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Research Article

The Effect of Lavender Inhalation Aromatherapy on Sleep Quality of the Elderly at Tresna Werdha Social Institution Jambi City

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Abstract

Aims: This study was to determine the effect of lavender inhalation aromatherapy on the sleep quality of the elderly living at Tresna Werdha Social Institution in Jambi City.

Methods: This was a quasi-experimental research with 45 participants in the intervention group and 45 in the control group of the elderly. Sleep quality disorders were measured using the Pittsburgh Sleep Quality Index (PSQI). Univariate analysis and bivariate analysis with t-tes t.

Result: Disruption of sleep quality in the post-test intervention group (5.31 ± 0.793) was lower than in the pre-test (9.91 ± 2.548). Sleep efficiency disturbances are the least affected by interventions. There was a significant difference between the pre- and post-intervention groups, with p-value = 0.00.

Conclusion: This suggests that lavender inhalation may be particularly helpful in poor quality of sleep among the elderly. The study highlights the need for further research to explore optimal protocols for administering lavender inhalation aromatherapy, including dosage, duration, and frequency, to maximize its benefits on sleep quality among elderly populations. Additionally, investigating the long-term effects and safety of this intervention would be valuable for its integration into healthcare practices.

Keywords:
Aromatherapy, Elderly, Inhalation, Lavender, Sleep Quality

INTRODUCTION

The increase in the elderly population in the world will be around 6% in 2050, while the number of elderly in Indonesia will reach 18.1 million people or 7.6 percent of the total population (1). Indonesia is thought to have a sizable number of aging people due to its vast population and the elderly segment's quick rise. The number of old people in Indonesia has increased as a result of factors such as shifting birth rates, life expectancy, and demography (2). In Jambi Province, In 2050, the estimated percentage of the population elderly increased 4 times compared to 2010, namely from 8.52 percent in 2010 to 34.49 percent in 2050 (3).

Sleep problems are a major concern experienced by older people. In Indonesia, around 40% to 50% of older people experience sleep quality disorders, accompanied by other problems such as physical problems and psychiatric diseases (depression, anxiety disorders), which can cause quality sleep disorders. Previous research showed that in Budhi Dharma Nursing Home, 87.6% of the elderly experience sleep quality disorders. According to research conducted in

California, over 30% of elderly people sleep less than the recommended amount of ≥7 hours per day. Additionally, 9% have exhaustion throughout the day, 13% experience insomnia, and 18% experience poor sleep quality (4).The impact of sleep quality disorders results in a deterioration of independence, daily activities, and interests in the elderly, thus affecting their quality of life.

Poor sleep quality can have a major impact on the elderly, impacting various aspects of their physical health, mental well-being, and overall quality of life. Poor quality sleep can cause cognitive impairment, difficulty concentrating, and memory problems, which can impact daily functioning and independence (5). The elderly who experience poor quality sleep are at higher risk of developing mood disorders such as depression and anxiety, thereby exacerbating existing emotional problems and contributing to irritability and mood swings (6). Chronic poor sleep quality in older adults is associated with an increased risk of various health conditions, including cardiovascular disease (e.g. hypertension, heart disease), metabolic disorders (e.g. diabetes), and immune system dysfunction (7). Lack of sleep can also weaken the immune system, making older people more susceptible to infections (8). Poor of sleep or fragmented sleep can disrupt balance, coordination, and reaction time, thereby increasing the risk of falls and accidents in the elderly (9). Falls are a big worry for seniors because they can cause serious injuries and complications. Elderly people with poor sleep quality may experience decreased physical vitality, social engagement, and enjoyment of daily activities (10). Prolonged poor sleep problems can lead to feelings of tiredness, low energy levels, and a decreased sense of well-being (11). Poor sleep can worsen symptoms and make it difficult to treat this condition effectively. As health workers, nurses must try to help manage sleep quality problems in the elderly.

One of the non-pharmacological therapies that can help the elderly fall asleep quickly and efficiently is smelling fragrance. Aromatherapy given to the elderly who experience sleep quality disorders will make the olfactory cortex instruct the brain, and its impulses reach the limbic system (12). The brain will automatically release neurotransmitters (endorphins and serotonin) that sedate the elderly. Serotonin can produce melatonin, making a person sleepy and sleep soundly (13). Several previous studies have shown that lavender aromatherapy can help improve sleep quality in the elderly (14). The potential biomechanisms by which lavender aromatherapy may affect sleep is still an area of ongoing research, but several hypotheses and findings have emerged from previous research. Inhaling the scent of lavender can stimulate the limbic system, which can regulate emotions and promote relaxation, thereby facilitating sleep induction (15). Certain volatile compounds in lavender may act on neurotransmitter systems in the brain, such as serotonin and gamma-aminobutyric acid (GABA), which are involved in regulating mood and sleep-wake cycles. Lavender aromatherapy can affect the secretion of hormones such as cortisol (related to stress) and melatonin (a hormone that regulates the sleep-wake cycle) (16). Lavender has the potential to increase melatonin levels, thereby triggering drowsiness (17). However, earlier studies shown that sleep disorders were common among the elderly. The intended target demographic for this study was mostly elderly people who had poor sleep quality. Based on the description above, researchers are interested in researching to identify The Effect of Lavender Inhalation Aromatherapy On Sleep Quality Disorders Of The Elderly.

METHODS

The type of research used is quantitative, quasi-experimental, with a control group pre-test and post-test. Research data collection began on 20th May - 10th July

2023 at the Tresna Werdha Social Home, The sample used was 90 respondents who experienced sleep disorders (45 respondents for the intervention group and 45 respondents for the control group). The sampling technique was purposive sampling. The intervention group was given direct inhalation through an aroma diffuser to spread the scent of lavender in the elderly's bedroom before going to bed. Mix a few 7 drops of lavender essential oil with water according to the diffuser instructions. Determination of intervention and control groups using randomization. The Pittsburgh Sleep Quality Index (PSQI) is used to measure sleep quality. The statistical test used is the dependent t-test/paired sample t-test (normally distributed data) with a significance level of 95% ($\alpha = 0.05$).

RESULTS

Characteristics of Respondents

The results of the study of respondents' characteristics related to age and gender are in the following table:

Table 1. Characteristics of Respondents

Characteristic	Intervention Group		Control Group		P value
	f	%	f	%	
Gender					
Female	19	42.2	18	40.0	0,833
Male	26	57.8	27	60.0	
Age (year)					
60-65	24	53.3	23	51.1	0,835
66-75	21	46.7	22	48.9	

The results showed that most respondents were female in both groups, whereas in the intervention group, gender was (57.8%), and in the control group (60.0%). Most of the respondents' ages were in the late elderly stage, namely the intervention group (53.3%) and the control group (51.1%). Both groups are declared homogeneous because they have a p-value above 0.05

Analysis of the Sleep Quality Questionnaire

Table 2. Analysis of the Sleep Quality Questionnaire Pre-Post test Intervention group

Component	Pre Test				Post Test			
	0	1	2	3	0	1	2	3
	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)	f (%)
subjective sleep quality	18 (40)	11(24.4)	12(26.7)	4(8.9)	8(17.8)	25 (55)	9(20)	3(6.7)
Sleep latency	0	3(6,7)	39(86.7)	3(6.7)	18(40)	27(60)	0	0
sleep duration	1(2.2)	18(40.0)	25(55.6)	1(2.2)	16(35.6)	22(48.9)	7(15.6)	0
sleep efficiency	14(31.1)	10(22.2)	6(13.3)	15(33.3)	28(62.2)	9(20)	6(13.3)	2 (4.44)
Sleep Disorders	0	23(51.1)	21(46.7)	1(2,2)	1(2.2)	42 (93.3)	2 (4.4)	0

| Drug Use | 5(11.1) | 23(51.1) | 17(37.8) | 0 | 35(77.8) | 10(22.2) | 0 | 0 |
| Daytime Dysfunction | 13(28.9) | 18(40.0) | 14(31.1) | 0 | 9(20) | 31(68.9) | 5(11.1) | 0 |

Table 3. Analysis of the Sleep Quality Questionnaire Pre-Post test Control group

Control Group

Component	Pre Test				Post Test			
	0	1	2	3	0	1	2	3
	f(%)	f(%)	f(%)	f(%)	f(%)	f(%)	f(%)	f(%)
subjective sleep quality	15(3.33)	22(48.9)	7(15.6)	1(2.2)	14(31.1)	15(33.3)	15(33.3)	1(2.2)
Sleep latency	1(2.2)	2(4.4)	38(84.4)	49(8.9)	1(2.2)	3(6.7)	32(71.1)	9(20)
sleep duration	4(8.9)	13(28.9)	27(60.0)	1(2.2)	2(4.4)	11(24.4)	31(68.9)	1(2.2)
sleep efficiency	6(13.3)	12(26.7)	8(17.8)	19(42.2)	11(24.2)	15(33.3)	8(17.8)	11(24.4)
Sleep Disorders	0	24(53.3)	20(44.4)	1(2.2)	0	24(53.3)	19(42.2)	2(4.4)
Drug Use	10(22.2)	23(51.1)	12(26.7)	0	12(26.7)	20(44.4)	13(28.9)	0
Daytime Dysfunction	13(28.9)	18(40.0)	14(31.1)	0	12(26.7)	15(33.3)	18(40)	0

Based on Tables 2 and 3 of the questionnaire analysis above, it is known that the questionnaire item that was the least good in the intervention group pre-test was complaints about sleep efficiency < 65% (33.3%) of respondents and after being given treatment, there was a decrease to 4.4%. In the control group, it was found that the questionnaire item that was the worst in the pre-test was also sleep efficiency < 65%, namely 42.2%. Post-test results found that there were still 24.4% who had a sleep efficiency percentage < 65%.
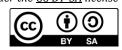
Effect of Lavender Inhalation Aromatherapy on Sleep Quality in Intervention and Control Groups
The results of the study show that there is an effect of giving lavender inhalation aromatherapy on the sleep quality of the intervention and control groups treatment in the following table:

Table 4. Effect of Lavender Inhalation Aromatherapy on Sleep Quality in Intervention and Control Groups

Sleep quality disorders	Intervention Group			Control Group		
	Mean	SD	p *Value*	Mean	SD	p *Value*
Pre Test	9.91	2.548		9.87	2.464	
			0.000			0.445
Post Test	5.31	0.793		9.93	2.544	

The results of the study showed that in the intervention group, the p-value of sleep quality disorder before and after the intervention was 0.000 (p < 0.05, while the control group had a p-value of 0.445 (p > 0.05). There was a significant difference in sleep quality between the two groups.

DISCUSSION

Respondent characteristics

The research results on the characteristics of the elderly at the Tresna Werdha Social Institution Jambi City found that in the intervention group, there were more women (57.8%). In the control group, there were more women (60.0%). Previous research states that gender is one of the factors that influence sleep quality (18), and other research shows that the majority of elderly who have poor sleep quality are 39.2% in women and 26.3% in men ($P < 0.01$) (19). There are changes in the hormones progesterone and estrogen due to menopause that cause receptors in the hypothalamus that directly impact circadian rhythms and sleep patterns, which can cause women to have poor sleep quality (20). Older women experience the menopause phase, so they experience a decrease in the hormone estrogen, which can affect their psychological condition, namely becoming more emotional, restless, and easily anxious, which makes older women have difficulty sleeping compared to older men.

The results showed that in the intervention group, the characteristics of respondents based on age were more late elderly (53.3%), and in the control group, there were also more late elderly (51.1%). Late elderly is someone aged 60-65 years. When a person enters old age, many changes occur in him, such as physiological, functional, and cognitive as well as psychosocial changes, and these problems can be overcome and become the goal of the establishment of social institutions so that this is the basis for the entry of most older people into social institutions. Previous research shows a relationship between age and sleep quality. The older you get, the worse your sleep quality will be. Sleep disturbances experienced by older people include waking up in the middle of the night (startled to hear a sound noise), feeling like going to the toilet in the middle of the night, feeling cold, and what most affects the quality of sleep is pain or soreness in the back or other parts of the body (21). The older a person gets, the more the older person's physical and health declines, complaints that result in sleep disorders can reduce the quality of sleep

The research results showed that sleep quality disturbances in the intervention group after treatment had a mean value (5.31) lower than in the pre-test (9.91), which means there has been an improvement in sleep quality among intervention respondents. Furthermore, in the control group, the mean score of post-test sleep quality did not improve from the mean score of pre-test sleep quality. Lavender flower aromatherapy contains linalool, which works as a sedative effect so that it can stimulate the olfactory nerve cilia receptors located in the olfactory epithelium to transmit the aroma to the olfactory bulb, which is connected to the limbic system. The most important parts of the limbic system related to smell are the amygdala and hippocampus, which are the centers of emotion and memory (including the aroma produced by lavender flowers). Next, through the hypothalamus, the fragrance is carried to the brain; small but significant is the raphe nucleus, which causes the release of serotonin, a neurotransmitter that regulates the onset of sleep (22). The results of this study are in line with research conducted in Iran that after being given lavender aromatherapy inhalation, the mean sleep quality of the intervention group was better than the control group (23,24). Intervention Lavender inhalation therapy every 2 times a week before bed can improve the sleep quality of older people (25).

Sleep is a physiologically natural process because when a person falls asleep, his body and mind will also rest; skeletal muscle activity, body metabolism, and the individual's reaction to the environment decrease (26). Sleep quality includes quantitative aspects of sleep, such as sleep duration latency, and subjective aspects, such as sleep at night and rest. Good sleep quality can be seen in signs of quality sleep, including looking fresh and fit when you wake up. Sleep needs are met according to a person's age level. The standard sleep requirement for older adults is 6 hours/day (25)

Based on the analysis of PSQI (7 Dimensions) questionnaire items carried out by researchers in the pre-test of the intervention group, the worst dimension was sleep efficiency < 65%: 33.3% of respondents after being given the intervention became 4.4%, there was a decrease of 28.9%. Furthermore, in the control group, it was found that the worst questionnaire item in the pre-test was also sleep efficiency, 65%: 42.2% of respondents, and post-test results were 24.4%; there was a slight decrease compared to the intervention group (17.8%). Sleep efficiency is the total time spent sleeping, namely the ratio of the total time spent sleeping (total sleep time) in one night compared to the total amount of time spent in bed, and good sleep efficiency is at a percentage of > 85% (27). Based on the questionnaire analysis carried out by researchers on the PSQI questionnaire items, it is known that in the assessment of the sleep quality questionnaire in the intervention group, during the pre-test, it was found that as many as 24.4% of respondents were only able to fall asleep after 55 minutes. The average time needed by all respondents to sleep was 56.3 minutes. After treatment, 46.7% of respondents could sleep after 10 minutes. The average time required by all respondents to sleep was only 14.6 minutes. Furthermore, in the control group, the pre-test found that 28.9% of respondents could

only fall asleep after 55 minutes. The average time needed by all respondents to sleep was 57.3 minutes. Post-test results found that 24.4% of respondents could sleep after 55 minutes. The average time required by all respondents to sleep was 59.3 minutes, so it can be concluded that there was no change in the control group.

The process takes longer for the elderly to enter a state of sleep, and their deep sleep will be fewer and shorter. One form of the normal aging process can be changed in sleep patterns caused by physiological and neurological reasons and is also often associated with pathological processes experienced by the elderly (28). Analysis of the follow-up questionnaire that the researchers carried out on the PSQI questionnaire revealed that in the intervention group, only 2.2% of respondents could sleep > 7 hours during the pre-test. After being given treatment, 35.6% of respondents could sleep > 7 hours. Furthermore, in the control group, during the pre-test, it was found that 8.9% of respondents could sleep > 7 hours, but during the post-test, only 4.4% of respondents could sleep > 7 hours. In the control group, there was no change in sleep time. The adequacy of rest and sleep in the elderly is very different from other age categories, and the elderly need at least 6 hours of sleep every night. Going back to sleep when waking up at night requires an older adult longer (29). The research results showed that in the intervention group, during the pre-test (73.3%), respondents experienced nightmares, and after being given treatment, 40.0% of respondents never experienced nightmares again. Furthermore, in the control group, during the pre-test, it was found that 71.1% of respondents experienced nightmares, but during the post-test, there were still 68.8% who experienced nightmares. In the control group, there was no change in the nightmares experienced during sleep. Nightmares are dreams that cause someone to feel anxious or afraid. Nightmares often wake sufferers from sleep. All age groups,

including the elderly, can experience this condition. Nightmares are often referred to as nightmares or parasomnias, and this is a common condition experienced by almost everyone. However, if they occur frequently, nightmares can cause sleep disturbances (30)

Sleep disorders in the elderly resulting from nightmares can be avoided with non-pharmacological methods such as minimizing the use of coffee, tea, soda, alcohol, and smoking before bed. Other conditions that can reduce nightmares are limiting naps (< 30 minutes), going to bed only when sleepy, maintaining a comfortable temperature in the bedroom, and minimizing loud noises, bright lights, and temperatures that are too hot and too cold (31). This significant influence and difference is because the intervention group was given lavender aromatherapy inhalation treatment, while the control group was not given treatment. Lavender aromatherapy given to elderly people who experience decreased sleep quality will make the olfactory cortex order the brain, and its impulses reach the limbic system; the brain will automatically release neurotransmitters (endorphin and serotonin) which have a sedative effect on the elderly (27). Serotonin can produce melatonin, making a person sleepy and sleep soundly (13). Aromatherapy essential oil is believed to be able to help overcome sleep problems in the elderly because the flowers contain linalool and, linalyl acetate, melatonin, which can cause a calm response for those who inhale it (32).

LIMITATION

Limitations in the study focused on the short-term effects of lavender aromatherapy on sleep quality, providing limited insight into its ongoing benefits over a longer period. Longitudinal studies are needed to evaluate the durability of improvement and the potential impact of habituation over time.

CONCLUSION

This research shows that nurses can plan to provide lavender inhalation aromatherapy to elderly patients to improve their sleep quality. It has been proven that elderly patients with sleep problems can achieve better quality sleep when they inhale lavender aromatherapy.

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