

# The Evaluation of the Effect of Aromatherapy with Lavender Essential Oil on the Quality of Sleep of Cardiac Patients Candidate for Angiography

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## ABSTRACT

**Introduction and Purpose:** Sleep disorders are one of the most common problems in hospitalized patients, and can lead to serious effects on patients' health and speed of recovery. This study aimed to investigate the effect of aromatherapy with lavender essential oil on the quality of sleep of cardiac patients candidate for angiography in the intensive care unit.

**Materials and Methods:** This clinical trial study was performed on 70 patients candidate for angiography in the cardiac intensive care unit of the Ali-Ibn-Abitaleb hospital of Rafsanjan in 2019. Patients entered the study according to the criteria of entry and exit and after obtaining written informed consent from them and they were randomly classified into two groups of intervention and control by classification by minimization by age and gender. The patients then completed the St. Mary's Hospital Sleep Questionnaire. In the intervention group, a cotton swab impregnated with 15 drops of lavender essential oil and then pinned to the patient's pillow. In the control group, a cotton swab impregnated with 15 drops of water and then pinned to the patient's pillow. The next morning, the mentioned questionnaire was completed again by the patients and the data were collected. The data were analyzed using SPSS 18 software, through performing paired t-test, the Chi-square test, the independent t-test, and Fisher's exact test, and  $p < 0.05$  was considered significant.

**Results:** There was no significant difference between the two groups in terms of demographic characteristics. The sleep quality of both groups was poor before the intervention, and there was no significant difference between the groups. After performing aromatherapy, the quality of sleep in the intervention group improved significantly compared to the control group. And the sleep quality scores of the two groups show a statistically significant difference ( $p < 0.00001$ ).

**Conclusion:** Aromatherapy with lavender essential oil, which is a non-invasive, easy, and low-cost technique with low side effects, improves patients' sleep quality, so this method can be used to increase patients' sleep quality.

**Keywords:** Aromatherapy, Lavender Essential Oil, Sleep Quality, Patients, Angiography

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## INTRODUCTION

Cardiovascular diseases are one of the leading causes of death worldwide and are responsible for at least one-third of deaths in individuals over age 35. Studies have shown that by 2020, cardiovascular diseases will have 25 million victims<sup>1</sup>. Today in Iran, cardiovascular diseases are one of the most common causes of death, so that studies have shown that the mortality rate from cardiovascular diseases in five consecutive years in Iran indicates that 46.04% of all deaths were due to cardiovascular diseases<sup>2</sup>. Today, deaths from cardiovascular diseases, especially coronary heart disease, have dropped dramatically compared to previous years. One of the reasons for this decline is the improvement of diagnostic techniques.

Angiography is the most definitive method of diagnosing cardiovascular diseases, which determines the treatment process<sup>3</sup>. However, due to its aggressive nature, this method causes anxiety in patients and subsequently disrupts the patients' sleep<sup>4</sup>. Sleep is an organized behavior that is repeated as a vital necessity based on the biological rhythm. Sleep helps to regenerate mental and

physiological powers, and any disturbance in it reduces a person's physical and mental functioning<sup>5</sup>. Inadequate sleep increases the risk of obesity, diabetes, heart disease, and depression, and the result of this sleep disorder is often daily fatigue. People with sleep disorders report an inability to perform daily tasks such as memory, learning, logical reasoning, and math operations<sup>6</sup>. Decreased sleep quality in hospitalized patients is a common problem, especially in the intensive care unit, and can lead to serious effects on patients' health and speed of recovery.

Patients' sleep patterns during hospitalization are affected by a variety of factors, including the hospital and the severity of the disease. The rate of change in the daily sleep and wakefulness patterns depends on the patient's physical condition and the physical agents around the patient, such as light, sound, and so on. In the study of the relationship between the severity of the disease and the sleep disorder in patients admitted to the intensive care unit, sleep disorders were more common in patients who died and in patients who were more severely ill than in other patients who survived<sup>7</sup>. Insomnia increases the contractile power of the heart muscle and thus increases

the oxygen demand in the heart. On the other hand, due to increased secretion of epinephrine and norepinephrine, followed by the increased activity of the sympathetic nervous system, the heart rate and respiration rate increase, and the risk of cardiac arrhythmias increases, which exacerbates ischemia and causes myocardial infarction<sup>8</sup>.

The use of pharmacological and non-pharmacological methods is one of the common treatment methods to increase the quality of patients' sleep. Various medications are used to treat sleep disorders in patients. Diazepam and Oxazepam are among the most commonly used benzodiazepine drugs. Although these drugs have had acceptable effects and are relatively safe and secure, they have many side effects that are commonly seen in high-dose and long-term use<sup>9</sup>. Today, the use of non-pharmacological methods, including the use of complementary and alternative medicine (CAM) methods to treat sleep disorders, has become commonplace. One of the reasons why complementary therapies are considered today is the high cost of health care<sup>10</sup>. Aromatherapy is the use of essential oils of aromatic plants such as mint, sweet marjoram, rose and lavender to help reduce physical problems and improve the overall quality of life.

It is claimed that the benefits of aromatherapy include promoting relaxation and sleep, relieving pain, and reducing depressive symptoms<sup>11</sup>. One of the most common essential oils used in aromatherapy is the lavender essential oil. Lavender belongs to the Lamiaceae family. This plant has long been used in traditional medicine. Lavender is a plant with narrow and reddish cilia, similar to that of barley, and its leaves are longer than the barley leaf. The woods of this plant have a brown color, and its taste is spicy and bitter. The lavender temperament is primarily warm, and secondly, it is dry. The reason why this plant is used in aromatherapy is that it can play its analgesic and anticonvulsant sedative effects through the neurological system. Also, the linalool and linalyl acetate in this plant can stimulate the parasympathetic system; Linalyl acetate also has narcotic properties, and the Linalool acts as a sedative. Its constituent varies in concentration and therapeutic effects with the different species<sup>12</sup>.

Various studies have measured the effects of aromatherapy with lavender essential oil on the quality of sleep in patients, which have shown different results; These include the effect of lavender essential oil on improving sleep quality in people with chronic insomnia<sup>13</sup>, improving heart rate and sleep quality in middle-aged women<sup>14</sup>, and increasing deep sleep in young people<sup>15</sup>. However, research findings on the effectiveness of aromatherapy on improving sleep quality are contradictory. For example, review studies have shown that aromatherapy with lavender essential oil does not have a significant effect on sleep quality<sup>16</sup>. Another study also found that aromatherapy did not affect the quality of sleep in children with autism<sup>17</sup>. Another study on the effect of aromatherapy with lavender essential oil on the sleep quality of patients candidate for angiography did not show an improvement in patients' sleep quality<sup>18</sup>.

Considering the negative effect of sleep disorders on patients' physiological conditions and the existence of contradictions about the effect of lavender essential oil on

sleep quality, and considering the ease of using aromatherapy even by the individual, this study aimed to investigate the effect of aromatherapy with lavender essential oil on the quality of sleep of cardiac patients candidate for angiography in the intensive care unit.

## MATERIALS AND METHODS

This clinical trial study was performed in 2019 on 70 patients with acute coronary syndrome hospitalized in the cardiac intensive care unit of the Ali-Ibn-Abitaleb hospital of Rafsanjan who were candidates for angiography. The study plan was approved by the ethics and research committee of Rafsanjan University of Medical Sciences with the code IR.RUMS.REC.1397.025, and was registered in the Iranian Database of Clinical Trials with the code IRCT20180919041067N1. To determine the sample size based on the previous study (24) and using the following statistical formula, considering  $\alpha = 0.05$ ,  $\beta = 10\%$ ,  $d = 4$ , and  $\sigma = 4.54$ , the minimum sample required for each group was estimated to be 27 (27.05) patients. For added assurance, 35 people were selected for each group (intervention and control).

$$n = 2(z_{1-\alpha/2} + z_{1-\beta})^2 \sigma^2 / d^2$$

Written informed consent was obtained from each patient to participate in the study. Samples were selected by the convenient method and then randomly classified into two groups of intervention and control by classification by minimization by age and gender. Entry criteria included: 40-60 years old, confirmation of acute coronary syndrome by a cardiologist, willingness to participate in the study, no confirmed mental disorder, no history of asthma, no history of allergy to plants or any seasonal allergies, lack of olfactory disorder, lack of severe pain causing sleep disorders and the sleep quality score be at least 21. Exit criteria included: the absence of cooperation or patient satisfaction, the occurrence of any event in the ward leading to sleep disorders, the need for mechanical ventilation, and life-threatening complications such as cardiopulmonary resuscitation. To collect the data in this study, two questionnaires were used, one of which includes a demographic profile and the second questionnaire is the St Mary's Hospital Sleep Questionnaire (SMHSQ).

The standard St. Mary's Hospital Sleep Questionnaire assesses the mental quality of a person's last night's sleep. The questionnaire includes 14 questions related to last night's sleep quality and time to fall asleep and wake up. The answers to qualitative questions are based on the Likert scale and in quantitative questions based on time and are evaluated comparatively before and after the intervention. The score range is 11-44 based on the Likert scale. The lowest score of sleep disorder is 11, which is interpreted as lack of sleep disorder; And the highest score is 44, which indicates the highest rate of sleep disorder. A score of 11-21 is a mild sleep disorder, 22-32, moderate sleep disorder, and 33-44, severe sleep disorder. The reliability of the sleep quality questionnaire has been investigated in some studies. Abolhassani's study confirmed the reliability of the questionnaire using Cronbach's alpha of 91% and confidence of 0.99 (19).

Patients completed the St. Mary's Hospital Sleep Questionnaire before the intervention. In the intervention group, a cotton swab impregnated with 15 drops of 20% lavender essential oil from Barij Essence Pharmaceutical Company of Kashan and then pinned to the patient's pillow. In the control group, a cotton swab impregnated with 15 drops of water and then pinned to the patient's pillow. The next morning, the questionnaires were completed again by the patients and the data were collected. The data were analyzed using SPSS 18, through performing paired t-test, the Chi-square test, the independent t-test, and Fisher's exact test.

**Findings:** In general, the mean and standard deviation of patients' age in the intervention group was  $53.74 \pm 7.85$  and  $54.51 \pm 7.00$  in the control group and this difference was not statistically significant ( $P = 0.666$ ). In both groups, most patients were male (74.28%) and had a history of hospitalization (64.28%) and a history of drug use (24.28%). Also, all patients in the two groups were married (100%). Patients in both groups were homogeneous in terms of demographic characteristics.

Table 1: The frequency distribution of demographic characteristics of the studied units in the intervention and control groups

P-value	Total		Control Group		Intervention Group			
	Percent	Number	Percent	Number	Percent	Number		
0.584	100	52	48.1	25	51.9	27	Man	Gender
	100	18	55.6	10	44.4	8	Woman	
0.403	100	17	58.8	10	41.2	7	Yes	History of drug use
	100	53	47.2	25	52.8	28	No	
0.101	100	11	72.7	8	27.3	3	Yes	History of disease
	100	59	45.8	27	54.2	32	No	
0.803	100	45	48.9	22	51.1	23	Yes	History of hospitalization
	100	25	52	13	48	12	No	
0.643	100	5	60	3	40	2	Yes	History of event
	100	65	49.2	32	50.8	33	No	

Table 2: The comparison of the mean scores of patients' sleep quality before and after the intervention by the intervention and control groups

Group	Intervention Group Mean $\pm$ Standard deviation	Control Group Mean $\pm$ Standard deviation	P-value
Before the intervention	25.14 $\pm$ 3.82	26.82 $\pm$ 4.82	P = 0.110
After the intervention	21.51 $\pm$ 3.47	25.25 $\pm$ 5.27	P = 0.001
	P < 0.00001	P = 0.08	

Table 3: The comparison of the average of last night's sleep rate (questions 1 to 6) between the two groups of intervention and control before the intervention

Group	Intervention Group				Control Group				Mann-Whitney Test	
	Average rate	25th percentile	median	75th percentile	Average rate	25th percentile	median	75th percentile	Z	P-Value
<b>Last Night's Sleep Rate</b>										
What time did you go to sleep last night? (Question 1)	38.77	22.00	22.30	23.15	23.32	22.45	22.00	23.00	-1.353	0.176
What time did you wake up today? (Question 2)	39.66	5.00	5.40	7.00	31.34	5.00	5.00	6.00	-1.728	0.084
What time did you get out of bed today? (Question 3)	39.10	6.00	7.15	8.00	31.90	5.30	6.00	8.00	-1.487	0.137
How many hours did you sleep last night? (Question 4)	40.77	4.30	6.00	8.00	30.23	3.30	5.00	6.00	-2.182	0.029
How many hours did you sleep during the day (yesterday)? (Question 5)	35.11	0	1.00	2.00	35.89	0	1.00	2.00	-0.162	0.871
How long did it take you to fall asleep last night? (Question 6)	32.67	00.30	1.00	1.30	38.33	00.30	1.00	2.00	-1.179	0.238

The mean and standard deviation of patients' sleep quality score in the intervention group was  $25.14 \pm 3.82$  before the intervention and  $21.51 \pm 3.47$  after the intervention. The mean and standard deviation of patients' sleep quality score in the control group was  $26.82 \pm 4.82$  before the intervention and  $25.25 \pm 5.27$  after the intervention. According to the paired t-test, there was a significant difference between the mean scores of patients'

sleep quality in the intervention group before and after the intervention ( $p < 0.00001$ ), but in the control group this difference was not significant ( $p = 0.08$ ).

Comparing the average scores of questions 1 to 6 of sleep in the intervention group (before and after the intervention), using the Wilcoxon test, showed that the scores of questions 4 and 6 of sleep (duration of sleep and duration of time it takes to go to sleep in the intervention

group (before and after the intervention) had statistically significant differences ( $P < 0.05$ ).

But the average scores of the sleep questions in the control group (before and after the intervention) did not have a statistically significant difference ( $P < 0.05$ ). Comparing the average of last night's sleep rate (questions 1 to 6) between the two intervention and control groups

before the intervention, using the Mann-Whitney test, showed that the average of last night's sleep rate (Question 4) had a statistically significant difference between the two groups of intervention and control (before the intervention) ( $P < 0.05$ ).

Table 4: The comparison of the average of last night's sleep rate (questions 1 to 6) between the two groups of intervention and control after the intervention

Group Last night's sleep rate	Intervention Group				Control Group				Mann-Whitney Test	
	Average rate	25th percentile	median	75th percentile	Average rate	25th percentile	median	75th percentile	Z	P-Value
What time did you go to sleep last night? (Question 1)	35.34	22	22.45	23.30	35.66	21.20	23.00	23.30	-0.065	0.948
What time did you wake up today? (Question 2)	41.17	5.00	6.00	7.00	29.83	5.00	5.00	6.00	-2.373	0.018
What time did you get out of bed today? (Question 3)	37.81	6.00	7.00	8.00	33.19	5.30	7.00	7.00	-0.964	0.335
How many hours did you sleep last night? (Question 4)	45.59	6.00	7.00	8.30	25.41	4.00	5.00	6.00	-4.172	0.0001 < p
How many hours did you sleep during the day (yesterday)? (Question 5)	35.66	0	1.00	3.00	35.34	00.30	1.00	2.00	-0.066	0.947
How long did it take you to fall asleep last night? (Question 6)	30.23	00.30	00.30	1.00	40.77	00.30	1.00	1.30	-2.225	0.026

## DISCUSSION AND CONCLUSION

Based on the results of this study, a significant difference was observed between the mean scores of sleep quality in the intervention group before and after the intervention ( $0.00001 > p$ ). The results of this study showed that aromatherapy with lavender essential oil can be effective in improving the sleep quality of patients candidate for angiography. The results of the present study are consistent with the results of a study of Karadag and Najafi. The study of Karadag showed that aromatherapy with lavender essential oil has been effective in improving patients' sleep quality for 15 days<sup>20</sup>. In a study by Najafi et al., aromatherapy with lavender in 60 hemodialysis patients for two weeks led to an improvement in patients' sleep quality<sup>21</sup>. Afshar's study on the effect of aromatherapy with lavender essential oil on the quality of women's sleep after childbirth indicated that this method had an effect on improving their sleep status<sup>22</sup>. The results of this study are also consistent with the studies of GholamAlian and Cho<sup>23,24</sup>. Most of the above studies used inhalation aromatherapy and the study time was longer than the present study.

However, despite the above study, a systematic review by Kate Fismere titled Lavender and Sleep showed that aromatherapy with lavender essential oil does not have much effect on people's sleep (16). The study of Lytle, which examined the effect of aromatherapy with lavender essential oil on vital signs and patients' perceived sleep quality, also showed that in general, the mean score of sleep quality in the intervention group was higher than the control group, but the difference between the two groups

was not significant (7). In their study, Quds et al., who studied the effect of lavender essential oil and sesame oil on the quality of nurses' sleep, found that lavender essential oil did not have a significant effect on nurses' sleep quality<sup>25</sup>. Otaghi et al. also examined the effect of aromatherapy with lavender essential oil on the quality of sleep of patients candidate for angiography, and the results showed that the aromatherapy did not affect the quality of sleep of patients<sup>18</sup>.

The results of Chang's and Lee's studies also show that aromatherapy has no effect on sleep quality<sup>26,27</sup>, which is inconsistent with the present study. This difference in results can be due to differences in the number of samples, the duration of the study, the amount and method of use of lavender essential oil, as well as the mental state of patients and sleep habits. Therefore, considering that the aromatherapy with lavender essential oil in this study has been able to improve the quality of patients' sleep, it can be introduced as a non-invasive method without side effects to improve sleep disorders in patients and reduce the effects of insomnia.

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