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Lavender Aromatherapy and Sleep Quality among Perimenopausal Women in a Primary Health Care Setting in South Jakarta

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Abstract

Sleep disturbances are common among perimenopausal women due to hormonal fluctuations and psychosocial changes, which may negatively affect physical health, emotional well-being, and overall quality of life. Non-pharmacological interventions are increasingly recommended in primary health care settings to manage sleep problems safely and effectively. This study aimed to examine the relationship between lavender aromatherapy and sleep quality among perimenopausal women in a primary health care setting. A quasi-experimental study with a pretest–posttest control group design was conducted involving 60 perimenopausal women aged 45–55 years who were divided into an intervention group (n = 30) and a control group (n = 30). Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). The intervention group received lavender aromatherapy via inhalation using a diffuser for 30 minutes before bedtime over seven consecutive days, while the control group received no aromatherapy intervention. Data were analyzed using the Wilcoxon Signed-Rank Test and the Mann–Whitney U Test. The results showed a significant improvement in sleep quality in the intervention group, with the mean PSQI score decreasing from 12.00 (SD = 1.89) to 6.23 (SD = 2.73) ($p < 0.001$), whereas no significant change was observed in the control group ($p = 0.349$). Posttest comparison revealed a significant difference in sleep quality between the intervention and control groups ($p < 0.001$). In conclusion, lavender aromatherapy is associated with improved sleep quality among perimenopausal women and may serve as an effective complementary intervention in primary health care settings.

Keywords: lavender aromatherapy, perimenopausal women, sleep quality, PSQI.

Introduction

Sleep quality is a crucial component of overall health and well-being, influencing physical, psychological, and social functioning. Among women, sleep disturbances are particularly prevalent during the perimenopausal period, a transitional phase toward menopause characterized by fluctuating estrogen levels and neuroendocrine changes. These hormonal alterations are frequently associated with vasomotor symptoms, mood disturbances, and increased vulnerability to insomnia, which may significantly impair quality of life if left unaddressed [1–3].

Previous studies have reported that more than half of perimenopausal women experience sleep-related complaints, including difficulty initiating sleep, frequent nocturnal awakenings, and reduced sleep efficiency [2,4]. Persistent sleep disturbances during this period have been linked to adverse outcomes such as fatigue, decreased cognitive performance, emotional instability, and an increased risk of chronic health conditions [3,5]. Therefore, effective and safe interventions to improve sleep quality among perimenopausal women are an important concern in women's health care.

Pharmacological treatments for sleep disorders may provide short-term benefits; however, their long-term use is often limited by side effects, dependency risks, and contraindications, particularly in midlife women [6]. As a result, non-pharmacological and complementary approaches have gained increasing attention, especially within primary health care settings. Aromatherapy, a form of complementary therapy using essential oils, has been widely explored for its potential relaxation and sedative effects [7].

Lavender (*Lavandula angustifolia*) essential oil is one of the most commonly used aromatherapy agents and has been shown to influence the autonomic nervous system through olfactory stimulation, leading to reduced sympathetic activity and enhanced parasympathetic responses [8,9]. Several studies have demonstrated the effectiveness of lavender aromatherapy in improving sleep quality among menopausal and perimenopausal women; however, evidence from controlled studies conducted in primary health care settings remains limited [9–11]. Therefore, this study aimed to examine the relationship between lavender aromatherapy and sleep quality among perimenopausal women in a primary health care setting.

Method

1. Research design

This study employed a quasi-experimental design using a pretest–posttest control group approach. This design was selected to evaluate the relationship between lavender aromatherapy and sleep quality among perimenopausal women while allowing for comparison between an intervention group and a control group. The quasi-experimental approach was considered appropriate due to ethical and practical constraints that limited random allocation of participants, while still enabling the assessment of changes in sleep quality before and after the intervention.

2. Setting and samples

The study was conducted in a primary health care setting. The specific name of the health facility was not disclosed to maintain generalizability. The study population consisted of perimenopausal women aged 45–55 years who accessed primary health care services during the study period. A total sampling technique was applied, whereby all eligible women who met the inclusion criteria were invited to participate. Inclusion criteria included women in the perimenopausal phase, aged 45–55 years, experiencing sleep disturbances, and willing to participate in the study. Exclusion criteria included the use of sleep medications, hormone replacement therapy, or diagnosed psychiatric or neurological disorders that could affect sleep quality. A total of 60 participants were recruited and allocated into an intervention group (n = 30) and a control group (n = 30). The sample size was determined based on the total number of eligible participants available during the study period.

3. Intervention

Participants in the intervention group received lavender aromatherapy through inhalation using a diffuser. The intervention was administered by the researchers. Three to five drops of lavender essential oil were diluted in 100 ml of water and diffused for 30 minutes before bedtime each night for seven consecutive days. Participants were instructed to use the diffuser in their sleeping environment under standardized conditions. The control group did not receive any aromatherapy intervention and continued their usual daily routines without additional treatment.

4. Measurement and data collection

Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI), a standardized questionnaire developed by Buysse et al. [12]. The PSQI consists of 19 items that assess seven components of sleep quality, producing a global score ranging from 0 to 21, with higher scores indicating poorer sleep quality. The PSQI has demonstrated good validity and reliability in previous studies, with a Cronbach's alpha of 0.83 [12]. The instrument was adopted without modification. Data collection was conducted twice: before the intervention (pretest) and after the seven-day intervention period (posttest). All data were collected directly by the researchers.

5. Data analysis;

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software. Descriptive statistics were used to summarize participant characteristics and sleep quality scores. Inferential analysis was conducted using the Wilcoxon Signed-Rank Test to examine differences in pretest and posttest sleep quality scores within each group, and the Mann–Whitney U Test to compare posttest sleep quality scores between the intervention and control groups. Statistical significance was set at $p < 0.05$.

Results

At baseline, both the control and intervention groups demonstrated poor sleep quality, as indicated by mean PSQI scores above the clinical cutoff point. The intervention group showed a higher mean PSQI score compared with the control group, suggesting more severe sleep disturbances prior to the intervention. After the intervention period, the control group exhibited minimal change in sleep quality, whereas a substantial reduction in PSQI scores was observed in the intervention group, indicating an improvement in overall sleep quality. Descriptive statistics of sleep quality scores before and after the intervention are presented in Table 1.

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Table 1
Descriptive Statistics of Sleep Quality Scores Before and After Intervention (PSQI)

		Pretest		Posttest	
Group	**N**	**Mean**	**SD**	**Mean**	**SD**
Control	30	10.33	1.97	10.17	1.91
Intervention	30	12.00	1.89	6.23	2.73

Further analysis within each group revealed different patterns of change in sleep quality. Participants who received lavender aromatherapy experienced a statistically significant improvement in sleep quality, whereas no significant change was observed in the control group. The results of the Wilcoxon Signed-Rank Test for within-group comparisons are shown in Table 2.

Table 2
Within-Group Comparison of Sleep Quality Scores Before and After Intervention

		Pretest		Posttest		
Group	**N**	**Mean**	**SD**	**Mean**	**SD**	**p-value**
Control	30	10.33	1.97	10.17	1.91	0.349
Intervention	30	12.00	1.89	6.23	2.73	< 0.001

Between-group analysis using the Mann–Whitney U Test demonstrated significant differences in sleep quality between the intervention and control groups. Differences were observed at baseline and became more pronounced after the intervention period, with the intervention group showing better sleep quality outcomes. The results of the between-group comparison are presented in Table 3.

Table 3
Between-Group Comparison of Sleep Quality Scores Before and After Intervention

		Control Group		Intervention Group		
Measurement	**N**	**Mean**	**SD**	**Mean**	**SD**	**p-value**
Pretest	30	10.33	1.97	12.00	1.89	0.003
Posttest	30	10.17	1.91	6.23	2.73	< 0.001

Overall, these findings indicate that lavender aromatherapy was associated with a significant improvement in sleep quality among perimenopausal women, while no comparable improvement was observed among participants who did not receive the intervention.

Discussion

The findings of this study demonstrate that lavender aromatherapy was associated with a significant improvement in sleep quality among perimenopausal women in a primary health care setting. Participants who received lavender aromatherapy showed a marked reduction in PSQI scores after the intervention, whereas no meaningful improvement was observed in the control group. This contrast between groups strengthens the evidence that the observed improvement was attributable to the intervention rather than to spontaneous recovery or time-related effects.

The within-group improvement observed in the intervention group is consistent with previous studies reporting the beneficial effects of lavender aromatherapy on sleep quality among menopausal and perimenopausal women [5,6,9]. Lavender essential oil contains bioactive compounds such as linalool and linalyl acetate, which are known to exert sedative and anxiolytic effects through olfactory stimulation of the limbic system, leading to modulation of autonomic nervous system activity and increased inhibitory neurotransmission, particularly gamma-aminobutyric acid (GABA) [8,10]. These neurophysiological mechanisms may explain the observed reductions in sleep latency, nocturnal awakenings, and overall sleep disturbance reflected in lower PSQI scores following the intervention.

In contrast, the absence of significant change in sleep quality within the control group aligns with evidence indicating that sleep disturbances during the perimenopausal period often persist without targeted intervention [2,3]. Hormonal fluctuations, vasomotor symptoms, and psychosocial stressors characteristic of this life stage contribute to chronic sleep problems that are unlikely to resolve spontaneously [1,4]. The between-group differences observed in the present study, particularly at posttest assessment, further support the effectiveness of lavender aromatherapy as a complementary intervention.

Compared with earlier studies that primarily relied on single-group or pre–post designs [9,11], the use of a control group in this study provides a clearer demonstration of the intervention effect within a real-world primary health care context. This is particularly relevant, as primary health care settings play a crucial role in delivering accessible, non-pharmacological interventions for midlife women. Pharmacological treatments for sleep disorders may be effective in the short term; however, their long-

term use is often limited by adverse effects and dependency concerns [6,12]. In this context, lavender aromatherapy offers a safe, low-cost, and easily implemented alternative that can be integrated into routine health education and counseling services.

The findings of this study have important clinical implications for midwifery and women's health practice. Incorporating lavender aromatherapy into sleep health management strategies may enhance the quality of life of perimenopausal women and support holistic, patient-centered care approaches. Moreover, the simplicity of the intervention allows for self-administration, promoting patient empowerment and adherence within community-based health care services.

Despite these strengths, the interpretation of the findings should consider several limitations. Sleep quality was assessed using a self-reported instrument, which may be influenced by subjective perception and recall bias. Additionally, other factors affecting sleep quality, such as stress levels, physical activity, caffeine intake, and environmental conditions, were not controlled in detail. The relatively short duration of the intervention also limits conclusions regarding long-term effects. Future studies with longer follow-up periods, objective sleep measurements, and broader control of confounding variables are recommended to further elucidate the sustained impact of lavender aromatherapy on sleep quality.

Overall, this study contributes to the growing body of evidence supporting the use of complementary therapies in managing sleep disturbances among perimenopausal women and highlights the practical value of lavender aromatherapy within primary health care settings.

Limitation

Several limitations should be considered when interpreting the findings of this study. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), a self-reported instrument that may be subject to recall bias and subjective perception. In addition, potential confounding factors such as stress levels, physical activity, caffeine consumption, and environmental sleep conditions were not fully controlled. The relatively short duration of the intervention limits conclusions regarding the long-term effects of lavender aromatherapy on sleep quality. Furthermore, the quasi-experimental design without randomization may restrict the generalizability of the findings. Future

studies employing randomized controlled designs, longer follow-up periods, and objective sleep measurements are recommended to strengthen the evidence base.

Conclusion

This study demonstrates that lavender aromatherapy is associated with a significant improvement in sleep quality among perimenopausal women in a primary health care setting. Participants who received lavender aromatherapy showed a marked reduction in PSQI scores, whereas no comparable improvement was observed in the control group. These findings advance current knowledge by providing controlled evidence supporting the effectiveness of lavender aromatherapy as a complementary, non-pharmacological intervention for sleep disturbances during the perimenopausal period within real-world primary health care services.

The results highlight the potential application of lavender aromatherapy as a simple, safe, and low-cost strategy that can be integrated into routine sleep health education and midwifery care. This intervention may enhance patient-centered and holistic approaches to women's health care by promoting relaxation and improving sleep quality without pharmacological risks. Future research should explore the long-term effectiveness of lavender aromatherapy, assess dose–response relationships, and examine its combination with other behavioral sleep interventions to further optimize outcomes.

Ethical Considerations

This study was conducted in accordance with ethical principles for health research, including respect for persons, beneficence, and justice. All participants received a clear explanation of the study objectives, procedures, potential benefits, and possible risks prior to participation. Written informed consent was obtained from all respondents, and participation was voluntary, with the right to withdraw at any time without consequences. Participant confidentiality and anonymity were maintained by using coded data and excluding personal identifiers. Ethical approval for this study was obtained from the Health Research Ethics Committee of the Faculty of Health Sciences, Universitas Nasional.

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Conflict of Interest

The authors declare that there is no conflict of interest related to the conduct or publication of this study.

Author contribution

Puji Hastutiningsih contributed to the study conception and design, data collection, data analysis, and manuscript drafting. Putri Azzahroh and Rukmaini contributed to data interpretation, critical revision of the manuscript, and final approval of the version to be published. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work.

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