxiety: Beck Depression Inventory (BDI), Depression Anxiety Stress Scale-21 (DASS-21), Edinburg Postnatal Depression Scale (EPDS), Positive and Negative Affect Schedule (PANAS), State-Trait Anxiety Inventory (STAI), Treatment Satisfaction Questionnaire (MS-TSQ), Demographic Characteristic Questionnaire Female Sexual Function Index(FSFI), Hamilton Depression Inventory Scores. Quality of Life: Utian Quality of Life Scale, MENQOL, Cervantes Scale, SF-36. Menopausal Symptoms: Greene Climacteric Scale (GCS), Blatt-Kupperman Index, Oxford Happiness Questionnaire, Five-point Likert Scale, Personal Characteristics Questionnaire. The heterogeneity of tools limits direct comparability but confirms consistent improvements across multiple validated scales for certain herbal interventions.

5. Safety and Adverse Effects

Most interventions were well tolerated, with no major adverse effects reported. However, some adverse effects were noted: Lavender and Bitter orange combination: mild side effects such as nausea (4–8%), palpitations (4%), and headache (2–4%). Nigella sativa oil: reported vaginal bleeding, stomachache, breast enlargement, and increased libido. For the majority of other interventions (*Saffron, Rosa damascena, Vitex, Salvia, Melissa officinalis*), no significant adverse effects were reported.

6. Synthesis of Findings

Overall, the evidence suggests that Saffron, *Rosa damascena, Vitex agnus-castus, Ocimum basilicum, Salvia officinalis,* Lavender (oral and inhalation), Chamomile, and certain polyherbal formulations are effective in reducing Depression, Anxiety, and stress in menopausal women. Several other herbs (e.g., *Ginseng, Melissa officinalis, Shatavari*) showed more pronounced effects on Quality of Life rather than specific Mental Health symptoms. Conversely, *Elaeagnus angustifolia* and *Rheum ribes* did not demonstrate significant benefits.

Although these results suggest that herbal medicine may help manage psychological symptoms in menopause, differences in study design, sample size, duration and outcome measures reduce comparability. Larger, longer-term, and methodologically rigorous RCTs are required to strengthen the evidence base and establish standardized clinical recommendations.

The review articles contained details on following plant based interventions during menopause.

1. Black Cohosh (*Actaea racemosa L. / Cimicifuga racemosa L.*)

Black Cohosh, a perennial plant native to eastern North America and a member of Ranunculaceae family [10] has a rhizome used for medicinal purposes. Previous studies report that treatment with an isopropanol extract of Black Cohosh significantly reduces psychological symptoms associated with menopause [10]. Higher doses appear more effective, particularly when combined with St'John's Wort (*Hypericum perforatum*). Reported side effects are minimal and non-hepatotoxic [10].

2. Fenugreek (*Trigonella foenum*)

Fenugreek, a member of the Fabaceae family, is cultivated across the Mediterranean, Northern Africa and the Indian Subcontinent and is used as a herb, spice or in traditional medicine. A recent Randomized, double blind, placebo controlled trial in perimenopausal women reported that 500mg of Fenugreek extract daily for 42 days led to over a 30% reduction in depressive symptoms [10]. While Fenugreek is generally considered safe, individuals taking Anti-Diabetic medications should monitor blood glucose levels closely [10].

3. Hops (*Humulus lupulis L.*)

Hops, native to Central Europe [10], were evaluated in a trial in which participants received 500mg daily in tablet form. Compared with placebo, this intervention led to a statistically significant reduction in menopausal symptoms, including Depression and Anxiety [10]. Depression scores decreased significantly in the Hops groups in week 4, 8, and 12 relative to placebo, with no reported side effects [10].

4. Valerian (*Valeriana officinalis L.*)

Naturally grown in Europe, Western Asia and was introduced to North America [10]. A double blind clinical trial was performed on 48 women aged 45-62 years, who were randomly divided into two groups [10], 29 in the Valerian group and 19 in the placebo group [10], intervention group was treated with 350mg of capsules of Valerian every 12 hrsf for 2 months [10]. Measuring tools such as Demographic Characteristic Scale, Hamilton Anxiety Scale, and BDI were used [10]. The results showed that the Anxiety and Depression scale after the intervention significantly reduced [10]. Also, scientists have studied about the efficacy of Valerian Root indicating the significant reduction in Anxiety and Depression scales after the usage of Valerian root [11].

5. Lemon balm (*Melissa officinalis*)

In a clinical trial carried out with menopausal women, the efficacy of the balm of non-monomeric lemons are used to treat Anxiety [11].

6. Flower of Passion (*Passiflora incarnata*)

The studies have showed the effect of the flower of Passion as tea has given significant reduction in Anxiety Scores in menopause [11].

The consecutive case series study shows the role of phytoestrogen in menopausal women with depressive symptoms. This was a six months follow up which was conducted in a private consultant Endocrinologist's clinic in Trikala, Greece. The phytoestrogen tablets contained 54.4.mg of Soy isoflavines and was administrated to 108 eligible women aged from 45 and above experiencing Depressive symptoms. The BDI was measured at 3 points (t=0, t=3months, t=6months). The results showed a gradual decrease in Depressive symptoms among menopausal women over time.

Discussion

This systematic review highlights the growing body of evidence supporting the role of plant-based interventions in improving mental health outcomes during menopause. A diverse range of herbal preparations including Saffron, *Rosa damascena, Vitex agnus-castus, Ocimum basilicum, Salvia officinalis,* Lavender (oral or inhaled), Chamomile, Ginseng, *Melissa officinalis, Nigella sativa,* and several poly-herbal formulations were found to significantly reduce Depression, Anxiety, and Stress or to improve Quality of Life. Among these, saffron extract demonstrated some of the most consistent and marked improvements in both Anxiety and Depression, with favorable safety outcomes.

Conversely, some interventions such as *Elaeagnus angustifolia* and *Rheum ribes* showed no significant benefits, suggesting that not all botanicals confer psychological relief in menopausal women. Additional promising findings were reported for Black Cohosh, Fenugreek, Hops, Valerian, Passion flower, and Soy isoflavones, which demonstrated improvements in Mood and Anxiety symptoms, often with minimal or no side effects. These complementary findings, although based on a limited number of studies, expand the spectrum of potentially effective plant-derived therapies for menopause-related psychological symptoms.

Proposed Biological and Psychobiological Mechanisms of Herbal Interventions

The beneficial effects of plant-based interventions on menopause related psychological symptoms observed in this review maybe attributed to several biological, psychobiological and endocrinal mechanisms reported in the primary clinical studies.

Several herbs including *Crocus sativus* (Saffron), *Lavandula angustifolia* (Lavender), *Melissa officinalis* (Lemon Balm), *Matricaria chamomilla* (Chamomile), *Passiflora species* (passionflower) and *Valeriana officinalis* (Valerian) have been reported to exert neurotransmitter-modulating effects, particularly through enhancement of Serotonergic and Gamma-Aminobuyric acid (GABAergic) pathways. These mechanisms are closely associated with reduction in Anxiety, Depressive symptoms and Stress and are consistent with their observed clinical benefits in menopausal women.

Phytoestrogen containing plants such as *Vitex agnus-castus, Glycine max* (Soy Isolflavines), *Trigonella foenum-graecum* (Fenugreek), *Humulus lupulus* (Hops) and *Cimicifuga racemosa* (Black Cohosh) are believed to influence estrogen receptor activity or modulate Hypothalamic-Pituitary-Ovarian axis signaling. Such as endocrinal effects may contribute indirectly to improvements in mood,

emotional stability and quality of life during estrogen deficient states such as menopause.

Other botanicals including *Rosa damascena, Ocimum basillicum, Nigella sativa* and *Panax ginseng* have demonstrated anti-inflammatory, antioxidant and adaptogenic properties which may reduce neuro-inflammation, oxidative stress and dysregulation of the Hypothalamic-Pituitary-Adrenal (HPA) axis. These psychobiological effects have been linked to improvements in stress resilience, fatigue and emotional well-being.

In contrast, herbs such as *Elaeagnus angustifolia* and *Rheum ribes* which did not show significant psychological benefits in clinical outcomes, may lack sufficient central nervous system activity or endocrinal modulation relevant to mood regulation as suggested by the limited mechanistic evidence available in the included studies.

Overall, while these mechanisms provide biological plausibility for the observed clinical effects, the majority of evidence is derived from secondary mechanistic explanations reported within clinical trials rather than direct biomarker assessments. Further studies incorporating hormonal, neurochemical and inflammatory biomarkers are warranted to confirm these proposed pathways.

The safety profile of most interventions was generally favorable, with mild and reversible side effects reported in a small number of studies. However, isolated cases such as those involving *Nigella sativa* oil and bitter orange-lavender combinations underscore the importance of safety monitoring and careful patient selection.

Taken together, the findings suggest that plant-based therapies represent a valuable complementary approach for managing psychological symptoms during menopause, particularly for women seeking alternatives to conventional pharmacological treatments such as hormone replacement therapy or antidepressants. Nevertheless, the review also highlights key limitations: heterogeneity in trial design, small sample sizes, short intervention durations, and variability in outcome measurement tools. These factors restrict the comparability of findings and limit the ability to draw firm clinical recommendations.

Future studies should prioritize large scale, long duration, rigorously designed RCT's employing standardized doses, validated outcome measures and comprehensive safety monitoring and also studies should integrate objective biological markers, including hormonal profiles, inflammatory mediators and neurotransmitter related biomarkers to better elucidate the mechanism pathways underlying the psychological benefits of herbal interventions during menopause. Such studies will be essential to establish the efficacy, safety, and clinical applicability of specific herbal interventions.

Conclusion

In conclusion, while evidence indicates that certain plant-based interventions, particularly saffron, *Vitex agnus-castus, Rosa damascena,* lavender, and polyherbal formulations hold promise for alleviating menopausal Depression, Anxiety, and Stress, further confirmatory trials are required. These findings reinforce the potential role of integrative and plant-based medicine in improving the Quality of Life and mental well-being of menopausal women.

Ethical Approval

Ethical approval was not required because the study utilized only data already available in published sources.

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Conflicts of interest

The authors declare no conflicts of interest.

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Data Availability Statement

This study is based exclusively on data obtained from previously published literature. All data analyzed are included in the published articles cited in the references. No original datasets were generated for this study.

Disclaimer

The views and conclusions expressed in this article are solely those of the authors and do not necessarily reflect the official policies or positions of their affiliated institutions.

Statement on the Use of Artificial Intelligence

During the preparation of this work, the authors utilized AI tools such as ChatGPT, version 5 to assist with language editing. The authors reviewed and edited the content as necessary and take full responsibility for the content of the publication.

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All authors contributed equally to this work.

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