

Comparison of the effect of aromatherapy with essential of Damask Rose and Citrus aurantium on the sleep quality of the elderly people

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Abstract

Context: Aromatherapy is a complementary therapy to improve the sleep quality.

Aims: The aim of the current study was to compare the effect of aromatherapy with essential of Damask Rose and Citrus aurantium on the sleep quality of the elders.

Setting and Design: This quasi-experimental study conducted in the day-care centers.

Materials and Methods: Sixty elderly people were randomly selected and inhaled essential of Damask Rose 10% on the pillows concurrently, for three nights, before sleeping. After 1 month wash out, they were under aromatherapy with C. aurantium 10%, as the same method. At both periods, sleep quality were assessed by Pittsburgh Sleep Quality Index.

Statistical Analysis Used: Data were analyzed by SPSS version 25 and using independent *t*-test, paired *t*-test, and Wilcoxon signed-ranks test.

Results: Although the total sleep quality score was improved at two periods of aromatherapy, it was significantly better at Damask Rose period, compared to C. aurantium ($P < 0.001$). Regarding to sleep domains, at both periods, aromatherapy had no effects on sleep disturbance. The score changes of subjective sleep quality ($P = 0.001$), sleep efficacy ($P = 0.013$), and daytime dysfunction ($P = 0.033$) were significantly better at the Damask Rose period, compared to C. aurantium.

Conclusion: Both essential of Damask Rose and C. aurantium could improve the sleep quality, although the effect of Damask Rose on the total sleep quality score of elders was more than C. aurantium. Therefore, regarding to elders' preferences, one of these mentioned essentials could be used for improving sleep quality.

Keywords: Citrus aurantium, Elderly, Rose damascene, Sleep quality

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INTRODUCTION

One of the major problems affecting the quality of life of the elderly is sleep disorder.^[1] Studies show that more than 50% of older people living in the community experience sleep problems.^[2] Statistics also show that sleep problems after headaches and gastrointestinal disorders rank third among elderly problems. Sleep disorder causes fatigue, increased risk of falls and accidents, headaches, depression, dementia, heart attack, obesity, diabetes, and impaired relationship with others and ultimately decreases the quality of life of the elderly.^[1,2] There are several ways to deal with sleep disorders in the elderly, and pharmacological and psychological interventions are conventional methods for the treatment of insomnia. Due to the side effects and temporary effects of hypnotics, complementary and alternative therapies such as herbal remedies have grown significantly in recent decades.^[3,4] Meanwhile, aromatherapy as an herbal remedy to improve the quality of sleep with limited side effects which is simply performed and cost-effective can work like drug therapy or even better in treating sleep disorders.^[5,6]

Bitter orange extract known as *Citrus aurantium* is one of the essential oils, which contains linalool and an aromatic substance called limonene which improves sleep quality.^[7,8] Another herb used in the aromatherapy is called *Rosa damascena* which is one of the most famous herbs in gardening history. The flavonoids found in Damask Rose have sedative, analgesic, and anxiolytic properties.^[9] These flavonoids bind to receptors of neurons which produce gamma amino butyric acid in the central nervous system and opens the channels of chlorine, thereby exerting its sedative and anxiolytic effect.^[10] Given that the best treatment options for sleep disorders should be considered by healthcare providers, including nurses, in this regard, nurses can use aromatherapy to reduce sleep disorders in the elderly.^[11] In this regard, some studies have separately investigated the effect of aromatherapy on sleep quality with essential oils of Bitter orange,^[8,12-14] Damask Rose,^[4,9,15] lavender,^[1,3,5] and chamomile.^[16] While none of the studies specifically address the impact of aromatherapy on the sleep quality of elderly living in their homes, also, since no comparisons between the essential oils have been made so far, this study was designed to compare the effect of aromatherapy with Damask Rose and *C. aurantium* on the sleep quality of the elderly.

MATERIALS AND METHODS

This study was a quasi-experimental study performed on elderly people referred to day-care centers affiliated to the

Welfare Organization of Mazandaran province, Iran, in 2019. This study was approved by the Ethics Committee of the Mazandaran University of Medical Sciences with code IR.MAZUMS.REC.1398.5040. According to the following formula and the results of Abdollahzadeh and Naji's study,^[16] with 95% confidence level and 90% power, the minimum sample size calculated was 34 people:

$$n = \frac{(z_{1-\alpha/2} + z_{1-\beta})^2 \times (\sigma_1^2 + \sigma_2^2)}{(\mu_1 - \mu_2)^2} = \frac{(1.96 + 1.28)^2 (3.7^2 + 4^2)}{(8 - 5)^2} = 34.7$$

For more suitable response, 60 people were selected in the intervention period. This study was single arm. First, the randomly selected elderly, inhaled essential of Damask Rose 10%, for three nights. After 1 month wash out, the same elderly were under aromatherapy with *C. aurantium* 10%.

Inclusion criteria included being 60 and older, no history of asthma and allergies to essential oils, no use of psychotropic drugs and other sleep-inducing drugs (such as antihistamines, corticosteroids),^[8] not being diagnosed with Alzheimer and mental illnesses, no smell disorders, no nasal obstruction, not using other herbal essentials during the study, no drug and alcohol addiction, acquiring a score of 5 or more on the Sleep Quality Assessment Tool,^[15] and no sleep disorder caused by physical symptoms such as pain^[17] and an anxiety score lower than 21.

Exclusion criteria included elderly noncooperation, respiratory problems, allergy and allergy to damask rose and *C. aurantium* during the study, taking sedatives, antidepressants, sleeping drugs, narcotics and alcohol,^[8] leaving the study environment for more than 30 min per night,^[15] and unpredictable dramatic changes in sleep conditions (such as acute illness, travel, and death).^[13]

Data collection tools included demographic and clinical questionnaire, Pittsburgh Sleep Quality Index (PSQI), and geriatric anxiety scale (GAS). The PSQI is a standard sleep quality questionnaire that self-reports sleep quality over the past month. The questionnaire consists of 19 questions and seven components. These components are "subjective sleep quality," "sleep latency," "sleep duration," "habitual sleep efficiency (number of hours slept/number of hours spent in bed) × 100 = habitual sleep efficiency (%)," "sleep disturbances," "use of sleep medication," and "daytime dysfunction" (problems experienced by the person during the day due to sleeplessness). The scores of 0, 1, 2, and 3 on each scale indicate natural state, mild, moderate, and

severe difficulties, respectively. The sum of all these seven components yields on global score, with a range of 0–21, “0” indicating no difficulty and “21” indicating severe difficulties in all areas. A score of 5 or higher is indicative of poor sleep quality.^[15,16] The validity of this questionnaire has been confirmed in the Iranian population. Sensitivity of 100%, specificity of 93%, and Cronbach’s alpha of 0.89 have been reported for the Persian version of this questionnaire.^[3]

The GAS was designed by Segal *et al.* to assess recent elderly anxiety levels.^[18] This questionnaire is a 10-item self-report measure and based on a 4-point Likert scale ranging from “not at all” (0), “sometimes” (1), “often” (2), to “all the time” (3). The obtained score is between 0 and 30 and the higher score indicates higher anxiety. According to the questionnaire, individuals are divided into three groups: mild anxiety (1–10 score), moderate anxiety (11–20), and severe anxiety (21–30). The GAS questionnaire in Iran has been validated by Bolghan-Abadi *et al.* and Cronbach’s alpha was 0.92%.^[19]

Researcher, after obtaining a code of ethics, referred to the Welfare Organization, prepared a list and address of day-care centers and randomly selected three day-care centers for the elderly. In each center, first, while stating the goal and procedures of the study, a list of eligible elderly people (primarily sleep quality score of 5 or higher and anxiety score lower than 21 and then having other inclusion criteria based on checklists) was prepared. Then, using RANDBETWEEN Excel software output data, random sampling was performed. For intervention, 10% essential oils of Damask flower and 10% *C. aurantium* of Tehran Adonis Gol Darou Co. were used. After sampling was done, participants were instructed on how to use essential oils; on three consecutive nights, they were asked to pour 3 drops of Damask essential oil on a cotton ball with a dropper and place it at a distance of 10 cm from their nose and take deep breaths. They then were instructed to pin the essential oil on their pillows and inhale it until they wake up.^[13,15] Before the intervention, Pittsburgh Sleep Quality Questionnaire for the elderly was completed. After three nights of intervention, on the 4th day, the Pittsburgh Sleep Quality Questionnaire for the elderly was completed again. It should be noted that to increase the power of the study and reduce the likelihood of error, completion of the questionnaires after the intervention was done by a person who did not know the type of intervention. Then, after 1 month of purification of essential oil of Damask flower,^[20] the same procedure was repeated for *C. aurantium* essential oil. The essential oils were provided to the elderly with a dropper, a few cotton balls, a lock, and a leaflet

explaining the procedure. A single day of intervention was initiated for the simultaneous use of the essential oils, and seniors were instructed to begin using the essential oils in the same manner as they were trained. The elderly were also contacted every night to follow-up and be assured of performing aromatherapy during the intervention period.

The data were analyzed in SPSS version 25.0 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp). with $P < 0.05$ as the level of significance. Paired *t*-test was used to determine the effect of aromatherapy on overall sleep quality score in each period before and after intervention, and independent *t*-test was used to compare the overall sleep quality score in the two periods of Damask flower and *C. aurantium*. Further, Wilcoxon rank test was used to compare sleep quality scores in two periods. Ethical considerations were taken into account in all stages of the research. To this end, after receiving a code of ethics from Mazandaran University of Medical Sciences and receiving a letter from the Welfare Organization, referring to the Elderly Care Centers, the research plan, its goals, and possible side effects and allergy symptoms for the elderly and related authorities were thoroughly described.

Informed consent was obtained from the volunteers to participate in the study. Cultural values and the rights of individuals under study were considered at all stages of the research.

RESULTS

Sixty elderly people participated in this study. None of the patients had stopped performing aromatherapy. The mean age was 68.7 ± 36.11 years, and the highest frequency considering sex was among females with 71.7%. Sixty-five percent of the participants were married and the rest were widowed. 38.3% of the participants lived with spouse and children, 28.3% with spouse, 15% with children, and 18.3% lived alone. 13.3% of them were illiterate, 26.7% of them had educational level under diploma, 30% had diploma, and 30% had university degrees. The most frequent history of disease was related to joints (70%) and hypertension (61.7%). Moreover, in terms of medication, 38.3% of the elderly used 0–2 types of medication, 35% of the patients used 3–5, and the rest used more than 5 kinds of drugs [Table 1].

Data analysis showed that the mean score of total quality of sleep before intervention in aromatherapy was 9.98 ± 2.75 which decreased to 7.78 ± 2.72 after intervention ($P < 0.001$). The mean score of total quality of sleep before intervention during aromatherapy with

Table 1: Demographic variables

Variable	n (%)
Age	
60-65	26 (43.3)
66-70	13 (21.7)
>70	21 (35.0)
Gender	
Female	43 (71.7)
Male	17 (28.3)
Living arrangement	
Spouse	17 (28.3)
Children	9 (15.0)
Spouse and children	23 (38.3)
Alone	11 (18.4)
Education level	
Illiterate	8 (13.3)
Under diploma	16 (26.7)
Diploma	18 (30.0)
University degree	18 (30.0)
Income	
Lower than living costs	33 (55.0)
Equal to living costs	24 (40.0)
Higher than living costs	3 (5.0)
Number of children	
0-2	22 (36.7)
3-5	29 (48.3)
>5	9 (15.0)
Marital status	
Married	39 (65.0)
Single	0 (0.0)
Divorced	0 (0.0)
Widowed	21 (35.0)
Chronic diseases	
Heart	16 (26.7)
Respiratory	3 (5.0)
Digestive	16 (26.7)
Joints	42 (70.0)
Thyroid	15 (25.0)
Diabetes	12 (20.0)
Hypertension	37 (61.7)
Kidney	6 (10.0)
The number of medication used	
0-2	23 (38.3)
3-5	21 (35.0)
>5	16 (26.7)

C. aurantium was 10.02 ± 2.77 and after intervention was 8.42 ± 2.78 ($P < 0.001$). According to the results of paired *t*-test, there was a statistically significant difference between the mean total score of sleep quality before and after intervention period with Damask Rose as well as *C. aurantium*, indicating that intervention with aromatherapy using Damask Rose and *C. aurantium*, both can improve sleep quality ($P < 0.001$). The results of this test also showed a statistically significant difference in all subgroups of sleep quality, except sleep disorders and hypnotic drug use in both periods of aromatherapy. Independent *t*-test showed that there was no significant difference in overall mean sleep quality and its subgroups before intervention in two aromatherapy periods with Damask Rose and *C. aurantium* ($P = 0.776$). However, after intervention in two periods, there was a significant difference in the

areas of subjective quality of sleep, sleep adequacy, and total score of sleep quality ($P < 0.001$) [Table 2]. Changes before and after the intervention in two aromatherapy periods were analyzed using Wilcoxon rank-sum test (due to the nonnormal distribution of sleep quality changes). The results showed that the changes in sleep quality score in the Damask Rose group were significantly better than those of the *C. aurantium* group ($P < 0.001$). Considering subgroups, aromatherapy in both periods did not affect sleep disturbance. Changes in mental quality score of sleep ($P = 0.001$), sleep adequacy ($P = 0.013$), and daily dysfunction ($P = 0.033$) were significantly better in the Damask Rose period than in the *C. aurantium* intervention period [Table 3].

DISCUSSION

The results of this study, which aimed to compare the effect of aromatherapy with essential oil of Damask Rose and *C. aurantium* on sleep quality of elderly, showed that after aromatherapy in both periods compared to before, there was a significant difference in total sleep quality score and its subgroups. Statistical results also showed that aromatherapy with Damask Rose was significantly more effective than *C. aurantium*. In line with the present study, Arab Firouzjaei *et al.*^[8] showed that aromatherapy with essential oil of *C. aurantium* can improve sleep quality in the elderly. The above study, in which intervention was performed for three consecutive nights on 80 elderly patients with heart failure using St. Mary's Hospital Sleep Questionnaire, improved sleep time, wake up time, the time for getting out of bed, daily sleep time, general feeling after waking up, satisfaction from last night's sleep, and difficulty getting to sleep. The mean age of the participants was 71 years, and the most prevalent gender was female. In the study of Babai *et al.*^[15] 60 patients admitted to the cardiac care unit were randomly divided into two groups of blindfold and aromatherapy with Damask Rose for three nights. The results of the PSQI showed that in addition to overall sleep quality, the subscales of latent sleep, sleep duration, sleep adequacy, and sleep disorders were improved. However, aromatherapy had no effect on the areas of subjective sleep quality, hypnotic drug use, and impaired daily functioning. In the present study, a significant improvement was observed in the subjective sleep quality and daytime dysfunction; whereas sleep disturbances were not improved significantly. In above study, the mean age was 61 years in the Damask Rose group and 63 years in the blindfold and most of the samples were male. The age and gender are factors that can influence on the sleep quality.^[2] The difference between Babaei *et al.*'s research and the current research may be due to lower

Table 2: Comparison of mean total score of sleep quality and its subgroups in two periods of aromatherapy with Damask Rose and Citrus aurantium

Variable	Period (mean±SD)		P*
	Damask rose	Citrus aurantium	
Subjective sleep quality			
Before	1.25±0.50	1.25±0.50	1
After	0.70±0.56	0.98±0.62	0.001
P**	<0.001	<0.001	
Delay in falling asleep			
Before	1.63±1.17	1.67±1.18	0.484
After	1.00±0.92	1.10±1.03	0.109
P**	<0.001	<0.001	
Sleep duration			
Before	1.80±0.93	1.87±0.87	0.252
After	1.30±0.92	1.38±0.92	0.167
P**	<0.001	<0.001	
Sleep adequacy			
Before	2.98±0.12	2.98±0.12	1
After	2.82±0.43	2.92±0.33	0.013
P**	0.001	0.045	
Sleep disorder			
Before	1.35±0.54	1.32±0.53	0.159
After	1.32±0.53	1.32±0.53	1
P**	0.321	1	
Taking hypnotics			
Before	0.00±0.00	0.00±0.00	1
After	0.00±0.00	0.00±0.00	1
P**	1	1	
Daily dysfunction			
Before	0.97±1.04	0.93±0.97	0.532
After	0.65±0.89	0.72±0.86	0.252
P**	<0.001	0.002	
Overall quality of sleep			
Before	9.98±2.75	10.02±2.77	0.776
After	7.78±2.72	8.42±2.78	<0.001
P**	<0.001	<0.001	

*P (Independent t-test), **P (Paired t-test). SD: Standard deviation

Table 3: Comparison of before and after changes of sleep quality and its subgroups in two periods of aromatherapy with Damask Rose and Citrus aurantium

Variable	Period, mean±SD		P*
	Damask rose	Citrus aurantium	
Subjective sleep quality	-0.55±0.53	-0.26±0.344	0.001
Delay in falling asleep	0.63±0.51	-0.56±0.53	0.321
Sleep duration	-0.50±0.59	-0.48±0.59	0.843
Sleep adequacy	-0.16±0.37	-0.06±0.25	0.013
sleep disorder	-0.03±0.25	0.00±0.18	0.321
Taking hypnotics	0.00±0.00	0.00±0.00	1
Daily dysfunction	-0.31±0.56	-0.21±0.52	0.033
Overall quality of sleep	-2.20±1.16	-1.60±1.02	<0.001

*P (Wilcoxon signed-rank test). SD: Standard deviation

mean age and majority proportion of males, in their study. In addition, population study in their research was patients admitted to the cardiac care unit, while the present study was performed on elderly living in the community.

In the study of Cho *et al.*,^[21] the effect of aromatherapy on anxiety, vital symptoms, and sleep quality of patients undergoing angioplasty was evaluated using a convenience sampling method on 56 patients admitted to intensive care

units, most of whom were elderly participants. Participants underwent aromatherapy before and after angioplasty with ten deep breaths. The intervention reduced anxiety and hypertension and improved sleep quality of patients. Phillips barometer, Spielberger anxiety questionnaire, and Korean form of Verran Snyder Halpern sleep scale were used for data collection. Aromatherapy's essential oils were prepared from the combination of *C. aurantium*, lavender, and chamomile.

Mohaddes *et al.*^[14] conducted a nonrandomized clinical trial with available sampling method in which 60 patients with diabetes participated to evaluate the effect of aromatherapy with the extract of *C. aurantium* on sleep quality of patients with Type 2 diabetes. In this study, the mean age of participants was 59 years and the most frequent gender was female. The subjects in the experimental group inhaled 8 drops of 20% *C. aurantium* essential oil for three consecutive nights, and data were completed using Richard Campbell Sleep Quality Questionnaire. Finally, it was shown that aromatherapy with essential oil of *C. aurantium* can improve the sleep quality of diabetic patients, which is consistent with the findings of the present study.

Heidari Rad *et al.* performed a clinical trial on the effect of aromatherapy with Damask Rose essential oil on sleep quality of cancer patients in which in two intervention groups, participants received 5 drops of Damask Rose essential oil in two different concentrations (5% and 10%) for 2 weeks before bedtime. In this study, the mean age was approximately 50 years, with the highest prevalence of women. The data collection tool was PSQI as in the present study. Inclusion criteria for this study were cancer involvement and age range of 18–65 years. The researchers showed that the total score of subjective quality of sleep, delayed sleep, and nocturnal sleep duration in the 10% intervention group was higher than the intervention group of 5% concentration,^[9] which is consistent with the present study.

There were several limitations to this study, including that due to the comparability and the effect of individual differences on the results, the study was designed periodically and without a control group. Further, due to the nature of the intervention, it was not possible to blind the elderly to the type of intervention, but an effort was made to keep the elderly covered as much as possible. It is suggested that other studies with bigger sample size and different concentrations be designed to investigate the long-term effects of the essential oil of Damask Rose and *C. aurantium* on the sleep quality of the elderly and to determine its complications.

CONCLUSION

Overall, the findings showed that aromatherapy with essential oil of Damask Rose and *C. aurantium* had a favorable effect on sleep quality in the elderly, although statistically aromatherapy with essential oil of Damask Rose was more effective in improving sleep quality. However, given the high prevalence of sleep disorders in the elderly, aromatherapy as a simple and low-cost method can be considered as an alternative to sleeping pills which is not recommended in the elderly.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

All authors contributed to this research.

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