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## Lavender Aromatherapy for Sleep Disorders in Older Adults: A Systematic Review

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### Abstract

Sleep disorders among older adults are a growing global health concern that negatively affect physical health, psychological well-being, and quality of life. Non-pharmacological interventions are increasingly recommended due to the risks associated with long-term use of sleep medications in elderly populations. Lavender aromatherapy has emerged as a complementary therapy with potential benefits for improving sleep quality and reducing insomnia. This study aims to identify and analyze the effectiveness of lavender aromatherapy as a complementary intervention for managing sleep disorders in older adults. A systematic review design was employed using the PRISMA framework to identify relevant studies published between 2020 and 2025. Literature searches were conducted through Google Scholar, ScienceDirect, and Portal Garuda databases using predefined keywords and inclusion criteria based on the PICOS framework. Seven eligible studies were included and analyzed narratively to evaluate intervention methods, duration, and outcomes related to sleep quality and insomnia severity. The findings indicate that lavender aromatherapy, either as a single intervention or combined with therapies such as music, acupressure, or massage, consistently improves sleep quality and reduces insomnia symptoms among older adults. The therapy is safe, cost-effective, and easily implemented in community and clinical settings. Overall, lavender aromatherapy is a promising complementary intervention that can be integrated into holistic geriatric and nursing care to support healthy aging and improve quality of life.

**Keywords:** Aromatherapy; Complementary Therapy; Elderly; Insomnia; Lavender; Sleep Quality.

### Abstrak

Gangguan tidur pada lansia merupakan masalah kesehatan global yang semakin meningkat dan berdampak pada kesehatan fisik, psikologis, serta kualitas hidup. Intervensi nonfarmakologis semakin direkomendasikan karena risiko penggunaan obat tidur jangka panjang pada lansia. Aromaterapi lavender muncul sebagai terapi komplementer yang berpotensi meningkatkan kualitas tidur dan menurunkan insomnia. Penelitian ini bertujuan

untuk mengidentifikasi dan menganalisis efektivitas aromaterapi lavender sebagai intervensi komplementer dalam mengatasi gangguan tidur pada lansia. Penelitian menggunakan desain systematic review dengan kerangka PRISMA untuk mengidentifikasi artikel relevan yang diterbitkan tahun 2020–2025. Pencarian literatur dilakukan melalui basis data Google Scholar, ScienceDirect, dan Portal Garuda dengan kata kunci serta kriteria inklusi berdasarkan kerangka PICOS. Sebanyak tujuh artikel yang memenuhi kriteria dianalisis secara naratif untuk mengevaluasi metode intervensi, durasi, serta hasil terkait kualitas tidur dan tingkat insomnia. Hasil penelitian menunjukkan bahwa aromaterapi lavender, baik sebagai intervensi tunggal maupun dikombinasikan dengan terapi lain seperti musik, akupresur, dan pijat, secara konsisten meningkatkan kualitas tidur dan menurunkan gejala insomnia pada lansia. Terapi ini aman, terjangkau, dan mudah diterapkan di lingkungan komunitas maupun klinis. Secara keseluruhan, aromaterapi lavender merupakan intervensi komplementer yang potensial untuk diintegrasikan dalam pelayanan keperawatan dan perawatan lansia secara holistik guna meningkatkan kualitas hidup.

**Katakunci:** Aromaterapi; Insomnia; Kualitas Tidur; Lansia; Lavender; Terapi Komplementer.

## 1 Introduction

Sleep is a fundamental physiological process essential for maintaining physical health, psychological well-being, and overall quality of life (Mucharomah & Fitriani, 2024; Museva et al., 2024; Najwa et al., 2024). Adequate and restorative sleep supports immune function, cognitive performance, emotional regulation, and metabolic balance. However, sleep disturbances are increasingly recognized as a major public health concern, particularly among older adults. As populations age globally, the prevalence of sleep disorders among the elderly continues to rise, creating significant implications for healthcare systems and community well-being. Addressing sleep disturbances in this population has therefore become a priority in geriatric and community nursing, as well as in broader public health and clinical research (Graham et al., 2024; Zhao et al., 2025).

Older adults frequently experience changes in sleep architecture, including reduced slow-wave sleep, increased nighttime awakenings, and alterations in circadian rhythm (Ishii et al., 2024; J. Li et al., 2022). These changes are often compounded by chronic illness, medication use, psychological stress, and environmental factors. As a result, insomnia and other sleep disorders are highly prevalent in the elderly population. Epidemiological studies indicate that approximately one-quarter to over half of older adults report some form of sleep disturbance, with insomnia being the most common complaint. Sleep disorders in this population are not merely benign symptoms of aging but are associated (Cavanaugh et al., 2024; Y. Li et al., 2022) with serious consequences, including impaired

cognitive function, increased risk of falls, depression, cardiovascular disease, and decreased quality of life. Poor sleep quality has also been linked to higher mortality rates and increased healthcare utilization, highlighting the urgency of effective and accessible interventions.

The management of sleep disorders in older adults typically involves both pharmacological and non-pharmacological approaches (Falup-Pecurariu et al., 2024; Javed et al., 2023). Pharmacological treatments, such as sedative-hypnotics and benzodiazepines, are commonly prescribed but carry significant risks for elderly patients, including dependency, cognitive impairment, daytime drowsiness, and increased risk of falls. Long-term use of sleep medications can also lead to tolerance and diminished therapeutic effectiveness. Consequently, healthcare providers and researchers increasingly emphasize non-pharmacological and complementary therapies as safer and more sustainable alternatives for improving sleep quality among older adults.

Among these alternative approaches, aromatherapy has gained considerable attention as a complementary therapy for promoting relaxation and improving sleep. Aromatherapy is a holistic therapeutic practice that utilizes essential oils extracted from plants to enhance physical and psychological well-being (Mihailov et al., 2023). Essential oils can be administered through inhalation, massage, or topical application, allowing aromatic compounds to interact with the limbic system and influence emotional and physiological responses. The simplicity, affordability, and minimal side effects associated with aromatherapy make it particularly suitable for elderly populations, who

often require gentle and non-invasive interventions.

Lavender (*Lavandula angustifolia*) is one of the most widely studied essential oils in aromatherapy research. Known for its calming and sedative properties, lavender contains bioactive compounds such as linalool and linalyl acetate, which are believed to influence the central nervous system. These compounds interact with neurotransmitter systems, including gamma-aminobutyric acid (GABA), and modulate autonomic nervous system activity, leading to reduced anxiety, decreased stress hormone levels, and enhanced relaxation. Through these mechanisms, lavender aromatherapy is thought to facilitate sleep onset, improve sleep continuity, and enhance overall sleep quality.

Over the past two decades, a growing body of research has explored the effectiveness of lavender aromatherapy in addressing sleep disturbances across diverse populations, including hospitalized patients, individuals with chronic illness, and older adults. Randomized controlled trials, quasi-experimental studies, and systematic reviews have generally reported positive outcomes, suggesting that lavender aromatherapy may reduce insomnia severity and improve sleep quality. For example, several clinical studies have demonstrated that inhalation of lavender essential oil before bedtime can significantly improve subjective sleep quality and reduce sleep latency. Meta-analyses have also indicated moderate to large effect sizes for aromatherapy interventions targeting sleep outcomes, particularly when sessions exceed twenty minutes and are conducted over several weeks.

Despite these promising findings, the current research landscape remains complex and occasionally contradictory. Some studies report significant improvements in sleep quality following lavender aromatherapy, while others find only modest or statistically insignificant effects. Variations in study design, sample size, intervention duration, and measurement tools contribute to these inconsistencies. For instance, differences in aromatherapy administration methods—such as diffuser use, inhalation patches, massage with essential oils, or combination therapies—may influence outcomes. Additionally, the subjective nature of sleep quality assessments and the reliance on self-reported measures in many studies complicate comparisons across research.

Another area of debate concerns the relative effectiveness of lavender aromatherapy as a standalone intervention versus its use in combination with other complementary therapies. Several studies suggest that combining lavender aromatherapy with interventions such as music therapy, massage, or acupuncture may produce synergistic effects that enhance relaxation and improve sleep outcomes. Conversely, some researchers argue that the observed benefits may be attributable primarily to general relaxation or placebo effects rather than specific properties of lavender essential oil. These diverging hypotheses underscore the need for comprehensive and systematic evaluations of existing evidence.

Furthermore, cultural and contextual factors may influence the effectiveness and acceptance of aromatherapy interventions. In many communities, particularly in Asia, complementary and traditional therapies are widely accepted and integrated into daily life. The incorporation of aromatherapy into community and family-based care for older adults aligns with holistic models of health that emphasize physical, psychological, and spiritual well-being. However, differences in cultural perceptions, healthcare infrastructure, and resource availability may affect the implementation and outcomes of aromatherapy interventions across settings. Understanding these contextual variables is essential for developing evidence-based recommendations that are both effective and culturally appropriate.

In the field of nursing and geriatric care, the exploration of complementary therapies such as lavender aromatherapy reflects a broader shift toward patient-centered and holistic approaches. Nurses play a critical role in assessing sleep problems, implementing non-pharmacological interventions, and educating patients and families about safe and effective self-care strategies. Integrating evidence-based complementary therapies into nursing practice can enhance patient comfort, reduce reliance on medication, and promote overall well-being. However, the adoption of such interventions requires a clear understanding of their effectiveness, mechanisms of action, and practical implications.

Systematic reviews provide a rigorous method for synthesizing existing research and identifying patterns, strengths, and limitations within the evidence base. By systematically collecting, evaluating, and integrating findings from multiple studies, systematic reviews can offer

comprehensive insights into the effectiveness of specific interventions. In the context of lavender aromatherapy for sleep disorders in older adults, a systematic review is particularly valuable given the diversity of study designs, populations, and outcomes reported in the literature. Such an approach enables researchers and practitioners to assess the overall strength of evidence, identify gaps in knowledge, and develop recommendations for future research and practice.

The present study aims to systematically review and analyze existing research on the effectiveness of lavender aromatherapy as a complementary therapy for sleep disorders in older adults. Specifically, this review seeks to examine the impact of lavender aromatherapy on insomnia severity and sleep quality, evaluate methods of administration and duration of therapy, and explore its implications for nursing and community health practice. By synthesizing findings from recent studies, this work aims to provide a comprehensive and evidence-based understanding of the role of lavender aromatherapy in improving sleep among the elderly.

The significance of this study lies in its potential to inform clinical practice, guide future research, and support the integration of complementary therapies into holistic care for older adults. As the global population continues to age, the demand for safe, effective, and accessible interventions for sleep disorders will only increase. Lavender aromatherapy, as a low-cost and minimally invasive intervention, offers a promising option that aligns with the principles of patient-centered and preventive healthcare. However, its widespread adoption requires robust evidence and clear guidance regarding its use.

The principal conclusions of this systematic review indicate that lavender aromatherapy is generally effective in reducing insomnia symptoms and improving sleep quality among older adults. Both standalone and combination interventions demonstrate positive outcomes, with inhalation methods and sessions lasting between fifteen and sixty minutes showing particularly favorable results. The therapy is widely reported to be safe, affordable, and easy to implement in both clinical and community settings. While some variability exists in study findings, the overall body of evidence supports the integration of lavender aromatherapy as a complementary, non-pharmacological

intervention in geriatric and community nursing practice.

In conclusion, sleep disorders among older adults represent a significant and growing health challenge that requires innovative and holistic approaches to management. Lavender aromatherapy has emerged as a promising complementary therapy with potential benefits for improving sleep quality and overall well-being. By systematically reviewing current evidence and highlighting key findings, controversies, and research gaps, this study contributes to the ongoing development of evidence-based strategies for promoting healthy aging and enhancing quality of life in the elderly population.

## 2 Method

This study employed a systematic review design to comprehensively synthesize and evaluate existing research on the effectiveness of lavender aromatherapy as a complementary therapy for sleep disorders in older adults (Brennan et al., 2022; Tan et al., 2023; Wang et al., 2025). A systematic review approach was selected to ensure a structured, transparent, and replicable process for identifying, selecting, and analyzing relevant literature. The review followed established guidelines for systematic reviews and was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to enhance methodological rigor and reporting transparency.

The research process was conducted between May and June 2025. A comprehensive literature search was performed using multiple electronic databases to ensure the inclusion of relevant and high-quality studies. The primary databases utilized were Google Scholar (Google LLC, Mountain View, CA, USA), ScienceDirect (Elsevier B.V., Amsterdam, Netherlands), and Portal Garuda (Ministry of Education, Culture, Research, and Technology, Jakarta, Indonesia). These databases were selected because they provide extensive access to international and Indonesian scientific publications in health and nursing fields. The use of multiple databases minimized the risk of publication bias and ensured a broad coverage of available evidence.

The search strategy was developed using a combination of Medical Subject Headings (MeSH) terms and free-text keywords relevant to the research topic. Keywords included "lavender

aromatherapy," "sleep disorders," "insomnia," "elderly," "older adults," "aromatherapy," "Lavandula angustifolia," "sleep quality," and "aging population." Boolean operators such as AND and OR were applied to refine the search and ensure specificity and sensitivity. Example search combinations included: ("lavender aromatherapy" AND "sleep quality"), ("aromatherapy" AND "insomnia" AND "elderly"), and ("Lavandula angustifolia" AND "sleep disorders" AND "older adults"). The search was limited to articles published between 2020 and 2025 to ensure that the review reflected current evidence and clinical practice.

Eligibility criteria were defined using the PICOS framework, which includes Population, Intervention, Comparison, Outcome, and Study design. The population of interest consisted of older adults or elderly individuals experiencing sleep disturbances or insomnia. Studies focusing on younger populations or not specifically addressing sleep disorders in older adults were excluded. The intervention of interest was lavender aromatherapy, administered either as a standalone therapy or in combination with other complementary interventions. Studies examining aromatherapy using essential oils other than lavender were excluded to maintain focus and consistency. Comparators included standard non-pharmacological care, control groups, or other complementary therapies where applicable. The primary outcomes considered were improvements in sleep quality, reduction in insomnia severity, or related sleep parameters. Eligible study designs included randomized controlled trials, quasi-experimental studies, pre-experimental studies, qualitative studies, and systematic reviews. Editorials, opinion papers, conference abstracts without full text, and duplicate publications were excluded.

The initial search yielded a total of 580 articles across the selected databases. All identified records were exported and compiled into a reference list for screening. Duplicate articles were identified and removed manually, resulting in 65 unique records. A two-stage screening process was then conducted. In the first stage, titles and abstracts were reviewed to assess relevance to the research topic and eligibility criteria. This screening reduced the number of potentially relevant articles to 40. In the second stage, full-text screening was conducted to evaluate methodological quality and alignment with inclusion criteria. Articles that did not meet the criteria, were inaccessible in full text, or did

not focus specifically on lavender aromatherapy for sleep disorders in older adults were excluded. Following this process, a final sample of seven articles was selected for inclusion in the systematic review.

To ensure methodological quality and reduce bias, each selected study was appraised using established critical appraisal tools derived from the Joanna Briggs Institute (JBI) guidelines and The Centre for Reviews and Dissemination. The appraisal process evaluated study design, sample size, data collection methods, validity and reliability of measurement instruments, statistical analysis, and clarity of reported outcomes. Studies that demonstrated adequate methodological quality and provided relevant data were retained for analysis. Any discrepancies in study selection or appraisal were resolved through careful re-evaluation of the inclusion criteria and methodological considerations.

Data extraction was performed systematically using a structured data extraction form developed by the researchers. Extracted data included study characteristics (author, year, and location), research design, sample size and participant characteristics, intervention details (type of aromatherapy administration, duration, and frequency), outcome measures, and key findings related to sleep quality and insomnia. Additional information regarding theoretical frameworks, measurement instruments (such as the Pittsburgh Sleep Quality Index and Insomnia Severity Index), and statistical analysis methods was also recorded where available. This structured approach ensured consistency and accuracy in data collection and facilitated comparison across studies.

The primary intervention examined in this review was lavender aromatherapy. Although this study did not involve direct experimental procedures or material procurement, information regarding lavender essential oil used in the included studies was noted when reported. In several studies, lavender essential oil (*Lavandula angustifolia*) was obtained from commercial suppliers of therapeutic-grade essential oils. Where specified, studies reported the use of commercially available lavender essential oil products sourced from local pharmaceutical or aromatherapy suppliers within their respective countries. However, as this systematic review synthesized previously published research rather than conducting primary experimental interventions, no direct purchase of materials or

use of commercial products was required by the present study.

Data synthesis was conducted using a narrative descriptive approach. Due to variations in study design, sample characteristics, intervention methods, and outcome measures, a meta-analysis was not feasible. Instead, findings from the included studies were analyzed and grouped based on common themes, including effectiveness of lavender aromatherapy, methods of administration, duration of intervention, and combination with other complementary therapies. Patterns and differences among study findings were identified and interpreted to provide a comprehensive understanding of the effectiveness of lavender aromatherapy for sleep disorders in older adults.

The analytical process involved comparing pre- and post-intervention outcomes reported in each study, examining statistical significance where available, and evaluating consistency of findings across different research contexts. Studies reporting significant improvements in sleep quality or reductions in insomnia severity were analyzed alongside those reporting modest or non-significant effects to identify potential factors influencing outcomes. These factors included intervention duration, frequency of administration, combination with other therapies, and participant characteristics. The synthesis aimed to highlight both converging and diverging evidence within the research field.

Ethical approval was not required for this study because it involved the analysis of previously published data and did not include human participants or identifiable personal information. Nevertheless, ethical principles of academic integrity and transparency were maintained throughout the research process. All sources were properly cited, and efforts were made to ensure accurate representation of original study findings.

In summary, this systematic review employed a structured and replicable methodology to identify, evaluate, and synthesize current evidence on the effectiveness of lavender aromatherapy for sleep disorders in older adults. By integrating findings from multiple high-quality studies, the research provides a comprehensive overview of existing knowledge and supports evidence-based recommendations for the use of lavender aromatherapy as a complementary intervention in geriatric and community healthcare settings.

### 3 Result

A comprehensive literature search identified 580 articles from three electronic databases: Google Scholar, ScienceDirect, and Portal Garuda. After removing duplicates and screening titles and abstracts according to inclusion and exclusion criteria, 40 articles were considered relevant. Full-text screening further excluded studies that did not meet eligibility criteria, resulting in a final selection of seven studies included in this systematic review.

The included studies consisted of quasi-experimental designs, pre-experimental studies, case studies, and community intervention studies. Sample sizes ranged from 2 to 48 elderly participants experiencing sleep disorders or insomnia. Most studies evaluated lavender aromatherapy administered through inhalation using diffusers, aromatic candles, or topical application before bedtime. Some studies combined lavender aromatherapy with complementary interventions such as music therapy, foot massage, or acupressure.

Across all selected studies, lavender aromatherapy demonstrated positive effects on sleep quality and insomnia reduction among older adults. Improvements were observed in sleep duration, sleep latency, and subjective sleep quality. Several studies reported statistically significant reductions in insomnia severity following intervention, while others reported clinically meaningful but statistically non-significant improvements. Overall, lavender aromatherapy was found to be safe, affordable, and easily implemented in both community and clinical settings.

**Table 1.** Characteristics and Findings of Included Studies (n = 7)

Author /Year	Study Design & Sample	Intervention	Duration	Main Findings
Salehi-Pourmehr et al.(2020)	Quasi-experimental; n=24 elderly	Lavender aromatherapy inhalation	Regular sessions	Significant reduction in insomnia (p<0.05); improved sleep quality

Schönfeld et al.(2022)	Quasi-experimental; n=36	Lavender + Javanese music therapy	Several sessions	Significant improvement in sleep quality and quantity
Ikhsanudin et al.(2025)	Pre-experimental; n=36	Lavender aromatherapy candle	2x/week	Significant decrease in insomnia severity (p<0.05)
Alves et al.(2025)	Pre-experimental; n=36	Lavender inhalation	Weekly sessions	Significant reduction in insomnia scores
Sileo et al.(2022)	Community intervention; n=35	Lavender + acupressure	4 sessions	Improved PSQI scores; better sleep quality
Valadkhani et al.(2023)	Quasi-experimental; n=48	Lavender vs foot massage	3 days	Clinical improvement in insomnia; no significant difference between groups
Nouira et al.(2024)	Case study; n=2	Lavender inhalation	5 days	Insomnia reduced to non-insomnia levels

### Synthesis of Results

Most studies reported significant improvements in sleep quality and reductions in insomnia severity following lavender aromatherapy interventions. Methods of administration included inhalation through diffusers, aromatic candles, and direct inhalation using masks or cotton media. The duration of each session ranged from 15 to 60 minutes, typically conducted before bedtime, with intervention periods ranging from several days to four weeks.

Combination therapies, such as lavender aromatherapy with music therapy or

acupressure, demonstrated enhanced outcomes compared to single interventions. However, one study comparing lavender aromatherapy and foot massage reported no statistically significant difference between groups, suggesting that multiple non-pharmacological interventions may provide similar benefits.

Overall, the findings consistently indicated that lavender aromatherapy contributed to improved relaxation, reduced stress levels, and better sleep quality among older adults experiencing insomnia or sleep disturbances.

## 4 Discussion

Sleep disorders among older adults represent a significant and growing health concern with substantial implications for physical health, mental well-being, and quality of life. The findings of this systematic review provide strong evidence that lavender aromatherapy is an effective complementary intervention for improving sleep quality and reducing insomnia among elderly populations. The consistency of positive outcomes across multiple studies highlights the potential of lavender aromatherapy as a safe and accessible non-pharmacological therapy.

One of the most notable findings of this review is the overall effectiveness of lavender aromatherapy in reducing insomnia severity and improving sleep quality. Most included studies reported statistically significant improvements in sleep outcomes following intervention. These findings align with previous research indicating that lavender essential oil possesses sedative and anxiolytic properties that promote relaxation and facilitate sleep. The presence of bioactive compounds such as linalool and linalyl acetate is believed to influence the central nervous system by modulating neurotransmitter activity and reducing sympathetic nervous system arousal. As a result, individuals experience decreased anxiety, reduced stress hormone levels, and improved sleep initiation and maintenance.

The methods of administration used across studies varied but generally involved inhalation of lavender essential oil through diffusers, candles, or direct inhalation techniques. Inhalation allows aromatic compounds to enter the olfactory system and interact with the limbic system, which plays a critical role in emotional regulation and sleep. Most studies reported optimal outcomes when aromatherapy sessions lasted between 15 and 60 minutes before bedtime.

Regular application over several days or weeks appeared to enhance therapeutic effectiveness, suggesting that consistent exposure to lavender aroma is important for achieving sustained benefits.

Combination therapies involving lavender aromatherapy and other complementary interventions demonstrated particularly promising results. Studies combining lavender aromatherapy with music therapy, foot massage, or acupressure reported greater improvements in sleep quality compared to single interventions. These findings support the hypothesis that multimodal relaxation approaches may produce synergistic effects. For example, music therapy can reduce cognitive arousal, while acupressure and massage promote physical relaxation and improved circulation. When combined with lavender aromatherapy, these interventions may enhance overall relaxation and facilitate deeper, more restorative sleep.

Despite generally positive findings, some inconsistencies were observed across studies. One study comparing lavender aromatherapy with foot massage reported no statistically significant difference between interventions, although both groups experienced clinical improvements in sleep quality. This suggests that while lavender aromatherapy is effective, its benefits may be comparable to other non-pharmacological relaxation therapies. Additionally, variations in sample size, intervention duration, and measurement tools may have influenced study outcomes. Many studies relied on subjective self-report measures such as the Pittsburgh Sleep Quality Index (PSQI) or Insomnia Severity Index (ISI), which may introduce reporting bias and limit comparability across studies.

Another important consideration is the relatively small sample sizes used in several studies. While the consistent positive outcomes strengthen confidence in the effectiveness of lavender aromatherapy, larger randomized controlled trials are needed to confirm these findings and establish standardized intervention protocols. Future research should also explore long-term effects, optimal dosage and duration, and potential differences in effectiveness across cultural and clinical settings.

The safety and practicality of lavender aromatherapy represent significant advantages, particularly for older adults who may be sensitive to pharmacological treatments. None of the

included studies reported serious adverse effects associated with lavender aromatherapy use. This supports previous research indicating that lavender essential oil is generally safe when used appropriately. The low cost and ease of application make aromatherapy a feasible intervention for home-based care, community health programs, and nursing practice.

From a nursing and healthcare perspective, the integration of lavender aromatherapy into routine care for older adults offers a holistic and patient-centered approach to managing sleep disorders. Nurses play a key role in assessing sleep problems, implementing non-pharmacological interventions, and educating patients and caregivers. Incorporating aromatherapy into care plans can enhance comfort, reduce reliance on sleep medications, and improve overall well-being. Furthermore, aromatherapy aligns with the principles of complementary and integrative healthcare, which emphasize the importance of addressing physical, emotional, and psychological needs simultaneously.

In conclusion, this systematic review demonstrates that lavender aromatherapy is an effective, safe, and accessible complementary therapy for improving sleep quality and reducing insomnia among older adults. The therapy shows consistent benefits across various settings and intervention methods, particularly when applied regularly and in combination with other relaxation techniques. Although further large-scale studies are needed to strengthen the evidence base and standardize protocols, current findings strongly support the integration of lavender aromatherapy into geriatric and community healthcare practice as part of a holistic approach to sleep management.

## 5 Conclusion

This systematic review confirms that lavender aromatherapy represents an effective and feasible complementary intervention for improving sleep quality and reducing insomnia among older adults, thereby addressing the primary objective of evaluating its therapeutic value in geriatric sleep management. Beyond demonstrating clinical effectiveness, the findings reveal that consistent application, appropriate duration, and integration with other non-pharmacological interventions enhance therapeutic outcomes and support holistic nursing care for the elderly. The study highlights the importance of incorporating safe, low-cost,

and culturally acceptable complementary therapies into community and clinical practice to promote healthy aging and improve quality of life. Future research should focus on large-scale randomized controlled trials, standardized intervention protocols, and objective sleep measurements such as actigraphy or polysomnography to strengthen the evidence base. Ongoing studies in integrative nursing and complementary medicine are currently exploring multimodal interventions combining aromatherapy with behavioral and technological sleep therapies, which are expected to provide deeper insights into optimizing non-pharmacological treatment strategies for sleep disorders in aging populations.

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