

The Effect of Aromatherapy on Sleep Quality and Fatigue Level of the Elderly

A Randomized Controlled Study

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This randomized controlled experimental study was conducted to determine the effect of inhaled aromatherapy on the sleep quality and fatigue level of the institutionalized elderly. The sample of the study consisted of a total of 59 elderly individuals (30 in the intervention group and 29 in the control group) who met the inclusion criteria and agreed to participate in the study. Aromatherapy (lavender oil) inhalation was administered to individuals in the intervention group half hour before their sleep every day for a month in accordance with aromatherapy protocol. No administration was applied to the control group. The data were collected using the Elderly Description Form, Pittsburgh Sleep Quality Index, and Fatigue Severity Scale. Forms were completed in the beginning of administration and in the follow-up at the end of 4 weeks (baseline and last follow-up). In the study, it was determined that aromatherapy administration improved sleep quality ($P < .001$) and decreased fatigue severity in the elderly ($P < .05$). The study should be replicated in a different group. **KEY WORDS:** *aromatherapy, elderly, fatigue, nursing, sleep quality* *Holist Nurs Pract* 2020;34(3):155–162

INTRODUCTION

Due to the aging of the world population, the gradual increase of the elderly population, and age-related physiological changes, a number of problems arise.¹ Aging brings challenges including chronic diseases, balance disorder, osteoporosis, urinary retention, urinary incontinence, orientation disability, fatigue, and sleep disorders in the elderly.^{1,2} The elderly frequently experience sleep problems due to chronic diseases, pain, neurological and psychiatric disorders, which affect their general health condition and quality

of life negatively.³ In a study by Gümüş et al,⁴ it was determined that the elderly were primarily diagnosed with poorer sleep patterns (60.6%), a reduction in social interaction (60.6%), and fatigue (54.5%). Long-term sleep disorder may increase fatigue, daytime sleepiness, depression, anxiety, irritability, and pain sensitivity and cause shivering, immunosuppression, reduced mental functions, and impaired general health and functional condition.⁵ Thus, chronic sleep disorders and fatigue may become a morbidity-related situation by decreasing the quality of life in the elderly. Older individuals need quality sleep to maintain their optimum life quality and protect their mental functions.⁶ Sleep quality contributes to the individual feeling fit and ready for a new day after waking.⁷

Sleep problems may be treated by pharmacological and nonpharmacological methods. Pharmacological treatments are usually based on the utilization of hypnotics (benzodiazepines: oxazepam, triazolam, and diazepam; and nonbenzodiazepines: zolpidem, zaleplon, and ramelteon), melatonin receptor antagonists, and antidepressants.⁵ Pharmacological treatments may cause various complications in the elderly. Therefore, it is important to investigate

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alternative strategies for sleep management.⁸ Nonpharmacological approaches heal sleep problems at the rate of 70% to 80% and could be used as a first step of treatment especially in older individuals who frequently experience drug interactions.^{9,10} Nonpharmacological methods for sleep problems include a number of methods such as massage, listening to music, progressive relaxation exercises, phototherapy, and aromatherapy.^{9,11,12}

Aromatherapy is a natural treatment in which essential oils derived from plants are applied via massage, friction, inhalation, compress, and bath. The safest way of using essential oils is inhalation and cutaneous administration.¹³ Lavender oil is among the most commonly used essential oils. It has an antiseptic, anti-inflammatory, pain-relieving, and relaxing effect in general and prevents sleep problems.¹³⁻¹⁶

Insufficient and inadequate sleep is of particular importance for the elderly in terms of a number of problems it causes. Nurses are members of the medical team who provide patient care continuously, determine problems first, administer medication, and implement nonpharmacological treatment approaches efficiently.

This randomized controlled trial was conducted to determine the effect of aromatherapy, applied to the elderly living in a nursing home via inhalation on the sleep quality and fatigue level.

METHODS

Study design and sample

This randomized controlled trial was conducted in a nursing home (Ordu Ahmet Cemal Mağden Nursing Home) located in a city center in Turkey. The population of the study consisted of all elderly individuals (65 years and older) (110) in the nursing home. Thirty subjects did not meet inclusion criteria and 21 subjects refused participation. The sample of the study, on the other hand, consisted of a total of 59 individuals including 30 in the aromatherapy group and 29 in the control group, and as a result of the power analysis, it was concluded that the sample size was adequate (Figure 1). Each older individual in the sample group was given a number; the numbers were entered into the computer and elder individuals were separated into the aromatherapy and control groups based on the randomization list on the

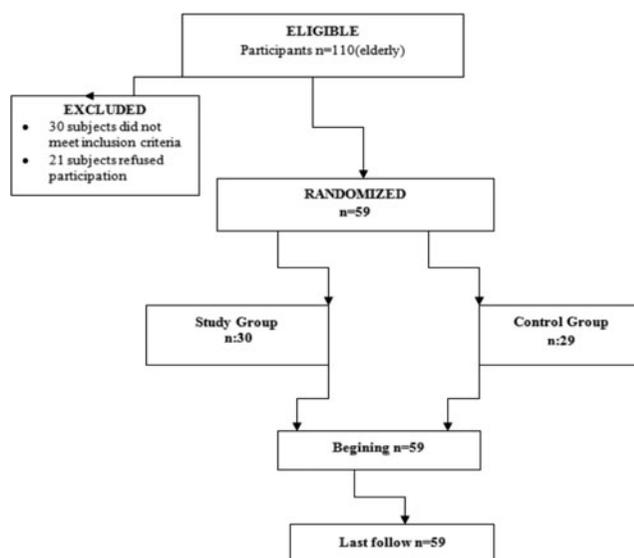


FIGURE 1. Sample diagram.

computer. According to the power analysis, $\alpha = 0.05$ and $\beta = 0.20$, and the power of the study was calculated as 0.94.

Ethical aspect of the study

In order to conduct the study, an Ethics Committee Approval from the Ethics Committee of Atatürk University Faculty of Health Sciences and a written institutional permission, from the center where the study was conducted, were obtained. Individuals who were included in the study were informed about the objective of the study and their informed consents, both verbal and written, were received.

Data collection

The data of the study were collected by using the Elderly Description Questionnaire, Pittsburgh Sleep Quality Index (PSQI), and Fatigue Severity Scale (FSS) before starting the administration. The PSQI and the FSS were completed again 1 month after the administration.

The inclusion criteria of the study were as follows:

- Having inadequate sleep problem for at least 3 months
- PSQI score ≥ 5
- FSS score ≥ 5
- Full ability to smell
- Full ability to see
- Full ability to hear
- Being open to communication and cooperation

- Having no psychiatric history
- Agreeing to participate in the study

Exclusion criteria of the study were as follows:

- Using antidepressants, antihistamines, diuretics, hypnotics, benzodiazepines, and narcotic analgesics that affect the sleep quality
- Being allergic to any odor
- Suffering from a respiratory disease such as asthma and chronic obstructive pulmonary disease

Termination criteria of the study were as follows:

- Developing an allergy or feeling unwell during the procedure
- Withdrawing from the study

Group 1: 3% lavender oil was administered to the aromatherapy group via inhalation. Two drops of lavender oil were dripped on a 2 × 2-cm cotton pad between 22.00 PM and 08.00 AM every night for a month. The forms were also completed before and after the administration.

Group 2: No aromatherapy was administered to the control group. The forms were also completed before and after the administration.

Elderly Description Questionnaire

Prepared by the investigators based on the literature review,^{3,6,17} the questionnaire consists of 8 questions including descriptive characteristics and sleep features of the elderly.

Pittsburgh Sleep Quality Index—PSQI

The index was developed by Buysse et al¹⁸ and its Turkish validity and reliability study was conducted by Ağargün.¹⁹ In the study, the Cronbach α value of the index was found as 0.97. In the present study, on the other hand, the Cronbach α value of the scale was found as 0.82. The PSQI is a self-report scale of 19 items evaluating sleep quality and disorder. The index consists of 7 subscales evaluating subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction.

Each item of the test is scored between 0 and 3 as follows: 0 if none during the last month, 1 if less than once a week, 2 if once or twice a week, and 3 if 3 or more times a week. In the questionnaire, sleep quality is evaluated as very good (0), fairly good (1), fairly bad (2), and very bad (3). Total score varies between

0 and 21. A total score of 5 or higher indicates a clinically poor sleep quality in a significant way.^{18,19}

Fatigue Severity Scale—FSS

The FSS was developed by Krupp et al²⁰ in 1988 for measuring the fatigue severity in patients with multiple sclerosis. The scale was adapted into Turkish by Armutlu et al.²¹ The FSS was used to determine the level of fatigue in the elderly by Soyuer and Şenol.²² The scale consists of 9 items and is a Likert-type scale. Each question is scored between 1 (strongly disagree) and 7 (strongly agree). The FSS score is the mean value of 9 sections. A high score signifies an increased fatigue severity. If the mean score in the FSS is 5 or higher, it is evaluated as “fatigue is experienced.”²⁰⁻²²

Process

Control group

No aromatherapy was applied to the control group. The Elderly Description Questionnaire, PSQI, and FSS were administered by the researcher to the elderly in the control group during the first follow-up. Their last evaluations were made using the PSQI and the FSS during the second follow-up 1 month later.

Study group

The Elderly Description Questionnaire, PSQI, and FSS were administered by the researcher to the elderly in this group during the first follow-up. Their last evaluations were made by using the PSQI and the FSS during the second follow-up 1 month later. As is seen in Figure 2, the administration was conducted in accordance with the administration protocol that was designed by reviewing the literature. The administration protocol was developed by reviewing the relevant literature for lavender oil inhalation.^{17,23,24} Lavender oil was administered after being prepared by an expert aromatherapist. The reason for choosing lavender oil in the aromatherapy administration is that lavender oil is the least toxic oil that is most frequently used for symptoms of sleep problems, stress, anxiety, and fatigue in the literature.^{17,23-28}

During the administration, 2 drops of lavender oil were dripped on a 2 × 2-cm cotton pad and placed on a stand approximately 15 to 20 cm far from the nose so that they could inhale it. The administration was conducted between 22.00 PM and 08.00 AM by considering the sleeping hours of the elderly. It was continuously performed every day for a month. The

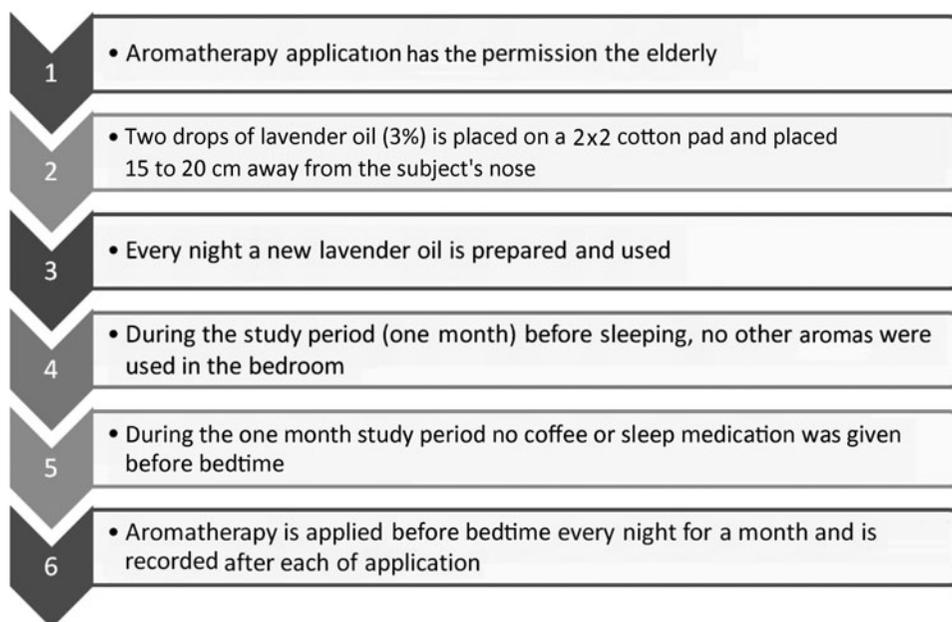


FIGURE 2. Aromatherapy practice guide.

researchers guided the elderly during all administrations.

Aromatherapy administration

Lavender oil administered to the patients in the aromatherapy group was supplied from essential oils produced by the same company. The oils were kept in dark-color glass bottles with (5 mL) drip caps. The bottles were closed with safety caps that could only be opened with a strong pressure so that the oils would have no contact with air. The oils were kept under proper conditions according to expert opinions. During the study, routine treatments of patients in the control and aromatherapy groups were not modified or discontinued. Sleep and fatigue treatment was based on aromatherapy according to the evidence-based aromatherapy inhalation administration guidance.^{17,23-28}

Data assessment

The data acquired from the study were assessed using the IBM SPSS Statistics 22.0 packaged software (IBM Corp, Armonk, New York). While χ^2 and independent Student's *t* test were used to evaluate the distribution of the data, independent Student's *t* test to evaluate PSQI and FSS scores obtained from the aromatherapy and control groups and paired sample Student's *t* test to assess the differences before and after the

administration and Bonferroni in advanced analysis were used. The value of $P < .05$ was accepted to be statistically significant.

RESULTS

This study was completed with a total of 59 elderly individuals including 30 in the aromatherapy group and 29 in the control group. It was determined that 73.3% of the elderly individuals in the aromatherapy group were male, 40.0% were primary school graduates, 73.3% had at least one chronic disease, 96.6% woke up at least once at night, and 46.7% slept in the daytime. Their average age was determined as 74.50 ± 6.62 and duration of staying in the institution was 4.34 ± 3.77 years.

On the other hand, 86.2% of elderly individuals in the control group were male, and 55.2% were primary school graduates. In addition, it was determined that 75.9% had at least one chronic disease, 86.2% woke up at least once at night, and 55.2% slept in the daytime. Their average age was 72.00 ± 7.94 and duration of staying in the institution was 2.78 ± 4.11 years. The aromatherapy and control groups were similar in terms of these variables ($P > .05$). These results showed that the groups had a homogeneous distribution (Table 1).

It was determined that there was a significant difference between PSQI and FSS pre-/posttest scores

TABLE 1. Descriptive and Disease Characteristics of Participants in the Aromatherapy and Control Groups (n = 59)

Characteristics	Aromatherapy Group (n = 30)		Control Group (n = 29)		Test P
Age, mean ± SD, y	74.50 ± 6.62		72.00 ± 7.94		1.315 ^a .194
Stay in institution, mean ± SD, y	4.34 ± 3.77		2.78 ± 4.11		1.518 ^a .134
Gender					
Female	8	26.7	4	13.8	1.508 ^b
Male	22	73.3	25	86.2	.219
Education status					
Not literate	11	36.7	11	37.9	3.333 ^b
Primary school	12	40.0	16	55.2	
Middle school	7	23.3	2	6.9	.189
Chronic illness status					
Yes	22	73.3	22	75.9	0.050 ^b
No	8	26.7	7	24.1	.824
Waking at night					
Yes	28	96.6	25	86.2	1.970 ^b
No	1	3.4	4	13.8	.160
Daytime sleepiness					
Yes	14	46.7	16	55.2	0.427 ^b
No	16	53.3	13	44.8	.514

^aIndependent *t* test.
^b χ^2 analyses.

of the elderly in the aromatherapy group (PSQI: $t = 5.370, P < .001$; FSS: $t = 2.443, P = .021$). Individuals' sleep quality improved and fatigue severity levels significantly decreased after the aromatherapy administration (Table 2). It was determined that there was no significant difference

between PSQI and FSS pre-/posttest scores of those in the control group (PSQI: $t = 0.189, P = .951$; FSS: $t = 0.207, P = .838$).

It was observed that there was a statistically significant difference between the pretest and posttest scores obtained by the elderly in the aromatherapy

TABLE 2. Pittsburgh Sleep Quality Index and Fatigue Severity Scale Subdimension Scores of the Participants in the Aromatherapy and Control Groups

Scales	Aromatherapy Group (n = 30)		Control Group (n = 29)		Test ^a P
	Mean ± SD		Mean ± SD		
PSQI beginning	8.10 ± 3.13		8.17 ± 3.01		$t = -0.478$.634
PSQI last follow-up	5.06 ± 2.51		8.00 ± 2.96		$t = -3.669$.001
Test ^b	$t = 6.474$		$t = 0.324$		
P	<.001		.951		
FSS beginning	4.66 ± 1.40 (2.32-6.41)		4.73 ± 1.22 (2.52-6.65)		$t = -0.761$.450
FSS last follow-up	3.77 ± 0.68 (1.42-5.64)		4.66 ± 1.33 (1.93-6.56)		$t = -2.531$.014
Test ^b	$t = 2.443$		$t = 0.207$		
P	.021		.838		

Abbreviations: FSS, Fatigue Severity Scale; PSQI, Pittsburgh Sleep Quality Index.
^aPaired sample *t* test.
^bIndependent sample *t* test

group from the subscales of the PSQI ($P < .05$). It was determined that there was a significant decrease in elderly subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, and daytime dysfunction, which are among the subscales of the PSQI, after the aromatherapy administration ($P < .05$). It was determined that there was no statistically significant difference between the pretest and posttest scores obtained by individuals in the control group from the subscales of the PSQI ($P > .05$) (Table 3).

DISCUSSION

Aromatherapy is one of the most frequently used nursing practices in recent years because it has fewer side effects than medication, provides the feeling of well-being, and is low-cost.¹⁶ Studies on animals have showed that some essential oils such as bergamot, sweet orange, lemon, rose, cedar, and lavender have sedative-soothing effects.²⁸ Inhalation of hypnotic essential oils is one of the effective and safe methods in treatment of sleep disorders.^{13,28} There are many studies indicating that lavender oil, one of the most frequently used aromatherapy oils, is effective in the solution of sleep and fatigue problems.^{24,29-34} However, there are a limited number of studies investigating sleep and fatigue problems that are frequently encountered in the elderly. This study revealed the effect of aromatherapy, which was

administered to the elderly with lavender oil, on the sleep quality and fatigue level.

In the present study, it was determined that aromatherapy applied via inhalation to a sample of elderly (59) nursing home residents who resided in the nursing home for a month increased their sleep quality and decreased their fatigue level. In their study, Joseph and Joseph⁹ determined that aromatherapy applied to the elderly via inhalation for 5 days enhanced sleep quality.

In the study conducted by Ko¹⁷ with 39 elderly individuals in a nursing home, it was found that lavender oil inhalation applied to the intervention group before sleeping for 7 days increased sleep quality. When examining the studies conducted in different patient groups, it was determined that aromatherapy applied to patients in the intensive care unit with lavender oil enhanced sleep quality.²⁹⁻³² Afshar et al³³ conducted a study with 158 women in the postpartum period and revealed that lavender oil applied to the intervention group via inhalation for 8 weeks significantly increased the sleep quality of women. These results support the results of the present study. On the other hand, in the study conducted by Lee²⁴ with mothers in the postpartum period, it was determined that aromatherapy applied with lavender oil had no effect on sleep quality, sleep duration, nighttime waking frequency, and sleep satisfaction.

In this study, it was determined that aromatherapy with lavender oil applied to the elderly decreased the

TABLE 3. PSQI Subscale Scores of the Participants in the Aromatherapy and Control Groups^a

PSQI Subscale Scores	Aromatherapy Group (n = 30)			Control Group (n = 29)		
	Beginning Mean ± SD	Last Follow-up Mean ± SD	Test ^a P	Beginning Mean ± SD	Last Follow-up Mean ± SD	Test ^b P
Subjective sleep quality	0.76 ± 0.97	0.10 ± 0.30	3.673 .001	0.41 ± 0.62	0.24 ± 0.43	1.410 .169
Sleep latency	2.10 ± 1.06	1.16 ± 0.79	4.597 >.001	2.37 ± 0.90	2.34 ± 0.93	0.189 .851
Sleep duration	1.63 ± 0.96	1.16 ± 0.91	3.120 .004	1.72 ± 0.92	1.75 ± 0.95	-0.254 .801
Habitual sleep efficiency	1.00 ± 1.17	0.60 ± 0.96	2.350 .026	0.93 ± 0.92	1.00 ± 1.00	-0.465 .646
Sleep disturbance	1.26 ± 0.44	1.00 ± 0.37	2.804 .009	1.34 ± 0.48	1.44 ± 0.50	-1.00 .326
Daytime dysfunction	1.23 ± 0.50	1.03 ± 0.18	2.693 .012	1.17 ± 0.38	1.13 ± 0.35	0.372 .712

Abbreviation: PSQI, Pittsburgh Sleep Quality Index.

^aPSQI score differences: score taken from last follow-up subtracted from score taken from the baseline follow-up.

^bPaired sample *t* test.

fatigue severity. No study determining the effect of aromatherapy on fatigue of the elderly was found; on the other hand, the study conducted by Lee²⁴ on postpartum mothers indicated that aromatherapy decreased the fatigue level. In the study conducted by Muz and Taşçı³⁴ with patients undergoing hemodialysis, aromatherapy applied via inhalation enhanced sleep quality and decreased fatigue severity. In their study conducted with 60 nurses working in shifts, Sihyun et al³⁵ determined that aromatherapy inhalation applied via lavender and rose oil enhanced sleep quality and decreased fatigue level.

Limitations of the study

In this study, short-term effects of lavender oil inhalation were evaluated. Thus, it is possible to state that lavender oil has short-term effects on sleep quality and fatigue level. It is recommended studies evaluating long-term effects of aromatherapy on the elderly be conducted.

CONCLUSION

The effect of lavender oil inhalation, applied for one month for 30 minutes before bedtime, on the sleep quality and fatigue severity of the elderly nursing home residents was evaluated:

- Sleep quality of elderly in the nursing home increased.
- Fatigue severity of elderly in the nursing home decreased.

The effect of lavender oil inhalation on sleep quality and fatigue severity in the elderly in the nursing home had not been investigated in Turkey before, and in this study, it was observed to be effective. Nurses who work in institutions can utilize the noninvasive, inexpensive, safe, and easy-to-apply aromatherapy administration for the purpose of enhancing sleep quality and decreasing fatigue severity of elderly within the scope of their independent nursing roles because they evaluate the general health of the elderly.

In addition, it is recommended to conduct double-blind randomized controlled studies on this subject. The results of the studies and the long-term effects can be evaluated within 6 months to 1 year.

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