



Effects of Aromatherapy Massage on Anxiety and Sleep Quality in Women

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Abstract

Anxiety and sleep disturbances are common problems experienced by women and can negatively impact daily functioning and quality of life. Non-pharmacological interventions such as traditional massage and aromatherapy are increasingly used as complementary therapies. The purpose of this study was to compare the effects of aromatherapy massage and massage alone on anxiety levels and sleep quality in women. This study used a quasi-experimental design. Anxiety scores were assessed using the Hamilton Anxiety Rating Scale (HARS), and sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). Data were analysed using a t-test. Both groups experienced a significant decrease in anxiety scores and sleep quality after the intervention. In the aromatherapy massage group, anxiety scores decreased from 16.10 ± 7.06 to 10.80 ± 8.82 ($p < 0.001$), while in the massage alone group, anxiety scores decreased from 12.75 ± 4.63 to 8.40 ± 5.92 ($p = 0.002$). The total sleep quality score in the aromatherapy massage group decreased from 11.05 ± 3.22 to 6.60 ± 3.17 ($p < 0.001$), and in the massage-only group from 8.40 ± 2.96 to 4.60 ± 2.33 ($p < 0.001$). However, there was no statistically significant difference between the two groups in either anxiety ($p = 0.889$) or sleep quality ($p = 0.531$), although clinically the aromatherapy massage group showed a greater decrease in the mean score. Traditional massage, both with and without lemongrass aromatherapy, was effective in reducing anxiety and improving sleep quality in woman. Although the addition of aromatherapy did not show a statistically significant difference between the groups, clinically, it provided greater improvement. It can be considered as a supportive therapy in nursing practice. Traditional massage with or without lemongrass aromatherapy, effectively reduce anxiety and improved sleep quality in women, with aromatherapy providing a clinically greater benefit despite no statistically significant differences between the groups.

Keywords: Anxiety, Aromatherapy Massage, Complementary Therapy, Lemongrass Aromatherapy, Sleep Quality.

INTRODUCTION

Women in their 40s and 60s often have anxiety and trouble sleeping. The incidence of anxiety in this demographic is purportedly greater than in males, primarily attributable to an interplay of psychological, physiological, and social determinants (Kaur, Das, Solanki, Awasthi, & Hyanki, 2021; Revati, Ranjan, Mehendale, & Garg, 2017; Saporovskaia et al., 2021). Sleep disturbances are highly prevalent among middle-aged women, with 56.6% reporting insomnia, poor sleep quality, or both (Blümel et al., 2012), and approximately 61.3% reporting anxiety (Arroyo et al., 2018). Anxiety and



sleep disorders can exacerbate each other. Anxiety and sleep disturbances can exacerbate each other. Anxiety can make it hard to fall asleep and stay asleep, and not getting enough sleep can make anxiety worse, producing a cycle that keeps going (Liashchenko & Yuryeva, 2021; Mendelevich & Mendelevich, 2023).

Prior research has demonstrated that insomnia and anxiety disorders have standard neural processes. Dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, increased amygdala reactivity, and decreased prefrontal cortex control are hallmarks of both conditions. This shared dysfunction can worsen emotional dysregulation and cognitive arousal, creating a vicious cycle where anxiety interrupts sleep, and lack of sleep makes anxiety symptoms worse (Hyndych, Koval, Dzeruzhynska, & Mader, 2025; Shen et al., 2024; Xue, Wang, Liu, Wang, & Walters, 2025).

Pharmacological approaches such as anxiolytics and hypnotics remain the mainstay of therapy. Nonetheless, evidence indicates that prolonged use can lead to adverse consequences, tolerance, and dependence (Kripke, 2018; Parsaik et al., 2016). Furthermore, not all individuals are able or willing to use medications continuously. Consequently, there is a growing necessity for non-pharmacological therapies that are safe, easily implementable, and yield both physiological and psychological benefits in nursing practice and community health services (Acharya et al., 2024).

Massage is a complementary therapy widely used to reduce muscle tension, promote relaxation, and stimulate the parasympathetic nervous system. Massage is a common supplementary therapy that helps relax muscles, calm the mind, and activate the parasympathetic nervous system. Multiple studies have demonstrated that massage can reduce cortisol levels, enhance heart rate variability, lower anxiety ratings, and improve sleep quality. These effects are linked to changes in how the body responds to stress and to greater relaxation (Ayik & Özden, 2018; Ghavami, Shamsi, Abdollahpoor, Radfar, & Khalkhali, 2019).

Aromatherapy, especially with lemongrass essential oil, is known to offer modest calming and anti-anxiety benefits by stimulating the limbic system and altering neurotransmitter levels. Lemongrass contains citral, which helps soothe the sympathetic nervous system and promote a sense of peace. Studies have shown that lemongrass aromatherapy can improve both anxiety and sleep quality, either on its own or as part of a larger treatment plan (Anggraini, Abidah, Rahayu, & Nisa, 2022; Goes, Ursulino, Almeida-Souza, Alves, & Teixeira-Silva, 2015).

Massage and aromatherapy have been examined independently; however, research concerning their synergistic impact on anxiety and sleep quality is still insufficient. The majority of research has concentrated on general symptoms or particular clinical populations, lacking direct comparisons of the effects of massage with and without aromatherapy (Anggraini et al., 2022; Tsai, Chung, Chen, & Yeh, 2020). Additionally, limited research has specifically assessed massage therapies incorporating lemongrass aromatherapy.

Based on these conditions, this study proposes an intervention by comparatively evaluating the effects of massage with lemongrass aromatherapy on anxiety and sleep quality in middle-aged women. Therefore, this study aimed to compare massage using lemongrass aromatherapy with massage alone on anxiety and sleep quality in middle-aged women. The results are expected to strengthen the evidence base for the use of safe, effective, and easily implemented complementary therapies across various healthcare settings.



METHODS

Setting dan Sample

A total of 42 women aged 40-60 from Kolaka Regency, Southeast Sulawesi, registered to participate in this study. However, only 40 met the inclusion and exclusion criteria and continued to participate, because two people did not come to attend the intervention.

Ethical Considerations

This study has been registered for ethical review with the Indonesian Academy of Medical Sciences (IAKMI) Southeast Sulawesi under No. 110/KEPK-IAKMI/IV/2024. The researcher explained the entire intervention procedure and obtained participants' consent if they were willing to participate in the study.

Measurements

The outcome measure for anxiety was the Hamilton Anxiety Rating Scale (HARS), which consists of 14 items: anxiety, tension, fear, sleep disturbances, intellectual impairment, depression, somatic (muscle) symptoms, somatic (sensory) symptoms, cardiovascular symptoms, respiratory symptoms, gastrointestinal symptoms, urogenital symptoms, autonomic symptoms, and behavioural symptoms. The reliability test of the HRS-A instrument has a Cronbach's alpha value of 0.752 (Rachmawati & Mustikasari, 2020).

Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI). The PSQI has seven indicators: subjective sleep quality, sleep duration, sleep efficiency, sleep latency, sleep disturbances, daytime dysfunction, and use of sleeping medication. The PSQI has a Cronbach's alpha coefficient of 0.887 (Nadya & Wati, 2023).

Procedure

Pre-test

Researchers measured anxiety and sleep quality before the intervention. Participants were given questionnaires to complete regarding their anxiety and sleep quality.

Intervention

Both the aromatherapy massage and massage alone interventions were conducted by the first author, who holds professional certification in aromatherapy massage. The intervention procedure was administered to participants in the first group for 45 minutes. The room where the intervention was carried out was a comfortable room with air conditioning, with a temperature of around 26^o C. For the aromatherapy massage group, researchers prepared a lemongrass aromatherapy diffuser by mixing 100 mL of water with approximately 3 drops of lemongrass essential oil. The diffuser was placed at a safe distance from the participants to allow the aroma to spread throughout the room.

The massage technique used a combination of effleurage, petrissage, friction, and vibration on the participants' backs, necks, heads, and faces. The massage pressure was adjusted to each participant's comfort level to ensure they enjoyed the intervention. This massage technique was also used in the second group, but without lemongrass aromatherapy. The intervention in the massage group was conducted on a different day than the aromatherapy massage group to prevent exposure to aromatherapy in the comparison group.

Post-intervention

Anxiety and sleep quality outcomes were reassessed in both groups 1 week after the intervention.



Data Analysis

The collected data were analysed using SPSS version 23. Paired t-tests, Cramer's v, and contingency coefficients were used to compare participant characteristics in both groups. Paired t-tests were used to compare changes in anxiety and sleep quality before and after the intervention. In contrast, independent t-tests were used to compare anxiety and sleep quality between the two groups.

RESULTS

The results of this study indicate that the average age of respondents in the aromatherapy massage group and the massage group was 48 years. The most common occupation in the aromatherapy massage group was civil servants (11, 55%), while in the housewife massage group, it was 8 (40%). The average anxiety score in the aromatherapy massage group was 16.10, and the average anxiety score in the massage group was 12.75. The average sleep quality score in the aromatherapy massage group was 11.05, while in the massage group it was 8.40 (Table 1).

Table 1. Respondent Characteristics

Variable	Aromatherapy Massage		Massage		p-value
	f	%	f	%	
Age, mean (SD)	48(5.399)		48(6,051)		0.562 ^a
Ansietas, mean (SD)	16.10 (7.055)		12.75(4.633)		0,088 ^a
Kualitas Tidur, mean (SD)	11.05(3.220)		8.40(2.963)		0,008 ^a
Marital Status					
Married	18	90.0	17	85.0	0.983 ^b
Single	1	5.0	1	5.0	
Widowed	1	5.0	2	10.0	
Occupation					
Civil Servant	11	55.0	5	25.0	0.500 ^c
Housewife	7	35.0	8	40.0	
Private Employee	1	5.0	2	2.0	
Self-Employed	1	5.0	3	3.0	
Honorary Employee	0	0.0	1	1.0	
Farmer	0	0.0	1	1.0	

^aPaired t-test, ^bCramer's v, ^ccoef contig

The results of the homogeneity test for both groups showed that only sleep quality scores differed, with a value greater than 0.05. Age, marital status, employment, and anxiety scores were not significantly different between the two groups.

Anxiety Before and After Intervention in the Aromatherapy Massage Group and the Massage Group

Anxiety scores before and after the intervention in the aromatherapy massage group and the massage group can be seen in Table 2 below:

Table 2. Anxiety Scores Before and After Intervention in the Aromatherapy Massage Group and the Massage Group

Group	Pre-test	Post-test	P-value	P-value
Aromatherapy Massage	16.10±7.055	10.80±8.823	<0.001	0.889
Massage	12.75±4.633	8.40±5.915	0.002	



Anxiety in the aromatherapy massage group had an average score of 16.10 and decreased to 10.80 ($p<0.001$), while the massage group also showed a decrease, from 12.75 to 8.40 ($p=0.002$). The results of the difference test in both groups showed no significant difference between those who received aromatherapy massage and those who received massage alone. However, clinical results showed a lower average score in the aromatherapy massage group than in the massage group.

Sleep Quality Before and After Intervention in the Aromatherapy Massage Group and the Massage Group

Sleep quality before and after intervention in the aromatherapy massage group and the massage group can be seen in Table 3 below:

Table 3. Sleep Disturbance Scores Before and After Intervention in the Aromatherapy Massage Group and the Massage Group

Group	Pre-test	Post-test	P-value	P-value
Aromatherapy Massage	11.05±3.220	6.60±3.169	<0.001	0.531
Subjective sleep quality	1.30±0.923	0.90±0.852	0.042	
Sleep latency	2.10±0.852	1.45±0.759	0.006	
Sleep duration	2.35±0.813	1.65±1.137	0.009	
Sleep efficiency	1.85±0.875	1.30±1.261	0.142	
Sleep disturbances	1.55±0.510	1.35±0.489	0.104	
Use of sleeping medication	0.15±0.671	0.12±0.523	0.804	
Daytime dysfunction experienced daily	1.75±0.786	1.05±0.826	0.001	
Massage	8.40±2.963	4.60±2.326	<0.001	
Subjective sleep quality	0.80±0.523	0.60±0.598	0.104	
Sleep latency	1.60±1.046	0.80±0.696	0.002	
Sleep duration	1.95±1.146	1.20±1.005	0.012	
Sleep efficiency	1.40±.995	0.65±1.089	0.028	
Sleep disturbances	1.35±.489	1.25±0.444	0.330	
Use of sleeping medication	0.10±0.308	0.05±0.224	0.577	
Daytime dysfunction experienced daily	1.20±0.410	0.70±0.657	0.004	

The results of this study showed a decrease in sleep disturbance scores experienced by respondents in the aromatherapy massage group, from an average of 11.05 to 6.60 ($p<0.001$). Meanwhile, the massage group also experienced a decrease, from 8.40 to 4.60 ($p<0.001$). In terms of sleep quality, the aromatherapy massage group showed no statistical difference ($p>0.05$) for sleep efficiency, sleep disturbance, and use of sleeping medication, although clinically significant decreases were observed. Meanwhile, the massage group showed no statistical difference ($p>0.05$) for subjective sleep quality, sleep disturbance, and use of sleeping medication, although clinically significant decreases were observed.



There was a difference in sleep disturbance scores between the two groups ($p=0.51$): the aromatherapy massage group had a significantly greater reduction in sleep disturbance than the massage-alone group.

DISCUSSION

The findings of this study demonstrate that massage intervention, whether paired with lemongrass aromatherapy or administered independently, significantly alleviated anxiety levels in a cohort of middle-aged women. In the aromatherapy massage group, anxiety ratings dropped from 16.10 to 10.80, which was a significant drop. In the massage-only group, scores dropped from 12.75 to 8.40. These results provide more support for the idea that massage is an effective non-drug way to lower anxiety by relaxing the body and mind. Studies have shown that massage therapy helps lower cortisol levels, an essential stress hormone. For example, a study of patients in a cardiac care unit found that massage by a specialist nurse significantly reduced cortisol levels in blood (Momeni, Arab, Dehghan, & Ahmadinejad, 2021). Massage therapy increases parasympathetic nervous system activity, which is associated with relaxation and stress reduction. For example, hand massage increases parasympathetic activity, as indicated by a significant increase in pNN50 and a decrease in heart rate, indicating a state of relaxation (Kunikata, Watanabe, Miyoshi, & Tanioka, 2012).

Massage can reduce anxiety through rhythmic pressure and slow, repetitive movements that stimulate skin mechanoreceptors and increase parasympathetic nervous system activity and decrease sympathetic responses. This can reduce heart rate, muscle tension, respiratory rate, and activation of the hypothalamic-pituitary-adrenal axis, as well as decrease cortisol levels. Reduced cortisol can reduce anxiety (Kunikata et al., 2012; Momeni et al., 2021). Parasympathetic activity and decreased muscle tension can stimulate the transition from wakefulness to sleep, while lower anxiety can reduce mental stress that disrupts sleep. Massage can also influence neurochemical pathways associated with relaxation and sleep regulation, including serotonin and melatonin activity. These effects can support longer sleep and shorten sleep latency. This mechanism is consistent with the improved sleep quality and decreased anxiety observed in both groups (Kudo & Sasaki, 2020; Ntoumas et al., 2025).

The significant decrease in anxiety in the aromatherapy massage group is also consistent with the literature, which suggests that aromatherapy, through inhalation, can influence the limbic system, which plays a role in regulating emotions and stress. Active components in essential oils, including citral in lemongrass, have been reported to have mild sedative and anxiolytic effects. In a study involving dental patients, inhalation of lemongrass essential oil significantly reduced systolic and diastolic blood pressure, heart rate, and anxiety scores during non-surgical periodontal treatment (Maybodi, Herandi, & Vaezpour, 2025). Another study showed that brief exposure to lemongrass aroma reduced subjective anxiety and tension in healthy volunteers exposed to anxiety-provoking situations (Goes et al., 2015).

However, the results of a between-group test showed no statistically significant difference between aromatherapy massage and massage without aromatherapy in reducing anxiety. This finding suggests that the effects of massage alone are strong enough to produce significant anxiety reduction, so the addition of aromatherapy did not provide a statistically significant increase in the effect. Similar results have been reported in several studies and meta-analyses, which suggest that although aromatherapy provides additional subjective benefits, the differences are often insignificant when compared with active relaxation interventions such as massage or therapeutic touch, as aromatherapy has only produced short-term improvements in anxiety, depression, and overall well-being (Džudžević-Čančar, Alispahić, Boškailo, & Dedić, 2025; Goes et al., 2015).



Regarding sleep quality, this study found significant improvements in both groups of middle-aged women after the intervention. The total sleep quality score decreased from 11.05 to 6.60 in the aromatherapy massage group, and from 8.40 to 4.60 in the non-aromatherapy massage group. Improvements were also observed in several components of sleep quality, including sleep latency, sleep duration, and daytime dysfunction. These findings are consistent with previous studies showing that massage lowers heart rate and improves sleep efficiency in older women and those with insomnia (Kudo & Sasaki, 2020; Ntoumas et al., 2025).

Aromatherapy has also been reported to improve sleep quality, primarily through its sedative and relaxing effects. Aromatherapy has been shown to significantly improve sleep quality across various populations, including those with insomnia, the elderly, and patients undergoing medical treatment (Shi, Liu, Fan, Peng, & Hu, 2025; Tang et al., 2021). However, as with the anxiety outcomes, the differences between the aromatherapy massage and non-aromatherapy massage groups in this study did not reach statistical significance, although clinically the aromatherapy group showed greater improvements in several sleep components.

There are a few reasons why there are no significant disparities between the groups. First, a typical massage is a treatment with a powerful, relaxing effect. This makes the extra benefit of aromatherapy minimal and hard to find statistically. Second, people's sensitivities to smells may vary widely based on past experiences, personal preferences, and the sensitivity of their noses, which increases data variability. Although studies have also noted that aromatherapy massage improves sleep quality in cardiac patients and caregivers (Chang, Lin, & Chang, 2017; Cheraghbeigi, Modarresi, Rezaei, & Khatony, 2019).

The results of this study are still important for clinical practice, nevertheless. The decrease in average anxiety levels and the improved sleep quality in the aromatherapy massage group indicate possible supplementary benefits from integrating massage and aromatherapy. These benefits may be especially pertinent in the realm of holistic nursing practice, where patients' felt comfort, relaxation, and subjective experiences are critical considerations, in addition to mere statistical relevance. Therefore, the results of this study support the use of massage as an effective non-pharmacological intervention and open the door to aromatherapy as a supportive therapy that can improve patients' experiences and clinical outcomes.

CONCLUSION

The research showed that both conventional massage and lemongrass aromatherapy massage effectively reduced anxiety and improved the quality of sleep in women. The intervention resulted in a substantial decrease in scores for both groups; however, there was no statistically significant difference between the aromatherapy massage group and the massage-only category. Nonetheless, the group undergoing aromatherapy massage showed a clinically significant decrease in mean scores. These results validate that massage is an advantageous non-pharmacological intervention for psychological well-being and sleep. At the same time, aromatherapy may serve as a complementary therapy that enhances the relaxing benefits in holistic nursing practice.

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