

The effect of aromatherapy applications on postpartum depression and postpartum blues: a meta-analysis*

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ABSTRACT

The study aimed to collect empirical information on the effects of aromatherapy practices on postpartum depression and blues and assess the influence of these practices on postpartum depression and blues. The current study synthesized findings to determine the effect of aromatherapy applications on postpartum depression and postpartum blues using a meta-analytic approach. Studies published between January 1, 2012, and December 1, 2022, in the databases “PubMed,” “Cochrane,” “Scopus,” and “Web of Science” were searched. Keywords were “postpartum depression,” “postpartum blues” and “aromatherapy”. After removing duplicate records, 358 records were reached. After title evaluation, full-text evaluation was performed, and the findings of five articles (n=407 women) that met the inclusion criteria were analyzed. A funnel plot was used to assess the risk of publication bias. This meta-analysis was performed according to preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. This meta-analysis, aromatherapy is effective in reducing the postpartum depression and postpartum blues (Hedge's $g=-0.346$, 95% CI: -0.161 to -0.141 ; $p=0.001$). This meta-analysis, aromatherapy is effective in reducing the postpartum depression and postpartum blues. The articles reported no evidence of any adverse effects of aromatherapy. Aromatherapy can be used as a non-pharmacological therapeutic option for women suffering from postpartum depression and postpartum blues, but further study is needed to improve the level of evidence. However, due to the limited number of included studies, the generalizability of the results should be interpreted with caution.

Keywords: Aromatherapy, postpartum period, postpartum blues, postpartum depression

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INTRODUCTION

In the postpartum period, changes in family roles and care demands cause the mother to experience mental health problems.¹ Postpartum blues, postpartum depression and postpartum psychosis are mental health problems that occur after birth.²

Postpartum blues, one of the postpartum mental disorders, is a process that typically happens between the second and fourth postpartum days and can last from a few hours to two weeks.³ Postpartum blues is a temporary physiological and psychological disease characterized by symptoms such as possible depression, crying, grieving, an unstable mood, insomnia, anxiety, and bewilderment.⁴ The prevalence of

maternal blues was determined to be 39% in a meta-analysis of 26 studies.⁵

Postpartum depression, another mental disorder that can arise after birth, is defined by the DSM-5 as the occurrence of a per-partum severe depressive episode during pregnancy or up to four weeks after birth. Emotional instability, tearfulness, uncontrollable crying, changes in appetite, weight, activity, and sleep level, fatigue, loss of interest in external factors, finding life meaningless, hopelessness, worthlessness, guilt, anger, and feeling overwhelmed, fear of injury, serious concern about the baby, loss of energy and motivation, difficulty focusing, recurrent death, and

suicidal thoughts may occur in the mother.⁵ The prevalence of postpartum depression is reported to be between 15.8% and 51.3% in Türkiye⁶⁻⁹ and 11.5% in the USA. Postpartum depression is thought to affect 20% of women worldwide.¹⁰

Healthy generations are needed for the development of healthy civilizations. Babies of mothers with postpartum depression may have delayed growth, fine motor development and language development.¹¹ Postpartum depression and postpartum blues should be treated due to their harmful impact on both the mother and the baby. Postpartum depression treatment is adapted from major depression treatment, and there is little particular approved treatment for postpartum.¹² Although psychosocial therapy and antidepressant medicines are suggested as first-line treatments, there is minimal evidence for their use during breastfeeding.¹³ Antidepressant medications can enter the body via breast milk and have some harmful effects on the newborn.¹⁴ Aromatherapies, which are non-pharmacological therapy approaches, have recently gained popularity in addition to pharmacological treatments.¹³ Aromatherapy, a therapeutic method, involves the use of essential oils to improve physical or emotional well-being. Essential oils can pass the blood-brain barrier. As a result, they have the potential to affect emotions, mood, blood pressure, heart rate, muscle tension, and body temperature.¹⁵

Essential oils can show therapeutic effects even in small amounts due to their high concentration. In the postpartum period, the concentration of pure essential oil should be 1-2%.¹⁶ The National Association for Holistic Aromatherapy (NAHA) list of evidence-based essential oils that can be used in the postpartum period includes fennel (*Foeniculum vulgare*), jasmine (*Jasminum grandiflorum* and *Jasminum sambac*), lavender (*Lavandula angustifolia*), neroli (*Citrus aurantium var amara*), rose (*Rosa damascena* and *Rosa centifolia*), sweet orange (*Citrus sinensis*), ylang ylang (*Cananga odorata*), and yuzu (*Citrus junos*).¹⁶

Aromatherapy was hypothesized in this study to significantly reduce symptoms of postpartum depression and sadness, given the limited and conflicting evidence on non-pharmacological treatments for postpartum mood disorders. The aim of this meta-analysis was to evaluate whether aromatherapy as a cost-effective and accessible intervention can be considered as a supportive therapy for postpartum women.

METHODS

Focused Question

The focused question addressed was the following: Are aromatherapy applications effective for postpartum depression and postpartum blues?

Protocol and Registration

This review was performed in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement¹⁷ and the updated guideline for reporting systematic reviews¹⁸ and registered at the PROSPERO database (CRD42023416062).

Search Strategy

“PubMed,” “Cochrane,” “Scopus,” and “Web of Science” electronic databases were used for the literature search. The literature search was performed in the English. The MeSH (Medical Subject Heading) index was used to identify keywords and the words “postpartum depression,” “postpartum blues” and “aromatherapy” were searched using the “AND” Boolean operator (Table 1). Research results were combined using the EndNote 20 program, and duplicate articles were identified and deleted. The findings of the studies on aromatherapy for postpartum depression and postpartum blues between January 1, 2012, and December 1, 2022 were examined. The literature review was conducted between April 12, 2023 and May 10, 2023 (Table 1).

Table 1. Search strategies used in PubMed, Scopus, Cochrane, and the Web of Science

Database	Search strategy
PubMed	Postpartum depression AND aromatherapy, postpartum blue AND aromatherapy
Scopus	Postpartum depression AND aromatherapy, postpartum blue AND aromatherapy
Cochrane	Postpartum depression AND aromatherapy, postpartum blue AND aromatherapy
Web of Science	Postpartum depression AND aromatherapy, postpartum blue AND aromatherapy

Study Selection and Eligibility Criteria

Three researchers, who were independent and blind to avoid bias in the selection of articles, conducted the evaluation initially with relevant titles, abstracts, and full texts. The inconsistencies were analyzed by consensus among the reviewers, with the participation of a fourth reviewer when necessary. The final version of the papers considered qualified was shared among the researchers for critical analysis.

Inclusion criteria: Studies investigating the effect of aromatherapy treatments on postpartum depression and postpartum blues, randomized controlled trials or non-randomized controlled experimental studies that directly discuss the results of the studies, and original studies with full text available in English

Exclusion criteria: Letters to the editor, case reports, case series, systematic reviews, meta-analyses, studies not written in English and without full text.

Data Extraction and Risk of Bias Assessment

Three researchers developed a data table prior to the study. The studies' general descriptive information, including authors, year and country of publication, study design, research objectives, participant information, interventions, and outcomes, was provided (Table 2). The methodological quality of the studies was assessed using the Cochrane collaboration tool¹⁹ to assess the risk of bias in randomized controlled trials and assess possible sources of errors that compromise the relevance of trials. The inconsistencies observed during the review of the articles were discussed among the reviewers and a consensus was reached (Table 2).

Meta-Analysis

Studies with sample n, mean, standard deviation or standard error of treatment, control/placebo group before and after

Table 2. Characteristics of included studies

Author, year of the study, and country	Participants, interventions, control, and/or placebo	Study design	Interventions	Scales	Summary of results
Conrad & Adams, 2012, USA	13/13	Non-randomized controlled trial	- Essential oil blend of rose otto and Lavandula angustifolia @ 2% dilution - The treatment consisted of 15-minute sessions twice a week for four weeks. - In addition to the inhalation group or the aromatherapy Hand M 'technique of aromatherapy, all participants received psychological treatment and support.	- Edinburgh Postnatal Depression Scale (EPDS) - Generalized Anxiety Disorder Scale (GAD-7)	- As a result of the intervention, it was determined that there was a decrease in EPDS and GAD-7 scores.
Kianpour et al., 2016, Iran	70/70	Clinical trial	- 3 drops of lavender essential oil were used in each session. - Aromatherapy was applied by inhalation every 8 hours for 4 weeks.	- The Edinburgh stress, anxiety, and depression scale - The depression, anxiety, and stress scale	Stress, anxiety, and depression levels all decreased thanks to the intervention.
Mirghafourvand et al., 2017, Iran	48/-/48	Randomized controlled trial	- Participants were given a glass of water containing orange peel essential oil (10 drops). - It was applied after each meal (1 to 3 times a day) for 8 weeks.	- Edinburgh postnatal depression scale - Spielberger state-trait anxiety inventory (STAI)	- Orange peel essential oil did not affect postpartum depression or anxiety.
Kianpour et al., 2018, Iran	35/35/35	Clinical trial	- 7 drops of lavender essential oil and 1 cc of rose water were dripped onto a cloth. - It was sniffed with 10 deep breaths before going to sleep and then put under the pillows.	- Edinburgh postnatal depression scale (EPDS)	- The mean depression score in the intervention group was significantly reduced compared to the placebo and control groups.
Malahayati & Nainggolan, 2020, Indonesia	20/20	Non-randomized quasi-experimental controlled trial	- 7 drops of lavender essential oil for one group and 7 drops of bergamot essential oil for the other were dripped onto a handkerchief. - It was sniffed with 10 deep breaths before going to sleep and then put under the pillow for 14 days.	- Edinburgh postnatal depression scale (EPDS)	- There was a decrease in EPDS scores after the intervention.

the intervention, same depression and postpartum Blues scale were selected and analyzed. For the meta-analysis the comprehensive meta-analysis (CMA) program was used for the analyses.

Data were analyzed using CMA V3.2.1. For publication bias, funnel plot, Kendall's tau and Egger regression analysis were used. Heterogeneity was analyzed with Q test and I^2 values. Random model results were interpreted due to the heterogeneous structure. Hedge's effect size was used to calculate the effect size. The significance level is $p < 0.05$.

RESULTS

Study Selection and Study Characteristics

As a result of searching the electronic databases, 386 studies were accessed, and 358 studies remained after eliminating 28 duplicate studies. 340 of these studies were not included in the study based on their titles and abstracts. The remaining 18 studies were analyzed in full text, and five studies were included in the analysis (Figure 1).

Methodological Quality/Risk of Bias

The risk of bias analysis of the studies is presented in Figure 2. The risk of bias was generally low in the studies. However, Malahayati and Nainggolan's (2020) study was found to have a high risk of bias. The study by Mirghafourvand et al. (2017) is the one with the lowest bias (Figure 2).

The studies considered to have the highest methodological quality were randomized controlled trials. Random

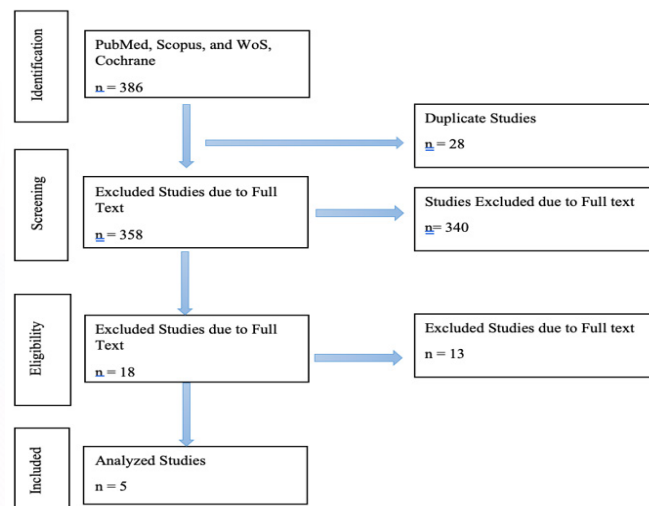


Figure 1. Flowchart of studies that met inclusion/exclusion criteria for qualitative and quantitative analyses (PRISMA)

sequence generation, allocation concealment, and blinding of participants and personnel ($n=3$, 60%). Selective reporting ($n=4$, 80%). Others ($n=5$, 100%) (Figure 3).

Meta-Analysis

Five studies with 407 postpartum women were included in the meta-analysis. In these studies, rose otto, lavandula angustifolia, orange peel, bergamot, and lavender essential oils were used. The aromatherapy application methods varied across the studies. Three studies used inhalation techniques by applying essential oils onto cloth or handkerchiefs, followed by deep breathing and overnight exposure under the pillow.²⁰⁻²² One study used hand massage/ inhalation²³

	Random sequence generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Selective reporting	Anything else, ideally prespecified
Mirghafoury et al., 2017	+	+	+	?	+	+	+
Kianpour et al., 2018	+	+	+	-	+	?	+
Kianpour et al., 2016	?	?	?	?	+	+	+
Conrad & Adams, 2012	+	+	+	-	+	+	+
Malahayati & Nainggolan, 2021	-	-	-	-	+	+	+

+ low risk of bias, - high risk of bias, ? unclear risk of bias

Figure 2. Presentation of risk of bias assessments for studies

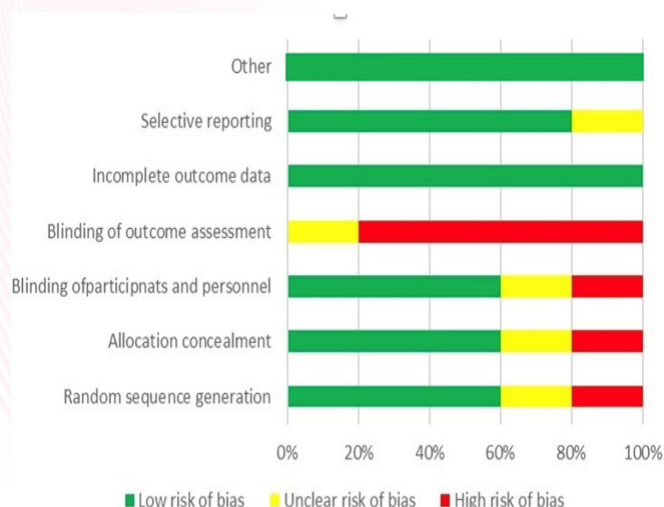


Figure 3. Methodological quality of studies included

and another administered orange peel essential oil diluted in water orally.²⁴ The duration of the interventions ranged from 2 to 8 weeks, with most repeated daily or multiple times per day. The variation in both the application method and duration is likely to influence the observed outcomes.

Aromatherapy was found to be useful in treating postpartum depression, with a statistically significant reduction in postpartum depression and postpartum blues (Hedge's $g = -0.346$, 95% CI: $-0.161, -0.141$; $p = 0.001$). This shows a large impact size by Cohen's norms, and heterogeneity was high ($I^2 = 90.278$)²¹⁻²⁵ (Figure 4). The Begg and Mazumdar test using Kendall's tau with continuity correction found $\tau = 0.400$, $Z = 0.979$ and $p = 0.327$, and Egger's test revealed no significant publication bias ($t = 0.690$ and $p = 0.539$).

A funnel plot was used to examine the risk of publication bias. The symmetric funnel plot shows that the meta-analysis was free of bias. The funnel plot was not completely symmetrical for the analysis; however, publication bias could not be detected due to the small sample size and heterogeneity of the studies. Diagonal lines represent 95% confidence limits. As exact 95% confidence limits are not reported, these are referred to as "pseudo 95% confidence limits (Figure 5).²⁵

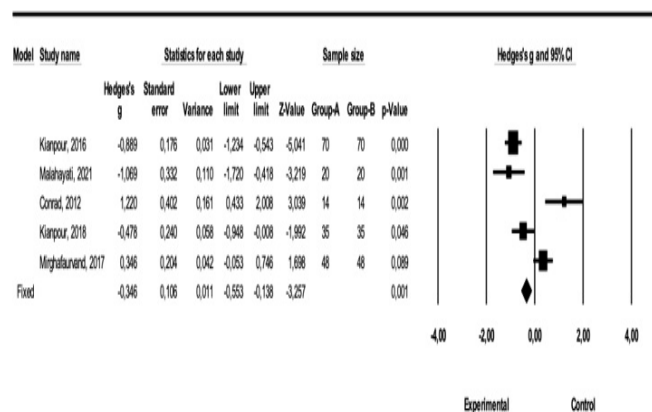


Figure 4. Forest plot for the effect of aromatherapy on postpartum depression and postpartum blues

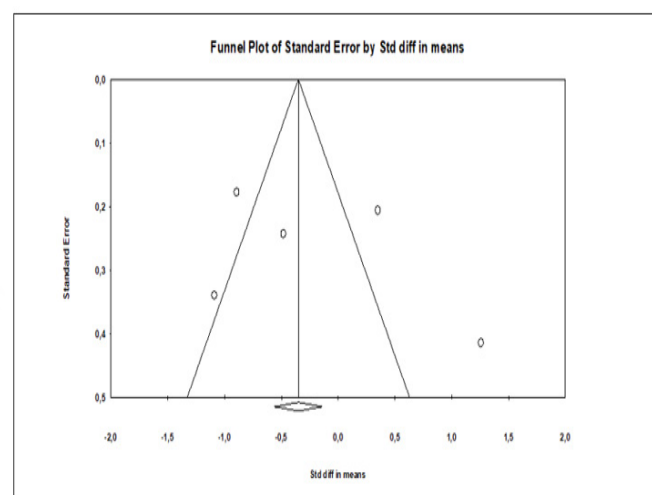


Figure 5. Funnel plot of publication bias

DISCUSSION

During the postnatal period, often known as the postpartum period, women undergo a variety of hormonal, physiological, physical, and social changes.²⁶ Women who are unable to cope with these changes may experience a range of problems, from mild psychiatric symptoms to severe psychiatric problems requiring hospitalization.²⁷ The most common psychiatric disorders observed in women in the postpartum period are maternity blues and postpartum depression. In the literature, it has been reported that the prevalence of maternal sadness ranges from 50 to 80%, while the prevalence of postpartum depression ranges from 5 to 20%.^{4,28,29} Maternity blues and postpartum depression are characterized by crying, anxiety, irritability, stress, decreased concentration, restlessness, and fragility.²⁹ Since it is widely accepted that symptoms of maternal sadness and postpartum depression can improve without treatment, treatment is often inadequate.³⁰ In addition to this perspective, mothers' reluctance to seek pharmacologic treatment due to breastfeeding in the postpartum period, avoidance of psychological support or inability to allocate time for psychological support have led them to search for different treatment options. Evidence shows that aromatherapy can

help with maternal blues and postpartum depression as well as reduce depressive symptoms.^{13,24} Lavender, bergamot, rose, jasmine, ylang-ylang, and sandalwood essential oils are commonly used for depression.³¹ Most of these essential oils have muscle relaxant and sedative properties.³² Lavender, rose, orange peel, and bergamot essential oils were used in the studies on the effect of aromatherapy on maternity blues and postpartum depression. These essential oils have been found to have comparable effects on depression. The sedative effect of lavender essential oil is beneficial in the treatment of depression.¹³ study on the effect of lavender essential oil on stress, anxiety and prevention of postpartum depression in postpartum women concluded that inhaling lavender essential oil for 4 weeks can prevent postpartum depression, anxiety and stress.²¹ Rose has two anti-anxiolytic substances (syringol and 2-phenyl ethyl alcohol), and these compounds, which also have antidepressant effects, induce sedative effect. It is thought that the sedative effect of rose essential oil, similar to lavender essential oil, has beneficial impacts on maternal blues and postpartum depression.^{32,33} Orange peel essential oil is obtained by water distillation of freshly harvested orange tree flowers.³⁴ Citrus essential oil has been reported to improve mood, lower blood pressure and reduce pain by stimulating the central nervous system.³⁵ Thanks to these effects, it is thought to be an option for maternity blues and postpartum depression. Aromatherapy using bergamot essential oil has been reported to be an excellent way to improve both mental health and individual well-being and is even employed in the waiting rooms of mental health centers.³⁶ Lavender and bergamot essential oils are also recommended for relaxation, depression, and sedation.^{37,38} A combination of lavender and bergamot essential oils is argued to be effective in relieving pain, depression, anxiety, and stress.³⁸ Although studies show that all these oils are used in postpartum depression with similar and positive results, more randomized controlled trials are needed.

In this meta-analysis study, data from five studies were evaluated. The heterogeneity among the included studies was notably high ($I^2=90.278$). This may be attributed to variations in the type of essential oils used (e.g., lavender, rose, bergamot), the method of application (e.g., inhalation vs. massage), different intervention durations, and the use of various outcome measurement tools. These discrepancies highlight the need for more standardized protocols in future studies. Although the bias of one of the studies included in the research was quite high, it was shown that the aromatherapy applications used in the studies had effects on postpartum depression and postpartum blues. In a previous systematic review and meta-analysis study that determined the effects of aromatherapy applications used only in postpartum depression, similar results were found with this study.³⁹

An important limitation of this meta-analysis is the small number of studies included, which limits the generalizability and robustness of the results. This may have affected both the statistical power and external validity of the results.

CONCLUSION

Aromatherapy can be applied in different areas of women's health. Despite the insufficient quality of evidence, the use of aromatherapy, which is non-pharmacological and has

minimal side effects, as an adjunct to medical treatment is increasing. One of the studies included in the meta-analysis had a high bias rate. There have also some uncertainties in another study. However, after the analysis, it is determined that aromatherapy treatment is effective in reducing postpartum depression and postpartum blues. It can be used as a non-pharmacological treatment option for women suffering from postpartum depression and postpartum blues, but more randomized controlled trials are needed.

Limitations

Aromatherapy applications has just started to be used in alternative medicine. For this reason, studies are few. According to this meta-analysis study, the number of studies that meet the criteria is low. In addition, some of the information in one of the studies with a high bias rate is unclear. However, it is thought that this research will contribute to healthcare professionals, especially midwives and nurses, in terms of providing evidence. Additionally, this meta-analysis included studies published up to December 2022; therefore, more recent evidence published in 2023 and beyond may have been missed.

ETHICAL DECLARATIONS

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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