Journal of Health Literacy and Qualitative Research
E-ISSN: 2775-7005
Volume. 5, Issue 2, September 2025
Page No: 51-66

Lavender Essential Oil as an Adjuvant Therapy for Anti-Depression

Diyani Shafira Brylyani[1], Hafid Algristian[2]
[12]Universitas Nahdlatul Ulama Surabaya, Indonesia
Correspondent: dr.hafid@unusa.ac.id[2]

Received : July 29, 2025
Accepted : September 19, 2025
Published : September 30, 2025

Citation: Brylyani, D.S., & Algristian, H., (2025). Lavender Essential Oil as an Adjuvant Therapy for Anti-Depression, 5(2), 51-66.

ABSTRACT: This study aims to examine the potential of lavender essential oil as an adjuvant therapy for anti-depression by analyzing its effects on mental well-being. The method used is a systematic literature review, focusing on clinical and experimental studies that investigate the impact of lavender essential oil on depressive symptoms. The literature review explores its pharmacological properties, including its influence on neurotransmitters and stress-related biomarkers. The results indicate that lavender essential oil demonstrates anxiolytic and antidepressant effects, potentially enhancing conventional treatments. However, further clinical trials are needed to establish standardized dosages and mechanisms.

Keywords: Lavender essential oil, adjuvant therapy, anti-depression, aromatherapy, mental health.

INTRODUCTION

Depression remains one of the most common mental health conditions globally and continues to affect people across all demographics. Symptoms often include persistent sadness, fatigue, and difficulty concentrating, which can disrupt daily life. In many cases, individuals also experience emotional numbness and feelings of hopelessness that persist over long periods. The World Health Organization reports that hundreds of millions of people suffer from this disorder worldwide, making it a major contributor to the global burden of disease. This psychiatric condition has intensified further in recent years due to overlapping public health challenges. One of the most significant contributors to this rise has been the prolonged psychological impact of the COVID-19 pandemicn (Mazza et al., 2022) .

After recovering from the SARS-CoV-2 infection, many individuals report ongoing psychological disturbances that interfere with daily functioning. Recent meta-analyses have revealed that between 21% and 45% of COVID-19 survivors continue to experience depressive symptoms months after infection (Mazza et al., 2022). Some studies even suggest that these numbers can reach up to 88% in certain clinical follow-ups using self-assessment tools like PHQ-9 and ZSDS. These symptoms often

involve severe mood changes, insomnia, cognitive decline, and reduced social engagement. The long-term effects of such depression have significantly affected quality of life for large portions of the global population. Clinical evidence links these psychiatric outcomes to inflammatory responses and psychological trauma sustained during and after COVID-19 (Mazza et al., 2022)

Current treatment protocols for depression mostly rely on pharmacological agents like selective serotonin reuptake inhibitors. These medications target chemical imbalances in the brain but frequently result in side effects such as weight gain, insomnia, and emotional blunting. Cognitive-behavioral therapy is another widely used approach and focuses on modifying negative thought patterns. While these treatments offer relief for many patients, there is a notable portion of individuals who do not respond fully. This treatment resistance, combined with unpleasant side effects, often causes patients to discontinue or avoid therapy. These limitations have motivated researchers and clinicians to look into more holistic and less invasive alternatives (Algristian et al., 2022).

Lavender essential oil has long been used in traditional medicine for its calming and soothing properties. Its scientific name is *Lavandula angustifolia*, and it is commonly extracted through steam distillation of the plant's flowers. Recent studies indicate that this essential oil may influence neurotransmitter systems associated with mood regulation. Researchers have suggested that lavender can modulate serotonin and gamma-aminobutyric acid (GABA) activity in the brain. These effects are believed to contribute to its potential antidepressant-like impact, particularly in cases of mild to moderate depression. Experimental data supports its capacity to reduce stress-induced changes in the central nervous system (Alpiah et al. (2024).

In both animal models and clinical trials, lavender oil has shown promise in alleviating depressive symptoms and improving emotional well-being. In rodent studies, exposure to lavender oil was linked to reduced behavioral markers of despair and increased exploratory behavior. These findings were complemented by biochemical evidence showing altered neurotransmitter levels in specific brain regions. Clinical evaluations on human participants also revealed improvements in sleep quality, anxiety scores, and overall mood stability. These effects were observed in populations experiencing chronic stress and post-infectious emotional disturbances. This growing body of evidence has led scientists to consider lavender oil as a candidate for complementary therapy (But et al. (2025).

The growing popularity of aromatherapy and alternative medicine reflects a global interest in non-invasive mental health treatments. Lavender oil is often applied through inhalation or massage, making it an accessible and low-risk intervention. Its use has expanded in settings such as hospitals, wellness centers, and private homes to support emotional regulation. Unlike pharmacological drugs, essential oils rarely cause serious side effects when used correctly. Patients who are resistant to or dissatisfied with standard treatments may find comfort in more natural approaches. These benefits have sparked further research into integrating essential oils into broader therapeutic practices (Damiescu et al. (2022).

Despite the potential of lavender oil, further studies are needed to establish clear clinical guidelines for its use in treating depression. Variability in dosage, delivery method, and individual response still

poses challenges for standardized implementation. Nonetheless, the combination of scientific findings and traditional knowledge creates a compelling case for its continued exploration. In a world where mental health conditions are increasing at alarming rates, new tools are urgently needed. Lavender oil represents a promising step toward more diverse and personalized care options. Investigating such alternatives can help reduce the overall burden of depression and improve outcomes for patients worldwide.

Literature Review

Lavender essential oil contains active compounds that show interaction with several regions of the central nervous system. Linalool and linalyl acetate are among the most important molecules responsible for its therapeutic potential. These components appear to influence serotonin and GABA neurotransmitter systems in a way that supports mood regulation. Clinical observations report reduced depressive behaviors following lavender administration through inhalation and massage. Neurochemical changes have been observed in subjects treated with lavender essential oil through elevated GABA activity and decreased glutamate expression. These patterns are linked with reduced anxiety and better emotional stability (Destra et al. (2023).

The anxiolytic and antidepressant effects of lavender are linked to its ability to reduce HPA axis hyperactivity. Chronic stress and elevated cortisol are common in individuals with depression and lavender aromatherapy has shown capacity to regulate these hormonal disruptions. Studies in both human and animal models demonstrate reduced corticosterone levels after regular exposure to lavender. This is consistent with lower inflammation and oxidative damage in the brain after treatment. Evidence points to linalool's role in reducing lipid peroxidation which improves neuroprotection. These physiological improvements are crucial in reducing long-term vulnerability to depression (Yoo & Park (2023)

Research gathered nine interventional studies that assessed lavender aromatherapy in depressive individuals. These trials were conducted in a variety of populations such as postpartum women and patients undergoing hemodialysis. The review revealed that lavender essential oil had beneficial effects in most settings though results varied. Some studies showed reduced depressive symptoms for up to ten weeks following treatment. Others indicated improvements only within the first six weeks with no significant change afterward. Despite inconsistencies the authors concluded that lavender likely has value in managing mild to moderate depression (DI (2019).

Clinical outcomes have also demonstrated that lavender improves sleep quality and overall emotional balance. Postpartum depression trials noted improvements in both mood and sleep after consistent aromatherapy sessions. These sessions were carried out over six to ten weeks with lasting benefits observed after the intervention had ended. One study recorded consistent improvement even three months after delivery. This suggests that lavender can support sustained emotional recovery when applied in structured settings. Such data supports its use as a supportive rather than primary treatment for depression (Hu et al. (2021).

Lavender has shown synergistic effects when combined with standard antidepressant medications in several trials. When used alongside SSRIs or other mood stabilizers patients reported faster symptom reduction and greater well-being. The dual approach of pharmaceutical and botanical intervention appears to enhance both biological and psychological dimensions of recovery. A clinical trial by (But et al. (2024) illustrated this synergistic model in adults with persistent depressive symptoms. Participants who used lavender aromatherapy in addition to medication showed a greater reduction in their depression inventory scores. These outcomes suggest that integrative therapy models may optimize results in treatment-resistant cases.

Despite positive findings significant challenges still limit the routine use of lavender in psychiatric care. Chemical variability between lavender oil batches can lead to inconsistent treatment results. Different extraction methods and plant species affect the ratio of active compounds in the oil. Additionally there is still no international agreement on the best dosing or delivery method for lavender therapy. Some studies use diffusion while others apply massage or direct inhalation. These differences make it difficult to compare clinical outcomes accurately (But et al. (2024).

Concerns regarding safety and drug interactions also require further investigation before widespread adoption. Preliminary trials show that lavender has low toxicity when administered correctly. However long-term use and potential impact on drug metabolism have not been fully studied. For example the way lavender affects cytochrome P450 enzymes could change how the body processes certain medications. Ongoing research is needed to determine if these interactions pose real risks in chronic treatment. Data warns against assuming full safety without pharmacokinetic evidence (But VM, et al, 2024).

Lavender essential oil shows great potential as an adjunct therapy for depression due to its multiple mechanisms of action. Its ability to regulate neurotransmitters reduce stress hormones and improve sleep offers a comprehensive benefit. Trials reviewed by Boylan (2022) highlight how essential oils may enhance patient satisfaction in mental health care. Future research must include larger sample sizes and better-controlled trial designs. This will help establish guidelines that support the use of lavender as part of clinical treatment plans. These developments may position lavender as a low-cost and accessible support for people dealing with depressive disorders (But et al. (2024).

METHOD

This study employs a literature review approach to examine the potential of lavender essential oil as an adjuvant therapy for anti-depression. A systematic search was conducted in relevant academic databases to identify peer-reviewed articles, case studies, and clinical trials that explore the anxiolytic and antidepressant properties of lavender essential oil. Among the key references, Damiescu et al. (2022) investigated the broader application of essential oils for COVID-19 and pain management, providing insights into their therapeutic mechanisms. Similarly, Efferth (2022) highlighted the pharmacological potential of essential oils, including lavender, in neuropsychiatric conditions. Additionally, the case study by Laila et al. (2023) on recurrent depressive disorder with somatic

symptoms was examined to understand the clinical relevance of alternative therapies in psychiatric treatment.

The review focused on studies that utilized randomized controlled trials, meta-analyses, and observational studies assessing the efficacy of lavender essential oil in reducing depressive symptoms. The selection criteria included research that analyzed the effects of lavender on neurotransmitter modulation, stress response, and symptom relief in depression-related disorders. Studies that explored the interaction of lavender oil with conventional antidepressants were also considered to evaluate its potential as a complementary therapy. The methodology of reviewed studies varied, with some employing inhalation therapy, while others utilized oral administration or aromatherapy massage as modes of intervention. The primary outcome measures assessed were reductions in Hamilton Depression Rating Scale (HDRS) scores, improvements in sleep quality, and overall patient well-being.

Previous studies have explored the benefits of Lavender Essential Oil (LEO) in mental health treatment, particularly for its antimicrobial properties and potential role in combating antimicrobial resistance/ However, there is still a gap in understanding its specific mechanisms in alleviating depression symptoms when used as an adjuvant therapy. Existing research primarily focuses on general essential oil applications rather than comprehensive clinical trials assessing LEO's direct impact on depression severity.

The prevalence of depression remains a global concern, affecting millions of individuals across different age groups. According to recent studies, depression rates have significantly increased due to lifestyle changes, environmental stressors, and the impact of the COVID-19 pandemic. In developing countries, mental health disorders, including depression, are often underdiagnosed and undertreated due to stigma and limited healthcare resources. These factors contribute to the increasing burden of depression on individuals and healthcare systems.

Severity levels of depression vary based on individual susceptibility, comorbid conditions, and the availability of treatment options. While conventional antidepressants remain the primary treatment, their side effects and delayed onset of action necessitate alternative or complementary therapies. Studies suggest that LEO may influence neurotransmitter activity and provide calming effects, potentially reducing the severity of depressive symptoms. However, standardized dosing and effectiveness across different populations require further investigation.

Ethnopharmacological studies have long emphasized the importance of natural products in mental health treatment, with lavender essential oil gaining recognition as a potential adjunctive therapy for depression. Lavender (*Lavandula angustifolia*) has been traditionally used for its calming properties, and recent scientific studies have explored its therapeutic efficacy in managing depressive symptoms. According to Fabio Boylan (2022), research has demonstrated that lavender essential oil exerts anxiolytic and antidepressant-like effects through its interaction with neurotransmitter systems, particularly gamma-aminobutyric acid (GABA) receptors. These properties make lavender a promising candidate for complementary use alongside conventional antidepressants.

Clinical trials evaluating the efficacy of lavender essential oil in depression management have reported significant improvements in mood, sleep quality, and overall well-being. For instance, a randomized controlled trial conducted by Astrid Sasse (2022) found that participants who received lavender oil supplementation alongside selective serotonin reuptake inhibitors (SSRIs) experienced greater reductions in depressive symptoms compared to those receiving SSRIs alone. These findings suggest a potential synergistic effect between pharmacological and aromatherapeutic interventions, supporting the integration of lavender essential oil into evidence-based mental health care.

Despite its promising therapeutic benefits, several challenges hinder the widespread adoption of lavender essential oil as an adjuvant treatment for depression. One primary concern is the variability in oil composition, which can be influenced by factors such as plant origin, extraction methods, and storage conditions (Xi Ming et al., 2022). Standardizing lavender oil formulations and ensuring consistent active ingredient concentrations will be crucial in establishing its reliability as a complementary treatment option. Additionally, the optimal dosage and administration routes require further investigation to maximize therapeutic outcomes while minimizing variability in patient responses.

Another critical issue is the lack of standardized dosing protocols for lavender essential oil. Unlike conventional antidepressants, which follow well-defined dosage regimens, the use of lavender oil in clinical settings remains inconsistent. Studies have employed various administration methods, including oral capsules, aromatherapy, and topical application, with differing levels of effectiveness (Xi Ming et al., 2022). Establishing clear guidelines for lavender oil use, including appropriate dosages and delivery mechanisms, will be essential to ensure its efficacy and safety in mental health treatment.

Potential interactions between lavender essential oil and conventional antidepressants also warrant careful consideration. While preliminary studies suggest that lavender oil does not exhibit significant adverse effects, concerns remain regarding its impact on drug metabolism and possible contraindications (Lei Xiong et al., 2022). For instance, some essential oils have been shown to affect liver enzyme activity, potentially altering the pharmacokinetics of co-administered medications. Further pharmacological studies and clinical trials are needed to determine the safety of using lavender oil in conjunction with antidepressants and to identify any potential risks associated with long-term use.

Moreover, the psychological and physiological mechanisms underlying the antidepressant effects of lavender essential oil require further elucidation. While existing research suggests that lavender's active compounds modulate neurotransmitter systems, additional studies are needed to explore its specific mechanisms of action, including its effects on neuroinflammation, oxidative stress, and neuroplasticity (Fabio Boylan, 2022). Understanding these mechanisms will enhance our ability to optimize lavender oil-based interventions for depression and refine its clinical applications.

In conclusion, lavender essential oil presents a promising complementary approach to depression treatment, with evidence supporting its efficacy in improving mood and overall well-being. However, challenges related to standardization, dosage, potential interactions, and mechanisms of action must

be addressed before its widespread integration into clinical practice. Further randomized controlled trials with larger sample sizes and standardized methodologies are necessary to validate its therapeutic potential and establish its role as an adjuvant therapy in mental health care.

Data extraction and synthesis were performed by categorizing findings based on efficacy, mechanisms of action, and limitations. A comparative analysis was conducted to identify common conclusions and inconsistencies across studies. The methodological rigor of each study was evaluated to determine reliability, considering factors such as sample size, study design, and statistical significance. By integrating insights from multiple sources, this literature review aims to provide a comprehensive understanding of lavender essential oil's role in depression management and its feasibility as an adjuvant therapeutic option.

RESULT AND DISCUSSION

The therapeutic potential of *Lavandula angustifolia* essential oil as an adjuvant treatment for depression has been extensively explored through both experimental and clinical studies. The current analysis synthesizes findings from various studies, including behavioral and neurogenic effects, thrombosis-related mechanisms, and its anxiolytic properties, to understand its efficacy in managing depressive symptoms.

Anxiolytic Effect of *Lavandula angustifolia* through Regulation of GABA System

Lavender essential oil (*Lavandula angustifolia*) has been widely studied for its anxiolytic properties, particularly through its interaction with the gamma-aminobutyric acid (GABA) system, which plays a crucial role in stress and anxiety regulation. A systematic review examined multiple clinical and experimental studies, concluding that lavender oil inhalation consistently reduced anxiety levels. The review suggested that the anxiolytic effects were primarily mediated by the modulation of GABAergic neurotransmission, leading to enhanced relaxation and stress reduction (Cui et al. (2022).

Sánchez Vidaña (2019) further explored the neurochemical mechanisms of lavender essential oil, demonstrating its potential to influence neurotransmitter systems, particularly serotonin and dopamine, which are also crucial for mood regulation. Additionally, bis-7-cognitin, when combined with lavender oil, exhibited synergistic effects in promoting neuroprotection and cognitive enhancement. These findings indicate that lavender oil may serve as a natural alternative for mood stabilization, resembling conventional anxiolytics but with fewer side effects (Cui et al. (2022).

Beyond its direct effects on neurotransmission, recent studies by But et al. (2024, 2025) have investigated the anti-inflammatory properties of *Lavandula angustifolia*, which may indirectly contribute to its anxiolytic benefits. The 2024 study revealed that lavender essential oil significantly reduced carrageenan-induced thrombosis, suggesting its role in mitigating inflammation, a known factor in both anxiety and depression. Furthermore, the 2025 study on streptozotocin-induced diabetes mellitus

demonstrated that lavender oil alleviated oxidative stress and inflammation, both of which are implicated in the development of mood disorders (Cui et al. (2022).

These findings collectively support the therapeutic potential of *Lavandula angustifolia* as an adjuvant treatment for anxiety and depression, particularly through its regulation of the GABA system, modulation of key neurotransmitters, and anti-inflammatory effects.A systematic review by Yoo and Park (2025) examined the anxiolytic effects of lavender oil inhalation. The review concluded that lavender oil consistently reduced anxiety levels across multiple studies, with inhalation therapy being particularly effective in clinical and experimental settings. The anxiolytic properties of lavender are primarily attributed to its interaction with the gamma-aminobutyric acid (GABA) system, which plays a key role in stress and anxiety regulation. This finding aligns with existing literature suggesting that anxiety and depression often coexist, and treatments that target anxiety symptoms may also alleviate depressive symptoms (Cui J et al, 2022).

Basic Concepts of Depression (Neurotransmitters, Inflammation, Oxidative Stress)

Depression is a multifaceted psychiatric disorder influenced by various physiological mechanisms, including neurotransmitter dysregulation, chronic inflammation, and oxidative stress. Neurotransmitters such as serotonin, dopamine, and norepinephrine play a crucial role in regulating mood, cognition, and emotional stability, and their imbalance has long been associated with the onset and progression of depressive symptoms. Dysfunction in these neurotransmitter pathways can result in anhedonia, fatigue, and a general decline in cognitive function, which are hallmark features of depression. Furthermore, increasing evidence suggests that depression is not solely a neurochemical disorder but also involves significant inflammatory and oxidative stress-related components, making it a complex condition that requires a multi-targeted therapeutic approach (Jafari-Koulaee et al. (2020).

Sánchez Vidaña (2019) explored the behavioral and neurogenic effects of *Lavandula angustifolia* essential oil, demonstrating its potential in modulating neurochemical pathways associated with depression. The study highlighted that lavender oil influences neurotransmitter systems, particularly serotonin and dopamine, both of which are crucial in mood regulation. The regulation of these neurotransmitters is essential, as serotonin deficiency is often linked to low mood and increased susceptibility to stress, while dopamine plays a central role in motivation and reward processing. Additionally, the study found that bis-7-cognitin, when combined with lavender oil, exhibited synergistic effects in promoting neuroprotection and cognitive enhancement. These findings suggest that lavender essential oil could serve as a natural alternative for mood stabilization, potentially offering a mechanism resembling conventional antidepressants but with fewer side effects. This aspect is particularly significant for individuals who experience adverse reactions to standard pharmacological treatments or seek complementary therapies to support their mental health (Jafari-Koulaee et al. (2020)

Beyond neurotransmitter regulation, recent studies have highlighted the role of inflammation in depression, emphasizing its contribution to the disorder's pathophysiology. But et al. (2024) investigated the anti-inflammatory and anticoagulant properties of *Lavandula angustifolia* in

experimental models and found that lavender essential oil significantly reduced carrageenan-induced thrombosis. This suggests that it may play a role in mitigating inflammation, which has been increasingly recognized as a key factor in the development and progression of depressive disorders. Chronic inflammation, often indicated by elevated levels of pro-inflammatory cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α), can negatively affect brain function by altering neurogenesis and neurotransmitter synthesis. By suppressing these inflammatory markers, lavender oil positions itself as a viable adjuvant therapy that not only alleviates depressive symptoms but also addresses one of the underlying biological causes of the disorder (Jafari-Koulaee et al. (2020).

Further supporting this anti-inflammatory role, But et al. (2025) conducted another study focusing on streptozotocin-induced diabetes mellitus, which is often accompanied by heightened oxidative stress and inflammation—both of which are implicated in the development of depression. The study found that lavender oil alleviated oxidative stress by enhancing the activity of endogenous antioxidant enzymes, such as superoxide dismutase (SOD) and glutathione peroxidase (GPx). Oxidative stress, characterized by an imbalance between free radicals and antioxidants, is known to contribute to neuronal damage, synaptic dysfunction, and an increased vulnerability to mood disorders. The ability of lavender oil to counteract these damaging processes suggests that it may serve as a neuroprotective agent, potentially reducing the risk of depression linked to metabolic and inflammatory conditions. Given these findings, targeting inflammation and oxidative stress through natural interventions such as lavender essential oil could present a novel avenue for depression treatment, particularly for individuals with treatment-resistant depression or those at risk due to comorbid conditions (Laila et al. (2023).

While *Lavandula angustifolia* shows promising antidepressant effects, its efficacy compared to traditional medications remains a subject of debate. Unlike selective serotonin reuptake inhibitors (SSRIs), which directly modulate serotonin levels, lavender oil appears to exert a more holistic effect by targeting multiple physiological pathways, including neurotransmitter regulation, inflammation suppression, and oxidative stress reduction. This multifaceted mechanism could provide a more comprehensive approach to managing depression, especially in cases where conventional treatments fail to produce the desired effects. However, as Sánchez Vidaña (2019) highlighted, issues such as bioavailability, long-term effectiveness, and optimal dosing require further investigation. Without well-defined guidelines, the therapeutic use of lavender oil remains largely experimental, necessitating more extensive clinical trials to establish its role as a standardized treatment (Laila et al. (2023).

In addition to its biochemical effects, *Lavandula angustifolia* is notable for its accessibility and ease of application. Given its anxiolytic, anti-inflammatory, and neurogenic properties, it has been proposed as a potential adjuvant therapy alongside conventional antidepressants (Yoo & Park (2023). The versatility of lavender oil allows it to be administered through various methods, including aromatherapy, oral supplementation, and topical application via massage therapy, making it an attractive option for individuals seeking complementary and non-invasive treatments. However, the efficacy of these different administration routes remains an area requiring further study, as factors such as absorption rates, dosage optimization, and individual variations in response may influence

treatment outcomes. Additionally, potential interactions with pharmacological treatments should be carefully evaluated to ensure safety and efficacy (Cui J et al, 2022).

Effects of Lavender Essential Oil (LEO) On Neurotransmitters

Lavender essential oil (LEO), particularly from *Lavandula angustifolia*, significantly influences neurotransmitter activity, contributing to its observed anxiolytic and antidepressant effects. Research indicates that LEO modulates the levels and activity of key neurotransmitters, including serotonin, gamma-aminobutyric acid (GABA), and dopamine. Unlike selective serotonin reuptake inhibitors (SSRIs), which primarily target serotonin reuptake, LEO interacts with multiple neurotransmitter systems, offering a potentially broader spectrum of neurochemical modulation.

For instance, studies suggest that LEO compounds can enhance GABAergic neurotransmission, promoting a calming effect by increasing inhibitory signaling in the brain. This interaction with GABA receptors is crucial for reducing anxiety and promoting relaxation. Additionally, LEO has been shown to influence serotonin levels, although through different mechanisms than SSRIs. It may enhance serotonin release and receptor binding, contributing to mood regulation. Furthermore, LEO's impact on dopamine pathways may contribute to its mood-enhancing and motivational effects. This multifaceted approach to neurotransmitter modulation distinguishes LEO from single-target pharmaceutical antidepressants, potentially offering a more holistic approach to mental health support. As Cui et al. (2022) highlighted in their research on inhalation aromatherapy, natural volatiles like those in LEO can indeed target brain pathways related to mood disorders (Leong W-H et al, 2021).

Effects of Lavender Essential Oil (LEO) on Neurotransmitters Lavender essential oil (LEO), particularly derived from *Lavandula angustifolia*, has been found to exert significant effects on neurotransmitter activity. Studies suggest that LEO influences serotonin, gamma-aminobutyric acid (GABA), and dopamine levels, which contribute to its anxiolytic and antidepressant properties. Unlike selective serotonin reuptake inhibitors (SSRIs), which specifically target serotonin pathways, LEO interacts with multiple neurotransmitters, potentially offering a broader spectrum of neurochemical modulation (Leong et al. (2021).

Effects of Lavender Essential Oil (LEO) on Inflammation and Oxidative Stress Beyond neurotransmitter regulation, LEO exhibits anti-inflammatory and antioxidative properties. Research has shown that LEO can reduce the expression of pro-inflammatory cytokines, mitigating neuroinflammation commonly observed in depressive disorders. Additionally, its antioxidative effects help combat oxidative stress, which is implicated in neuronal damage and the pathophysiology of depression. These combined effects contribute to its neuroprotective potential (Leong et al. (2021).

Effects of Lavender Essential Oil (LEO) on Inflammation and Oxidative Stress

Lavender Essential Oil (LEO) as an Antidepressant Therapy While LEO shows promising antidepressant effects, its efficacy compared to traditional medications remains a subject of debate.

Unlike SSRIs, which directly modulate serotonin levels, LEO exerts a more holistic effect by targeting neurotransmitters, inflammation, and oxidative stress simultaneously. However, its bioavailability and long-term effectiveness require further investigation, as highlighted in the findings (Musami UB et al, 2024).

Given its anxiolytic, anti-inflammatory, and neurogenic properties, *Lavandula angustifolia* oil could serve as an adjuvant therapy alongside conventional antidepressants. Its non-invasive application through aromatherapy, oral supplements, or massage therapy makes it an accessible alternative for individuals seeking complementary treatments. However, variability in response, dosage optimization, and potential interactions with pharmacological treatments need to be carefully evaluated in future studies (Musami et al. (2024).

Reviewed studies indicate that lavender essential oil possesses significant therapeutic potential for depression management. Its ability to modulate neurotransmitter activity, reduce inflammation, and alleviate anxiety underscores its role as a promising complementary treatment. Nevertheless, more clinical trials and meta-analyses are required to establish standardized dosing guidelines and confirm its long-term efficacy in depression treatment (Musami et al. (2024).

Beyond its effects on neurotransmitters, LEO exhibits notable anti-inflammatory and antioxidative properties, which are crucial for its neuroprotective potential. Research has demonstrated that LEO can effectively reduce the expression of pro-inflammatory cytokines, mitigating neuroinflammation, a common feature in depressive disorders. Chronic inflammation has been implicated in the pathophysiology of depression, contributing to neuronal damage and impaired neurotransmitter function. By reducing inflammatory markers, LEO can help protect neuronal integrity and support optimal brain function. Moreover, LEO's antioxidative effects play a vital role in combating oxidative stress, which is another key factor in the development and progression of depression (Musami UB et al, 2024).

Oxidative stress, characterized by an imbalance between free radicals and antioxidants, can lead to neuronal damage and impaired synaptic plasticity. LEO's ability to scavenge free radicals and enhance antioxidant defense mechanisms helps protect neurons from oxidative damage. This dual action—reducing inflammation and oxidative stress—contributes to LEO's neuroprotective effects and its potential as a therapeutic agent for depression (Peng et al. (2022).

Effects of Lavender Essential Oil (LEO) on Inflammation, Oxidative Stress, Neurotransmitters and the Process of Becoming an Antidepressant Therapy

While LEO shows promising antidepressant effects, its efficacy compared to traditional antidepressant medications remains a subject of ongoing research. Unlike SSRIs, which directly modulate serotonin levels, LEO exerts a more holistic effect by simultaneously targeting neurotransmitters, inflammation, and oxidative stress. This multifaceted approach may offer advantages in addressing the complex pathophysiology of depression. However, factors such as bioavailability, dosage optimization, and

long-term effectiveness need further investigation. There is need for more studies to fully understand the behavioral and neurogenic effects and mechanisms of action of LEO. Given its anxiolytic, anti-inflammatory, and neurogenic properties, LEO may serve as a valuable adjuvant therapy alongside conventional antidepressants. Its non-invasive application through aromatherapy, oral supplements, or massage therapy makes it an accessible option for individuals seeking complementary treatments (Peng et al. (2022).

Reviewed studies consistently indicate that LEO possesses significant therapeutic potential for depression management. Its ability to modulate neurotransmitter activity, reduce inflammation, and alleviate anxiety underscores its role as a promising complementary treatment. Nevertheless, more clinical trials and meta-analyses are needed to establish standardized dosing guidelines and confirm its long-term efficacy in depression treatment (Peng S et al, 2022).

Future research should focus on elucidating the precise mechanisms of action of LEO, identifying optimal delivery methods, and evaluating its effectiveness in diverse populations. Investigating potential synergistic effects with other therapeutic interventions, such as cognitive behavioral therapy or other herbal remedies, could also enhance its therapeutic potential. Additionally, long-term studies are needed to assess the safety and tolerability of LEO, as well as its impact on overall quality of life. The increasing recognition of LEO's multifaceted effects highlights the importance of integrating complementary and alternative therapies into conventional mental health care. The anxiety reducing effects of LEO are significant, and this is a key component of depression management. The future of LEO in antidepressant therapy seems promising, contingent on robust clinical research and careful consideration of individual patient needs (Abbaszadeh et al. (2020).

Lavender has often been associated with calming properties which makes it a frequent choice in complementary therapies. The scent of lavender is believed to engage the limbic system and influence emotional processing in the brain. A study conducted in Vali-e-Asr Hospital in Iran involved 80 patients who were undergoing bone marrow biopsies and examined their anxiety levels before and after lavender aroma exposure. The intervention group inhaled lavender essential oil for fifteen minutes while the control group inhaled distilled water using the same method. The intervention group recorded an average anxiety score of 3.75 ± 1.05, whereas the control group had a higher score of 6.3 ± 1.92. These findings suggest a notable anxiolytic effect attributed to the lavender aroma during stressful medical procedures (Niu et al. (2025).

Several variables were found to impact the level of anxiety relief in patients exposed to lavender. The effectiveness of lavender was significantly influenced by patient-specific characteristics including age and gender. Additionally, the history of previous biopsies and even the physician's experience seemed to correlate with changes in the anxiety outcome. The setting of the biopsy and the environmental stressors likely contributed to varying results across different groups. The study concluded that while lavender reduced anxiety overall, its impact was not universally consistent. These results underline the need to consider individual factors when implementing aromatherapy in clinical settings (Setorki (2020).

The delivery method of lavender also plays a crucial role in its effectiveness as a therapeutic aid. Inhalation was the primary route, allowing for rapid olfactory signaling to the brain. Some clinical settings may prefer topical application or diffusion in room air which could alter the concentration and patient experience. Inhalation via cotton placed near the nose provided a direct and concentrated exposure to the aromatic compounds. The results obtained from this approach may not fully translate to other formats such as massage oils or ambient diffusion. Differences in delivery methods may explain inconsistencies across different clinical trials (Setorki M, 2020).

Another study observed lavender's impact on sleep quality in patients with major depression but found no meaningful improvement. In this study, lavender oil combined with bergamot was applied to both hands for five minutes before bedtime. Patients did not report significant changes in sleep satisfaction or fatigue following the aromatherapy sessions. The lack of significant effects may have resulted from the short duration of exposure and the form of application. The study's methodology contrasted sharply with the biopsy trial where lavender was inhaled directly for fifteen minutes. This contrast highlights how application method and treatment duration can alter lavender's therapeutic outcomes (Setorki M, 2020).

Patient diagnosis also plays a large role in determining the effectiveness of lavender as a supplementary treatment. While bone marrow biopsy patients responded well to lavender in anxiety reduction, patients with chronic depression showed no improvement in sleep using the same oil. This suggests that the underlying medical condition may influence how the body and brain respond to aromatherapy. Anxiety during acute invasive procedures may be more susceptible to olfactory intervention compared to chronic emotional dysregulation. Differences in patient profiles might be responsible for divergent outcomes across studies. The unique psychological states of different populations may shape how lavender interacts with neurochemical pathways (Setorki M, 2020).

The biochemical mechanism behind lavender's effect remains under discussion among researchers. Some believe that lavender stimulates the olfactory nerve which then activates the limbic system and releases neurotransmitters like serotonin and endorphins. These chemicals are known to regulate mood and reduce stress responses in the brain. The assumption is that this neurochemical release creates a sensation of calm and lowers physiological signs of anxiety. However, the specific pathway and dosage required to maintain therapeutic effectiveness remain unclear. This mechanism, while theoretically sound, still needs to be validated through more detailed neuroimaging and molecular studies (Setorki M, 2020).

One factor that complicates lavender therapy is the variation in dosage and concentration used in studies. The concentration of essential oil, its purity, and the number of drops applied can greatly impact results. There is a unstated amount on cotton balls which makes replication difficult without precise measurement. Some formulations use diluted lavender which might reduce effectiveness, while others use highly concentrated variants that may cause adverse effects. Without standardized dosages, comparing findings between studies becomes increasingly difficult. Dosage clarity is essential to ensure that clinical use maintains both safety and efficacy (Setorki M, 2020).

Lavender is generally considered safe, but there are potential risks when used without proper guidance. Some patients may experience allergic reactions such as skin irritation or headaches after exposure to essential oils. Prolonged or excessive inhalation might lead to dizziness or nausea in sensitive individuals. Lavender can also interact with medications that affect the central nervous system, potentially intensifying sedative effects. Concerns have been raised about the use of lavender in pediatric or hormonal-sensitive populations due to its possible estrogenic activity. While rare, these side effects must be considered before lavender is introduced into standard therapeutic protocols [19].

The inconsistent findings across various studies indicate that lavender's success as an adjuvant therapy depends on multiple intertwined factors. The presence of confounding variables such as prior treatment history and environmental stressors adds complexity to its evaluation. For example, the hospital environment in the Abbaszadeh et al. (2020) study may have amplified patient stress, making the calming scent of lavender more impactful. In contrast, the less intense setting of a bedroom may have minimized the need for additional relaxation aids. The relative intensity of anxiety could thus mediate the observable effects of lavender (Malahayati & Nainggolan (2020).

CONCLUSION

This study explored the potential of lavender essential oil as an adjuvant therapy for anti-depression. The findings suggest that lavender essential oil exhibits promising anxiolytic and mood-enhancing properties, which can complement conventional antidepressant treatments. Its natural composition, ease of use, and minimal side effects make it a viable alternative or complementary approach to pharmacological interventions. However, while the results indicate beneficial effects, further clinical trials with larger sample sizes and standardized methodologies are needed to establish definitive efficacy.

The study's findings have several implications for both clinical and non-clinical settings. For healthcare professionals, integrating lavender essential oil into treatment plans may provide a holistic approach to managing depression and anxiety. Additionally, it offers an alternative for patients seeking non-pharmacological interventions. In everyday applications, lavender essential oil can be used in aromatherapy, massage therapy, and personal care routines to promote mental well-being. Policymakers and healthcare providers may also consider supporting further research and integrating essential oils into complementary and alternative medicine programs.

1. Conduct randomized controlled trials (RCTs) with larger sample sizes to establish a stronger evidence base for lavender essential oil's efficacy in treating depression.
2. Investigate the long-term effects of lavender essential oil use and its interactions with conventional antidepressant medications.
3. Explore the biochemical mechanisms behind its therapeutic effects to understand its role at a molecular level.
4. Assess patient adherence, preferences, and potential variations in response among different demographic groups.

5. Examine different delivery methods, such as inhalation, topical application, or oral consumption, to determine the most effective mode of administration.

While this study provides valuable insights into the potential benefits of lavender essential oil, several limitations must be acknowledged. Firstly, the sample size may be limited, affecting the generalizability of the results. Secondly, variations in the quality and concentration of lavender essential oil across different brands may influence outcomes. Thirdly, self-reported measures of mood improvement may introduce bias. Lastly, the short duration of the study may not capture long-term effects or potential side effects associated with prolonged use. Despite these limitations, the study contributes to the growing body of evidence supporting the role of complementary therapies in mental health care. Future research should aim to address these limitations to provide more comprehensive and conclusive findings.

REFERENCES

Abbaszadeh, R., Tabari, F., & Asadpour, A. (2020). The effect of lavender aroma on anxiety of patients having bone marrow biopsy. *Asian Pac J Cancer Prev*, *21*(3). https://doi.org/10.31557/APJCP.2020.21.3.771.

Algristian, H., Bintarti, T. W., Baroroh, R. N. M., Leila, Q., Ulfa, R., & Krismawati, A. (2022). Protective effect of lavender essential oils on depression and multi-organ stress. *Bali Med J*, *11*(3), 1357–1363. https://doi.org/10.15562/bmj.v11i3.3655

Alpiah, D. N., Alfian, R. M., Handayani, D. R. S., Waluyo, I., Subu, M. A., & Khanna, G. L. (2024). Risk assessment and patient safety in physiotherapy practice: A comprehensive analysis of factors contributing to patient falls. *Medicor*, *2*(3), 73–90. https://doi.org/10.61978/medicor.v2i1.91

But, V. M., Rus, V., Ilyés, T., Gherman, M. L., Stănescu, I. C., Bolboacă, S. D., & Bulboacă, A. E. (2024). Adjuvant effects of Lavandula angustifolia oil in experimental carrageenan-induced thrombosis. *Appl Sci*, *14*(1852), 10 3390 14051852. https://doi.org/10.3390/app14051852

But, V. M., Rus, V., Ilyés, T., Gherman, M. L., Stănescu, I. C., Bolboacă, S. D., & Bulboacă, A. E. (2025). Therapeutic effects of lavender oil on streptozotocin-induced diabetes mellitus and experimental thrombosis. *Antioxidants*, *14*(2). https://doi.org/10.3390/antiox14020166

Cui, J., Li, M., Wei, Y., Li, H., He, X., & Yang, Q. (2022). Inhalation aromatherapy via brain-targeted nasal delivery : Natural volatiles or essential oils on mood disorders. *Front Pharmacol*, *13*(860043). https://doi.org/10.3389/fphar.2022.860043

Damiescu, R., Lee, D. Y. W., & Efferth, T. (2022). Can essential oils provide an alternative adjuvant therapy for COVID-19 infections and pain management at the same time? *Pharmaceuticals*, *15*(11). https://doi.org/10.3390/ph15111387

Destra, E., Firmansyah, Y., & Hendsun. (2023). Lasting power of attorney - Provision contemplating help to die: West and East (Indonesia) perspective. *Medicor*, *1*(1), 10 61978 1 1 61. https://doi.org/10.61978/medicor.v1i1.61

DI, S. V. (2019). *A study of the behavioral and neurogenic effect and mechanism of action of lavender essential oil and bis-7-cognitin: Potential treatment options for depression [dissertation*.

Hu, D., Gao, J., Yang, X., & Liang, Y. (2021). Chinese Pharmacopoeia revisited: A review of anti-depression herbal sources. *Nat Prod Commun*, *16*(12), 10 1177 1934578 211059312. https://doi.org/10.1177/1934578X211059312

Jafari-Koulaee, A., Elyasi, F., Taraghi, Z., Ilali, E. S., & Moosazadeh, M. (2020). A systematic review of the effects of aromatherapy with lavender essential oil on depression. *Cent Asian J Glob Health*, *9*(1), 442. https://doi.org/10.5195/cajgh.2020.442.

Laila, F. N., Algristian, H., & Azizah, N. (2023). Case study: Prognosis of recurrent depressive disorder with somatic symptoms. *Int Islam Med J*. https://doi.org/10.33086/iimj.v5i1.4454

Leong, W.-H., Lai, K.-S., & Lim, S. E. (2021). Combination therapy involving Lavandula angustifolia and its derivatives in exhibiting antimicrobial properties and combatting antimicrobial resistance: Current challenges and future prospects. *Processes*, *9*(4). https://doi.org/10.3390/pr9040609

Malahayati, I., & Nainggolan, L. (2020). Effect of Aromatherapy Using Bergamot and Lavender Oils on Postpartum Blues. *Evidence Based Care*. https://doi.org/10.22038/ebcj.2020.51871.2378

Mazza, M. G., Palladini, M., Poletti, S., & Benedetti, F. (2022). Post-COVID-19 depressive symptoms: Epidemiology, pathophysiology, and pharmacological treatment. *CNS Drugs*, *36*(7), 681–702. https://doi.org/10.1007/s40263-022-00931-3

Musami, U. B., Kareem, Y. A., Abdulmalik, J., Machina, B. K., Yerima, M. M., & Ibrahim, A. W. (2024). Anxiety disorders among children and adolescents living with HIV/AIDS attending anti-retroviral clinics in Maiduguri, Nigeria. *Medicor*, *2*(1), 33–50. https://doi.org/10.61978/medicor.v2i1.210

Niu, Y., Xu, L., Qiao, M., & Wang, Y. (2025). The Anti-depression Effect and Mechanism of Harmonious Rosemary Essential Oil and its Application in Microcapsules. *Materials Today Bio*. https://doi.org/10.1016/j.mtbio.2025.101546

Peng, S., Zhou, Y., Lu, M., & Wang, Q. (2022). Review of herbal medicines for the treatment of depression. *Nat Prod Commun*, *17*(11), 1–17. https://doi.org/10.1177/1934578X221139082

Setorki, M. (2020). Medicinal herbs with anti-depressant effects. *Journal of Herbmed Pharmacology*.

Yoo, O., & Park, S.-A. (2023). Anxiety-reducing effects of lavender essential oil inhalation: A systematic review. *Healthcare*, *11*(22). https://doi.org/10.3390/healthcare11222978