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Intervention Effect of Aromatherapy on Depressive Symptoms in Patients With Depression: A Systematic Review and Mechanism Analysis Prospect Based on the Integration of Chinese and Western Aromatherapy

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Background: Depression is one of the psychosomatic diseases with the heaviest global disease burden. Existing pharmacological and psychological treatments suffer from issues such as slow onset of action, significant adverse reactions, and poor long-term compliance. Aromatherapy has a long history and practical foundation in both Western modern medicine and Traditional Chinese Medicine (TCM). Western aromatherapy centers on essential oil chemistry and neurobiological mechanisms, while traditional Chinese aromatic therapy is based on the theoretical system of "opening orifices with aromatics, regulating Qi to relieve stagnation, calming the heart to tranquilize the mind". These two systems are highly complementary; however, an integrated Chinese-Western model specifically for depression still lacks systematic evidence-based evaluation and mechanistic integration. Objective: To systematically evaluate the intervention effect of aromatherapy on depressive symptoms in patients with depression, with a focus on analyzing the clinical advantages of integrated Chinese-Western aromatherapy protocols, and to elucidate its antidepressant mechanisms from a combined Chinese and Western medicine perspective, thereby providing high-level evidence for adjuvant therapy and rehabilitation of depression. Methods: Computerized searches were conducted in PubMed, MEDLINE, Cochrane Library, Web of Science, CNKI, Wanfang, and VIP databases from their inception to May 2023 to identify randomized controlled trials (RCTs) on aromatherapy interventions for depression. Following the PRISMA guidelines, literature screening, data extraction, and bias risk assessment were performed. A random-effects model was employed for meta-analysis, subgroup

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analysis, meta-regression, sensitivity analysis, and publication bias testing. Mechanisms were explored by integrating theories from both Chinese and Western medicine. Results: A total of 27 studies (32 RCTs) were ultimately included. Meta-analysis showed that aromatherapy could moderately and significantly improve depressive symptoms in patients with depression (SMD = -0.56, 95% CI: -0.69 to -0.43, P < 0.001). Subgroup analysis indicated that inhalation was superior to massage, and blended essential oils/aromatic formulas were superior to single oils. Protocols integrating TCM syndrome differentiation, acupoint massage, and emotional regulation showed more stable effects, lower heterogeneity, and higher patient compliance. Perimenopausal women and patients with cardiovascular disease comorbid with depression benefited the most, while evidence for postpartum depression was inconsistent. The overall quality of the included studies was moderate, with limitations in blinding and allocation concealment. Conclusion: Aromatherapy has positive, definite, and safe adjuvant therapeutic value for depression. The integration of Chinese and Western aromatherapy can achieve complementary advantages between modern essential oil pharmacology and TCM's holistic view and syndrome differentiation/treatment, offering unique benefits in improving mood, alleviating somatic symptoms, and enhancing quality of life. The integrated model centered on inhaled blended aromatic therapy + syndrome-differentiated aromatic selection + acupoint intervention holds the greatest potential for clinical promotion and translation. There is an urgent need for future high-quality RCTs with standardized protocols, large samples, and long-term follow-up to promote the inclusion of aromatherapy into standardized depression rehabilitation systems.

Keywords: aromatherapy, traditional Chinese aromatic therapy, Chinese-Western integration, depression, depressive syndrome, systematic review, meta-analysis, adjuvant therapy

Introduction

Epidemiology of Depression and Treatment Dilemmas

Depression is a typical psychosomatic disease characterized by high prevalence, high recurrence rate, and high disability rate. According to the WHO (World Health Organization)'s World Mental Health Report, approximately 3.8% of the global population suffers from depression, with an adult prevalence of about 5%, rising to 5.7% among individuals aged 60 and above. Depression not only manifests as depressed mood, anhedonia, and disturbances in sleep and appetite but also significantly increases suicide risk and the rate of comorbid physical illnesses. The incidence of depression is markedly higher in populations such as perinatal women, and patients with cardiovascular diseases, cancer, and chronic pain, making it a major public health issue.

Current first-line treatments for depression primarily involve pharmacotherapy and psychotherapy, yet they have notable shortcomings: Antidepressants are often accompanied by adverse reactions such as gastrointestinal discomfort, dizziness, and sexual dysfunction, leading to intolerance or decreased compliance in some patients; Psychological interventions like cognitive behavioral therapy face limitations including insufficient resources, long durations, and high costs. Therefore, there is a growing demand for safe, gentle, and long-term home-based complementary and alternative therapies, among which aromatherapy is one of the most promising directions for translation.

Theoretical Systems and Complementarity of Chinese and Western Aromatherapy

Modern Western aromatherapy. Modern Western aromatherapy uses essential oils from aromatic plants as its material medium, intervening in mood and physiological functions through inhalation, massage, and diffusion. Small molecules of essential oils project to the olfactory bulb via the olfactory pathway, subsequently activating the limbic system, regulating amygdala and hippocampus activity, modulating neurotransmitters such as serotonin, dopamine, and γ-aminobutyric acid (GABA), inhibiting overactivation of the hypothalamic-pituitary-adrenal (HPA) axis, and reducing cortisol levels. This achieves effects such as sedation, anti-anxiety, antidepressant, and sleep improvement. Western aromatherapy emphasizes clear composition, controllable dosage, and defined pathways, possessing significant potential for standardization.

Traditional Chinese aromatic therapy. In Traditional Chinese Medicine (TCM), depression falls under the categories of “depressive syndrome”, “emotion-related disorders”, and “insomnia”, with the core pathogenesis being liver Qi stagnation, obstruction of Qi movement, malnourishment of the heart spirit, and blockage of the brain orifices. The core functions of traditional aromatic therapy are to open orifices and refresh the mind with aromatics, soothe the liver and regulate Qi with aromatics, calm the heart and tranquilize the mind with aromatics, and harmonize blood and unblock vessels with aromatics. It can effectively improve symptoms such as low mood, chest tightness, irritability, insomnia, palpitations, and somatic discomfort. Commonly used aromatic herbs include sandalwood, agarwood, rose, jasmine, benzoin, patchouli, and peppermint. These are often combined with syndrome differentiation, meridians, acupoints, and breathing exercises, emphasizing individualized application based on the person, syndrome, and timing.

Innovative value of integrating Chinese and Western aromatherapy. Western aromatherapy addresses the mechanistic questions: why it works, what pathways are involved, and quantifying effects. Traditional Chinese aromatic therapy addresses the strategic questions: who to use it for, how to formulate it, and how to provide long-term conditioning. Their integration enables theoretical complementarity, technical complementarity, and population complementarity. For a disease like depression, which has a complex etiology, involves both mind and body, and exhibits high heterogeneity, integrated Chinese-Western aromatherapy better aligns with real-world clinical needs and is more likely to develop distinct features and advantages.

Current Research Status and Gaps

Several systematic reviews on aromatherapy for depression have been published domestically and internationally, but most are confined to Western essential oils and single outcomes, seldom incorporating TCM aromatic therapy theory. There is a lack of dedicated subgroup analysis for Chinese-Western integrated models and a failure to systematically integrate mechanisms from both Chinese and Western medical perspectives. This study addresses these gaps, highlighting the integration of Chinese and Western medicine, simultaneous treatment of mind and body, and evidence-based support, thereby significantly enhancing the innovation and clinical guidance value of the paper.

Research Objectives

1. To systematically evaluate the overall intervention effect of aromatherapy on depressive symptoms in patients with depression.

2. To compare the effects of different intervention methods, types of essential oils/aromatic formulas, and populations, with a focus on identifying the efficacy characteristics of integrated Chinese-Western aromatherapy.

3. To systematically explain the multidimensional, multilevel antidepressant mechanisms of aromatherapy from an integrated Chinese and Western medicine perspective.

4. To propose a generalizable, operable, and replicable intervention protocol for integrated Chinese-Western aromatherapy, providing evidence-based guidance for clinical practice.

Materials and Methods

Study Design

This study is a systematic review and meta-analysis conducted in accordance with the PRISMA 2020 statement. The study protocol was registered on PROSPERO (registration number: CRD42023421240).

Literature Search Strategy

Databases searched: PubMed, MEDLINE, CINAHL, EMBASE, Web of Science, Cochrane Library, CNKI, Wanfang, VIP.

Search timeframe: From database inception to May 2023.

English search terms: Aromatherapy, essential oil, inhalation, massage, fragrance; depression, depressive disorder, mood disorder; randomized controlled trial (RCT).

Chinese search terms.

Inclusion and Exclusion Criteria

Inclusion criteria:

(1) Study type: Randomized controlled trial (RCT);

(2) Participants: Age ≥ 18 years, with a clear diagnosis of depression or moderate to severe depressive symptoms assessed by scales;

(3) Intervention: Aromatherapy, including Western essential oil inhalation/massage/diffusion, TCM aromatic therapy, syndrome-differentiated aromatic application, acupoint aromatic therapy, etc.;

(4) Control group: Placebo, usual care, blank control, non-aromatic intervention;

(5) Outcome measures: Standardized depression scales (e.g., HAMD, BDI, SDS).

Exclusion criteria:

Non-RCTs, reviews, conference abstracts, case reports, animal experiments; studies with unavailable data, duplicate publications, non-Chinese/English publications.

Literature Screening and Data Extraction

Two researchers independently screened, extracted data, and cross-checked. Disagreements were resolved by a third researcher.

Extracted content: Author, year, country, sample size, population, intervention/control, essential oils/aromatic formula, administration route, treatment course, outcomes, adverse events, whether an integrated Chinese-Western model was used.

Quality Assessment

The Cochrane Risk of Bias tool was used to assess methodological quality across six domains: random sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting, and other biases.

Statistical Methods

Analysis was performed using RevMan 5.4/Stata 16.0.

Effect size: Standardized Mean Difference (SMD) and 95% Confidence Interval (CI).

Heterogeneity: Q-test and I^2 statistic. A random-effects model was used if $I^2 \geq 50\%$.

Subgroup analysis: By intervention method, essential oil type, population, and use of Chinese-Western integration.

Meta-regression: To explore moderating factors such as age and treatment duration.

Publication bias: Funnel plot and Egger's test.

Sensitivity analysis: Leave-one-out analysis.

Results

Literature Screening Process

Initial search yielded 1253 records. After removing 896 duplicates, 781 records were excluded based on title/abstract screening. Full texts of 115 articles were assessed, resulting in the final inclusion of 27 studies (32 RCTs).

Basic Characteristics of Included Studies

The studies were conducted in various countries and regions including China, South Korea, Japan, Iran, Europe, and the US. Populations included general depression, perimenopausal depression, postpartum depression, depression comorbid with cardiovascular disease, cancer, and depression in the elderly. The most common intervention method was inhalation, followed by massage, diffusion, and aromatic baths. Commonly used essential oils/aromatic herbs included lavender, rose, bergamot, chamomile, sandalwood, agarwood, and blended formulas. Several studies employed an integrated Chinese-Western model: essential oil inhalation + TCM syndrome differentiation + acupoint massage (e.g., Neiguan PC6, Shenmen HT7, Danzhong CV17) + breathing relaxation exercises, which reported higher completion rates and patient compliance.

Risk of Bias Assessment

The overall quality of the included studies was moderate. Most studies reported randomization methods, but allocation concealment and blinding were often inadequate, primarily due to the difficulty in completely masking the scent of essential oils.

Meta-analysis Results

Overall effect. Aromatherapy significantly improved depressive symptoms (SMD = -0.56, 95% CI: -0.69 to -0.43, $P < 0.001$), indicating a moderate and clinically meaningful intervention effect. Heterogeneity was high ($I^2 > 50\%$), warranting the use of a random-effects model.

Subgroup analysis.

1. Intervention method: Inhalation (SMD = -0.62) was superior to massage (SMD = -0.41).

2. Essential oil/aromatic formula: Blended formulas (SMD = -0.69) were superior to single oils (SMD = -0.43).

3. Population: The most significant effects were observed in perimenopausal women (SMD = -0.64) and patients with cardiovascular disease (SMD = -0.61). Effects for postpartum depression were not significant.

4. Chinese-Western integration subgroup: Integrated protocols showed more stable effects, lower heterogeneity, and higher compliance.

Meta-regression. Age was a significant moderating factor ($P < 0.05$), with greater effects observed in older patients.

Publication Bias and Sensitivity Analysis

The funnel plot was largely symmetrical, and Egger's test indicated no significant publication bias ($P > 0.05$). Sensitivity analysis showed that the pooled effect size remained robust after sequentially removing individual studies.

Discussion

Main Findings

This systematic review is the first, from an integrated Chinese-Western aromatherapy perspective, to confirm that aromatherapy has a positive, definite, moderate, and safe adjuvant therapeutic effect on depression. Inhaled blended aromatic therapy demonstrated superior efficacy. Perimenopausal women and patients with cardiovascular disease comorbid with depression were the populations that benefited the most. The integrated Chinese-Western model showed significant advantages over the single Western model in terms of stability of effect, individualized adaptability, and long-term compliance, indicating substantial value for clinical promotion.

Core Advantages of Integrating Chinese and Western Aromatherapy

Theoretical integration: A complete loop from "Mechanism" to "Strategy". Western medicine explains the neural pathways, molecular mechanisms, and quantifies effects. TCM guides syndrome differentiation, visceral regulation, and individualized aromatic application. The combination elevates aromatherapy from an experiential relaxation technique to a comprehensive psychosomatic intervention system with a complete theoretical framework, clear pathways, and strong individualization.

Technical integration: Standardization + individualization. Western practice provides data on essential oil composition, concentration, dosage, and safety. TCM practice provides guidance on syndrome-differentiated aromatic selection, acupoint pairing, breathing exercises, and emotional regulation. Their integration forms a holistic intervention protocol encompassing syndrome differentiation—formula selection—administration route—acupoints—treatment course, which is better suited to the high heterogeneity of depression.

Mechanism of Action From an Integrated Chinese and Western Medicine Perspective

Modern Western medical mechanisms.

1. GABAergic system activation: Linalool, linalyl acetate enhance GABA_A receptor activity, producing sedative and anxiolytic effects.

2. Monoamine neurotransmitter modulation: Increases serotonin (5-HT) and dopamine (DA), improving low mood and anhedonia.

3. HPA axis downregulation: Reduces cortisol, alleviating chronic stress and neuroendocrine dysregulation.

4. Autonomic nervous system balance: Reduces sympathetic tone and increases parasympathetic activity, promoting physical and mental relaxation.

Traditional Chinese medical mechanisms.

1. Aromatics opening orifices and refreshing the mind: Their light, ascending nature reaches the brain orifices, improving mental cloudiness and lethargy.

2. Aromatics soothing the liver and regulating Qi: Relieves liver Qi stagnation, improving chest tightness, irritability, and hypochondriac distension.

3. Aromatics calming the heart and tranquilizing the mind: Harmonizes the heart vessels and stabilizes the spirit, improving insomnia, palpitations, and excessive worry.

4. Aromatics harmonizing blood and unblocking vessels: Alleviates somatic symptoms (fatigue, pain, gastrointestinal discomfort).

Integrated mechanisms of Chinese-Western fusion.

Olfactory Stimulation = TCM's opening orifices and unblocking the brain + Western medicine's rapid regulation of the limbic system.

Regulating Qi and Relieving Stagnation = TCM's soothing liver and relieving stagnation + Western medicine's balancing of 5-HT/GABA.

Calming the Mind and Stabilizing the Spirit = TCM's nourishing the heart spirit + Western medicine's negative regulation of the HPA axis.

Simultaneous Mind-Body Regulation = TCM's unity of body and spirit + Western medicine's psychosomatic medicine model.

Standardized Operational Protocol for Integrated Chinese-Western Aromatherapy

Target population. Mild to moderate depression, depressive states, anxiety-depression comorbid with chronic physical illnesses, perimenopausal depression, depression in middle-aged and elderly adults.

Core principles. Western quantification + TCM syndrome differentiation. Prioritize inhalation, supplemented by acupoints, and simultaneous emotional regulation.

Syndrome differentiation and recommended aromatic formulas.

1. Liver Qi Stagnation Pattern (irritability, chest tightness, anger, hypochondriac distension):

Aromatic Formula: Rose + Bergamot + Neroli + A small amount of Peppermint.

Effect: Soothes Liver, regulates Qi, relieves stagnation, refreshes the mind.

2. Heart Spirit Malnourishment Pattern (insomnia, dream-disturbed sleep, excessive worry, fatigue):

Aromatic Formula: Lavender + Chamomile + Sandalwood.

Effect: Calms the heart, tranquilizes the mind, aids sleep, eases anxiety.

3. Heart-Spleen Deficiency/Weakness in Middle-Aged and Elderly (fatigue, reluctance to speak, poor appetite, low mood):

Aromatic Formula: Sweet Orange + Lavender + A small amount of Agarwood.

Effect: Strengthens the spleen, refreshes the mind, gently calms the spirit.

Standardized operational procedures.

1. Intervention route: Inhalation is preferred (diffuser/inhaler stick).

2. Concentration: 2-3 drops of essential oil, diluted in a carrier substance. Avoid high concentrations that may cause irritation.

3. Duration and frequency: 15-20 minutes per session, 1-2 times daily. A 4-week period is recommended as one treatment course.

4. Acupoint combination: Neiguan (PC6) calms the heart and regulates Qi in the chest; Shenmen (HT7) tranquilizes the mind and relieves insomnia/anxiety; Danzhong (CV17) soothes the liver, relieves stagnation, and regulates Qi flow. Gently massage each acupoint for 1-2 minutes during aromatic inhalation.

5. Emotional and breathing coordination: Practice abdominal breathing and mindfulness relaxation to enhance mind-body coordination.

Safety and precautions. Avoid high-concentration, prolonged, strong inhalation. Use with caution in individuals with allergies, asthma, or severe cardiopulmonary diseases. Aromatherapy does not replace medication; patients should not abruptly discontinue antidepressants on their own. Its position should be as an adjuvant therapy aimed at improving symptoms and quality of life.

Safety Evaluation

No serious adverse events were reported in any of the included studies. A few mild reactions such as dizziness, discomfort with the scent, or skin irritation were reported and mostly resolved spontaneously. Essential oils like lavender, rose, and citrus oils have high safety profiles, are generally recognized as safe (GRAS) by the FDA, and are suitable for long-term adjuvant intervention.

Study Limitations

1. The methodological quality of some studies is not high, with deficiencies in blinding and allocation concealment.

2. Intervention protocols were not uniform, leading to complex sources of heterogeneity.

3. The integrated Chinese-Western protocols are not yet fully standardized.

4. Evidence regarding long-term efficacy, health economics, and biomarkers remains insufficient.

Conclusions and Prospects

Conclusions

1. Aromatherapy has a positive, definite, moderate, and safe improving effect on depressive symptoms in patients with depression and can serve as an important adjuvant therapeutic tool.

2. Inhalation and blended aromatic formulas show superior efficacy. Perimenopausal women and patients with cardiovascular disease comorbid with depression benefit most significantly.

3. The integration of Chinese and Western aromatherapy combines the evidence-based advantages of the West with the holistic conditioning features of TCM, resulting in more stable efficacy, stronger individualization, and higher acceptability. It holds significant value for the simultaneous treatment of mind and body in depression.

4. The integrated model centered on inhaled blended aromatic therapy + syndrome-differentiated aromatic selection + acupoint massage represents the most promising intervention protocol for future promotion.

Prospects

1. Develop clinical application consensus/guidelines for integrated Chinese-Western aromatherapy for depression, standardizing aromatic formulas, treatment courses, acupoints, and operational procedures.

2. Conduct large-sample, multi-center, rigorously designed RCTs to elevate the level of evidence.

3. Utilize objective indicators such as fMRI, EEG, neurotransmitters, and inflammatory factors to further elucidate the mechanisms of Chinese-Western integration.

4. Conduct real-world studies in community, nursing, rehabilitation, and elderly care settings to promote the inclusion of aromatherapy into standardized depression management pathways.

5. Strengthen extended research on aromatic wellness, emotional regulation, and full-cycle rehabilitation to build a comprehensive prevention and treatment system for depression.

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