

The Effect of Citrus Aurantium Aroma on Sleep Quality in the Elderly with Heart Failure

Z. ArabFirouzjaei (MSc)¹, E.S. Ilali(PhD)^{*2}, Z. Taraghi (PhD)², R.A. Mohammadpour (PhD)³,
K. Amin (PhD)⁴, E. Habibi (PhD)⁵

1.Student Research Committee, Mazandaran University of Medical Sciences, Sari, I.R.Iran

2.Health Sciences Research Center, Addiction Institute, Mazandaran University of Medical Sciences, Sari, I.R.Iran

3.Department of Biotatistics, School of Health, Mazandaran University of Medical Sciences, Sari, I.R.Iran

4.Clinical Research Development Unite of Rouhani Hospital, Babol University of Medical Sciences, Babol. I.R.Iran

5.Pharmaceutical Sciences Research Center, Hemoglobinopathy Institute, Mazandaran University of Medical Sciences, Sari, I.R.Iran

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ABSTRACT

BACKGROUND AND OBJECTIVE: Poor sleep quality is one of the most common problems in the elderly with heart failure, and hospitalization exacerbates this problem. In traditional Persian medicine, citrus aurantium has been recognized as a sedative and inducer of sleep. The aim of this study was to determine the effect of citrus aurantium on sleep quality in the elderly with heart failure.

METHODS: This randomized clinical trial was performed on 80 elderly patients with heart failure admitted in selected teaching hospitals of Mazandaran province in two intervention and control groups. In the intervention group, aromatherapy with two drops of 10% citrus aurantium essential oil was performed on a cotton ball for twenty minutes for three consecutive nights and the control group received routine care. Sleep quality of the elderly was assessed before and after the intervention using the standard St. Mary's Hospital Sleep Questionnaire (SMHSQ) (which assesses the quality of previous night's sleep in hospitalized patients).

FINDINGS: The mean sleep disorder in the elderly before and after the intervention in the intervention group was 24.70 ± 3.67 and 21.05 ± 3.62 , respectively, which was statistically significant ($p=0.001$). Mean sleep disorder in the elderly before and after the intervention in the control group was 24.37 ± 4.48 and 23.75 ± 4.71 , respectively, which was not statistically significant.

CONCLUSION: The results showed that using aromatherapy with citrus aurantium can improve sleep quality in the elderly with heart failure.

KEYWORDS: *Quality of Sleep, Aromatherapy, Citrus aurantium, Elderly.*

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*Corresponding Author: E.S. Ilali (PhD)

Address: Nasibeh Faculty of Nursing and Midwifery, Vesal Shirazi Ave., Amir Mazandarani Blv., Sari, I.R.Iran

Tel: +98 11 33367642

E-mail: paradis2082000@yahoo.com

Introduction

Hearth failure is a common disorder among the elderly (1). Ten percent of the population over the age of 80 suffer from heart failure (2). In Iran, about 150,000 people die from heart disease each year (3). Poor sleep quality is one of the problems of hospitalized patients (4). Seventy four percent of heart failure patients have sleep disorders, whose outcomes are everyday functional deficits, cognitive impairment, and mood disorders. Evidence suggests that treatment of sleep disorders improves left ventricular ejection fraction (LVEF) (5).

Sleep is a regular event and is one of the physiological needs of humans (6–8). Any sleep disorder can have a negative impact on health (6, 9). There are pharmacological and non-pharmacological approaches to treat sleep disorders. The most common drugs are benzodiazepines, which despite their good performance, have many side effects, including drowsiness, confusion, and dizziness (6). Numerous non-pharmacological methods have also been suggested to improve sleep disorders (10). Nowadays, there is a growing interest in using complementary therapies (6), such as relaxation techniques (11) and massage therapies (12). Orange juice has stimulating effects on the central nervous system (13, 14). Citrus aurantium essential oil contains linalool and limonene, which have sedative effects and induce sleep (14, 15).

The use of citrus aurantium essential oil is reliable and has no side effects (14). Various studies have investigated the effect of aromatherapy with orange blossom (16), lavender (17), and chamomile extract (18) on sleep quality. Considering that sleep disorder (18) and heart failure are common problems in the elderly (1) and given that clinical symptoms of heart failure such as dyspnea and debility have a negative effect on the quality of life in these patients (19) and considering the ease of aromatherapy, the present study was conducted to determine the effect of citrus aurantium aroma on sleep quality of elderly patients with heart failure admitted to selected teaching hospitals of Mazandaran province.

Methods

This randomized clinical trial was approved by the Ethics Committee of Mazandaran University of Medical Sciences with the code IR.MAZUMS.96.3064 and enrolled in clinical trial system (code: IRCT2017061134454N1) and performed among the elderly patients with heart failure in selected teaching

hospitals of Mazandaran province. Patients aged 60 years and above, heart failure (stages 3 and 4) confirmed in medical records, at least 24 hours after hospitalization and sustained vital signs, no history of asthma and allergy to citrus aurantium, lack of anosmia, lack of mental illness that resulted in hospitalization or use of neurological drugs and lack of sleep-related herbal remedies within the past two weeks were included. In case of showing symptoms of severe allergy to citrus aurantium during study, use of drugs, smoking, hypnotics and antihistamine use, patient's unwillingness to continue study, loss of consciousness and cardiac arrest during study, initiation of sedative medication, leaving the study environment for more than 30 minutes during the night, the patient was excluded.

Written informed consent was obtained from patients, and a list of eligible patients was prepared. Patients were divided into male and female groups based on the variable of gender. Based on the variable of age, they were divided into three levels of the young old (61-75 years), the old (76-90 years) and the very old (above 91 years) in four blocks, and were divided into intervention (n=40) and control (n = 40) groups through random allocation. The sample size for the two groups with 95% confidence level and 90% test power was considered 80 patients. Sampling was done by convenience method. The sample size in each group was determined based on the number of hospitalized patients with heart disease in the target hospitals; 20 patients in Sari hospital, 10 patients in Babol hospital and 10 patients in Ghaemshahr hospital.

Sleep quality of the elderly was assessed before and after the intervention using the standard St. Mary's Hospital Sleep Questionnaire (SMHSQ) (which assesses the quality of previous night's sleep in hospitalized patients). The questionnaire included 14 items to assess sleep duration and mental quality of sleep. The answers are based on a Likert scale. This questionnaire does not have a standard scoring system (20). In the present study, a questionnaire was scored based on the experts' opinion. Questionnaire scores were considered 10 to 53.

Score of 10 means no sleep disorder, score of 10 to 22 is mild sleep disorder, 23 to 36 is moderate sleep disorder, and scores of 37 to 53 is severe sleep disorder. Cronbach's alpha coefficient for this questionnaire was estimated to be 0.91 in the study of Moeini et al. (21). The questionnaires were completed in two groups at the beginning of the study. In the intervention group, two drops of 10% citrus aurantium essential oil (prepared

from Adonis gol Daro Co.) were poured on a cotton ball and placed at a distance of 10 cm from the patient's nose for twenty minutes. The control group received routine care. After three nights of aromatherapy, and after patients woke up on the fourth morning, the sleep quality questionnaire was completed again. Data were analyzed by SPSS software version 20 and Chi-square, independent t-test, paired t-test, Wilcoxon, chi-square, Mann-Whitney, and Wilcoxon tests. $P < 0.05$ was considered significant.

Results

The mean age of the subjects in the range of 60-90 years was 71.77 ± 77.86 years old. 70% were the young old (61–75 years), 62.5% were women, 83.1% were illiterate and 60.8% were married. The income level of 78.8% of the elderly was lower than the cost of living. 38.7% had diabetes and 60% had hypertension (Table 1). The results of the study showed that after the intervention, the patients' time of going to sleep in the intervention group changed from 9:28 pm to 8:89 pm on average. In other words, every elderly person fell asleep on average 39 minutes earlier, which was significant ($p = 0.032$). However, no significant difference was observed in the control group. The time to wake up in patients in the intervention group changed from 5.03 am to 5:43 am on average, which was significant ($p = 0.003$).

However, no significant difference was observed in the control group. The duration of sleep in the intervention group increased from 5.52 ± 2.57 hours before the intervention to 6.91 ± 2.34 hours; in other words, it increased by about 1:40 hours, which was significant ($p = 0.001$). Duration of sleep also increased in the control group for about 29 minutes, which was significant ($p = 0.009$). Justification of mean scores before and after the intervention in "time of getting up from bed" ($p = 0.001$), and "daytime sleep" ($p = 0.025$) showed a significant difference in the intervention group. No significant difference was observed for "time of preparing for sleep" ($p = 0.17$).

Satisfaction with sleep status after aromatherapy in the intervention group increased from 3 to 4, that is from "slightly dissatisfied" to "satisfied", which was significantly different ($p = 0.001$). Patient's feeling improved after waking up after aromatherapy in the intervention group, that is from "still slightly sleepy" to "relatively light and lively", which was significant ($p = 0.001$) (Table 3).

Mean sleep disorder in the elderly before and after the intervention in the intervention group were 24.70 ± 3.62 and 21.3 ± 05.62 , respectively, which showed a significant difference ($p = 0.001$). Mean sleep disorder in the elderly before and after the intervention in the control group was 24.37 ± 4.48 and 23.75 ± 4.71 , respectively, which was not statistically significant.

Table 1. Demographic characteristics and comparison of homogeneity in intervention and control groups

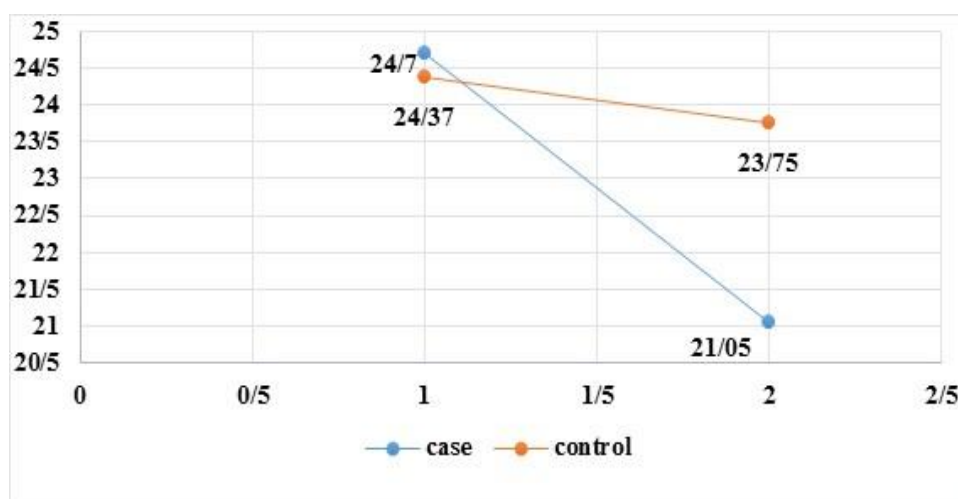
Variable	Specifications	N(%)	P-value
Age	(61–75 years)	56(70)	0.61
	(76–90 years)	24(30)	
Gender	Woman	50(62.5)	1
	Man	30(37.5)	
Level of education	Illiterate	65(83.1)	0.28
	Below high school diploma	14(17.5)	
	Diploma and higher	1(1.4)	
Marital status	Married	48(60.8)	0.54
	Widow / widower	31(39.2)	
Income level	Less than the cost of living	63(78.8)	0.17
	Equal to the cost of living	17(21.3)	
Diabetes status	Yes	31(38.7)	0.81
	No	49(61.3)	
Blood pressure	Yes	48(60)	1
	No	32(40)	

Table 2. Comparison of the effect of aromatherapy on the duration of previous night's sleep in both groups

SMHSQ Questionnaire					
Group		Before Mean±SD	After Mean±SD	Z-value	P-value
What time do you get ready for night sleep?	Intervention	9.34±2.33	9.35±2.15	- 1.37	0.17
	Control	10.06±2.42	9.91±2.32	1.82	0.068
What time did you sleep?	Intervention	9.28±2.92	8.89±2.82	- 2.14	0.032
	Control	7.95±4.44	8.16±3.99	- 1.05	0.293
What time did you wake up?	Intervention	5.03±1.16	5.43±0.84	- 2.98	0.003
	Control	5.19±1.17	5.22±0.95	- 0.27	0.785
What time did you get up from bed?	Intervention	5.16±1.07	5.57±0.89	- 3.19	0.001
	Control	5.27±1.08	5.30±0.96	- 0.27	0.785
How much did you sleep last night?	Intervention	5.52±2.57	6.91±2.34	- 4.12	0.001
	Control	5.10±2.14	5.39±2.43	- 2.59	0.009
The duration of sleep you get throughout the day	Intervention	75.95±49.79	62.05±26.98	- 2.23	0.025
	Control	85.71±46.53	81±46.55	- 1	0.317
How long did it take to fall asleep last night?	Intervention	72.66±52.40	43.33±28.96	- 3.63	0.001
	Control	81.66±66.23	79.19±65.53	- 2.21	0.027

Table 3. Comparison of the effect of aromatherapy on the quality of previous night's sleep in both groups

SMHSQ Questionnaire							
Question	Group	Before		After		Z-value	P-Value
		middle	Interquartile	middle	Interquartile		
Your sleep status	Intervention	2	1-3	3	2.25, 4.45	- 4.206	0.001
	Control	3	1-3	3	2-4	- 2.165	0.030
How many times do you wake up during the night?	Intervention	4	3-6	3	2-4	- 3.217	0.001
	Control	4	3-5	3.5	2.57-4	- 2.138	0.033
How did you sleep last night?	Intervention	3.5	2-4	4	4-5	- 4.046	0.001
	Control	3	2-4	4	2.25-4	- 2.653	0.008
How do you feel after waking up in the morning?	Intervention	3	2-4	4	3-5	- 4.415	0.001
	Control	3	2-4	4	2-4	- 1.508	0.132
How satisfied are you with your sleep?	Intervention	3	2-4	4	3.25, 4.75	- 5.007	0.001
	Control	3	2-4	3	2-4	- 0.905	0.366
How much trouble did you have to fall asleep?	Intervention	3	2-4	2	1-2	- 0.487	0.001
	Control	2.5	2-3	2	2-3	- 0.302	0.763

**Figure 1. Comparison of mean sleep disorder in case and control groups before and after the intervention**

Discussion

The results of this study showed that aromatherapy with citrus aurantium essential oil in elderly patients with heart failure can improve sleep quality. The performed intervention was effective on the overall sleep quality and categories of waiting time for sleep onset, time of waking up, getting up from bed, duration of sleep during the day, the feeling after waking up, satisfaction with sleep and having difficulty falling asleep in the intervention group.

In the present study, sleep disorder in elderly patients with heart failure was not significantly different between the intervention and control groups before aromatherapy with citrus aurantium, but after aromatherapy, there was a significant difference. The study of Zeighami et al. on the effect of citrus aurantium on sleep quality of cardiac patients hospitalized in cardiac care unit reached similar results and suggested that citrus aurantium could improve sleep quality (6). In the Zeighami study, the study population included patients admitted to cardiac care unit and the mean age of patients was lower than the present study.

Shabanian et al. in a study compared the effects of citrus aurantium and diazepam on reducing anxiety before surgery in Shahrekord hospital, and showed that the level of post-operative anxiety was reduced in both groups and there was no statistically significant difference between the two groups (22). The results of this study were not in line with the present study. Imani et al. in their study showed that the citrus aurantium essential oil reduced mental quality of sleep, delayed sleep and sleep disturbances, which was consistent with the present study (23). However, the time of getting ready for sleep was not significant in our study. Due to the short duration of hospitalization for hemodialysis, the intervention interval was short, but it was performed for three nights in the present study. Shamsipour investigated the effect of citrus aurantium aromatherapy on sleep quality of nursing students of Tabriz University

of Medical Sciences. Aromatherapy for 14 nights had a significant effect on students' sleep quality (24). The present study included individuals over 60 years of age, but the samples were young people in their study. Namadian compared the effect of lavender and citrus aurantium on depression and sleep quality in postmenopausal women.

The subjects consumed capsules containing citrus aurantium powder and lavender twice a day for 8 weeks. Results showed a significant difference in mean sleep quality score (25). The present study involved elderly hospitalized patients, but this study was conducted on women in their house. In a study aimed at investigating the effect of citrus aurantium aromatherapy on sleep quality of patients with type 2 diabetes, Mohaddes et al. showed that the extract of citrus aurantium can improve sleep quality (26). According to this study, it can be stated that aromatherapy with citrus aurantium essential oil is associated with the recommended amount without any side effects and can have a significant effect on the sleep quality of the elderly. Although significant results were not obtained in all categories, but considering the improvement of overall sleep quality, this method can be introduced as a new method in the treatment of sleep disorders. There were several limitations to this study, e.g., the mental status and sleep habits of patients were not included in this study. Therefore, it is recommended to consider mental status and sleep habits of patients in future studies. Evaluation of different doses of citrus aurantium essential oil is recommended in future studies.

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