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Contents lists available at ScienceDirect

Journal of PeriAnesthesia Nursing

journal homepage: www.jopan.org

Research

Effects of Inhalation Aromatherapy With *Rosa damascena* (Damask Rose) on the State Anxiety and Sleep Quality of Operating Room Personnel During the COVID-19 Pandemic: A Randomized Controlled Trial

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A B S T R A C T

Keywords:

anxiety
aromatherapy
damask rose
health personnel
operating rooms
sleep hygiene

Purpose: Although aromatherapy with damask rose can reduce anxiety and improve sleep quality in different conditions, no study has yet addressed its effects among operating room (OR) personnel. Considering the high level of workload among Iranian OR personnel during the COVID-19 pandemic which can affect their anxiety and sleep quality, this study evaluated the effects of damask rose aromatherapy on state anxiety and sleep quality among a population of Iranian OR personnel during the COVID-19 pandemic.

Design: A randomized, nonblinded, parallel-group controlled trial.

Methods: Eighty OR personnel were divided into the two groups of damask rose and placebo (paraffin oil) using the stratified randomization method. In the first aromatherapy session, the participants inhaled two drops of either damask rose oil or paraffin oil for 10 minutes at the beginning of their morning shift. Then, they attached an absorbent cloth napkin impregnated with 5 drops of products to the side of their pillow for 30 consecutive nights. The Spielberger state anxiety inventory (SAI) and the Pittsburgh sleep quality index (PSQI) were completed before random allocation (T1) and on the 31st day of the study (T3). Also, the SAI was completed 90 minutes after the end of the first aromatherapy session (T2).

Findings: The mean changes in the SAI score were significant compared to T1 both at T2 and T3 in favor of the damask rose group ($P < .001$ in two cases). Similarly, the mean change in PSQI score was significant compared to T1 at T3 in favor of the damask rose group ($P < .001$).

Conclusions: Damask rose can be effective in reducing state anxiety and improving sleep quality of OR personnel. Further studies are needed to determine the generalizability of the findings.

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The coronavirus disease 2019 (COVID-19) pandemic presented a severe threat to psychological health.¹ Health care personnel have been more likely to experience psychological problems, such as anxiety, depression, insomnia, and stress, during the COVID-19 outbreak compared to other individuals.^{2,3} Operating room (OR) personnel experienced a higher level of anxiety during the COVID-19 pandemic compared to the nonoutbreak period due to the fear of contracting COVID-19 and transmitting it to the loved ones, insufficient breaks at work, increased daily workload and extended shifts, working in units outside the scope of practice in times of emergency, observing pandemic-related health and safety protocols, inadequate personal

protective equipment (PPE), using additional PPE which could make them feel physically uncomfortable, and inadequate support from hospital managers.⁴⁻⁶ In addition to the anxiety induced by COVID-19, OR personnel are vulnerable to anxiety problems due to working in a closed environment and daylight deprivation, exposure to anesthetic gases and biologic factors, needle stick injuries, nonergonomic equipment and posture positions, and unpleasant smells.^{5,7,8} Moreover, OR personnel are constantly under stress and pressure to meticulously perform complex surgeries and patient care practices.⁹

Operating room personnel also experienced poor sleep quality during the COVID-19 pandemic, mostly due to mental abnormalities and psychological problems such as anxiety, suggesting that alleviating OR personnel's anxiety is one of the effective ways to improve their sleep quality.¹⁰ Similarly, reduced sleep quality might lead to a higher level of anxiety.¹¹ Therefore, it is necessary to consider effective interventions to reduce anxiety and improve the sleep quality of OR personnel during the outbreak of COVID-19.

Conflict of interest: The authors declare that they have no conflict of interest.

Funding: The study was funded by Vice-chancellor for Research and Technology, Hamadan University of Medical Sciences (Reference No. 140003252576).

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<https://doi.org/10.1016/j.jopan.2021.09.011>

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Recently, aromatherapy with different aromatic plants has attracted considerable attention in managing anxiety and sleep disorders.^{12,13} Damask rose (*Rosa damascena*), an aromatic plant that belongs to the Rosaceae family, has been traditionally used in aromatherapy to manage anxiety and sleep problems.¹⁴ This plant has been known as an antianxiety, hypnotic, and sedative agent, especially in the Iranian traditional medicine.^{15,16} Also, different products of this plant have been suggested for its effects on sleep problems by herbal medicine practitioners in the Unani medicine.¹⁷

In recent years, aromatherapy with different products of damask rose (ie, oil, essence, and extract) is suggested to reduce anxiety and promote sleep quality.^{18,19} Studies have indicated the potential effects of the inhaled type of damask rose for reducing the anxiety induced by labor,^{20,21} hemodialysis,²² burn dressing,^{23,24} surgery,^{25,26} and menstruation.²⁷ Also, studies have identified the effects of damask rose aromatherapy for improving sleep quality in patients with cancer,²⁸ those hospitalized in cardiac care units,^{29,30} and patients undergoing hemodialysis.³¹ These studies were conducted among patients, and research on this issue is scarce among healthy individuals, especially health care personnel.^{32–34} Also, most previous studies have been carried out to evaluate the effects of damask rose aromatherapy on either sleep quality or anxiety. Limited studies have been performed to concurrently evaluate the impact of damask rose aromatherapy on both sleep quality and anxiety.^{29,35}

Considering the high level of workload among Iranian OR personnel during the COVID-19 pandemic which can affect their anxiety and sleep quality,³⁶ this study aimed to compare the effects of inhalation aromatherapy with damask rose essential oil and placebo (paraffin oil) on the state anxiety and sleep quality of OR personnel. State anxiety and sleep quality were considered as the primary outcomes, and occurrence of any adverse events were recorded as the secondary outcome.

Materials and Methods

Study Design

This was a randomized, controlled, nonblinded, parallel-group trial. The study was reported according to the consolidated standards of reporting trials (CONSORT) for parallel-group randomized trials.³⁷

Ethical Considerations

The study protocol was approved by the Regional Ethics Committee of Hamadan University of Medical Sciences, Hamadan, Iran (approval No. IR.UMSHA.REC.1400.194). Before the commencement of the study, the study objectives and methods were explained to eligible personnel by the principal investigator (a BSc in OR Technology studying master's degree in Surgical Technology), and they were assured of the confidentiality of their information. Also, they were informed of their right to withdraw from the study at any time. Moreover, written informed consent was obtained from each eligible participant.

Participants

Surgical technologists and nurse anesthetists who worked in three hospitals affiliated with Hamadan University of Medical Sciences, from April to June 2021, were invited to participate in this study. The inclusion criteria were as follows: (1) the age range of 18 to 50 years, (2) obtaining a score of 32 to 53 on the Spielberger state anxiety inventory (SAI; below and above moderate anxiety), and (3) obtaining a score of more than 5 on the Pittsburgh sleep quality index (PSQI; poor sleep quality). The exclusion criteria were as follows: (1) having a history of known sleep-disturbing diseases (ie, rheumatoid

arthritis and migraine) and sleep disorders (as mentioned by participants), (2) experiencing allergic rhinitis and other respiratory and sinusitis problems (ie, asthma, dyspnea, chronic cough, and orthopnea), (3) having anxiety or cognitive disorders, (4) having a history of systemic or chronic diseases affecting the sense of smell, (5) having a history of using antipsychotic drugs, tranquilizers, and hypnotic-sedative agents in the past 2 months, (6) having a history of substance abuse or drug/alcohol addiction, (7) having a history of allergic reactions to flowers, aromas, and herbal oils or experiencing moderate-to-severe adverse events following the application of damask rose oil or paraffin oil during the trial (ie, irritation, itching, and skin rash), and (8) having experienced psychological interventions (ie, yoga, meditation, and mindfulness) or other aromatherapy interventions in the past 2 months. Also, the participants willing to withdraw from the study and those leaving their work during the study were excluded.

Sample Size

The sample size was estimated based on a previous study,³² showing a significant difference in the SAI score between nursing personnel who received aromatherapy with damask rose oil and placebo (44.00 ± 7.23 vs 48.87 ± 6.52 , $P = .008$). According to the findings of the mentioned study and the suggested formula for comparing two means in clinical trials, the minimum sample size was calculated as 32 participants per group at a confidence interval of 95% and power of 80%. However, 40 participants per group were recruited due to possible sample attrition.

Blinding

The trial was performed in a nonblinded design because the participants and the principal investigator who supervised and coordinated the interventions could not be blinded completely due to the different nature of damask rose oil and paraffin oil aroma. However, damask rose oil and paraffin oil were prepared and labeled in unnamed droppers, which were identical in all aspects of their appearance (ie, shape and size of the dropper), by an OR assistant. Hence, the participants did not know whether they inhaled damask rose or placebo during the trial. Also, the principal investigator was unaware of the droppers' contents and her nose was covered with a fragrant face mask during the intervention sessions.

Sampling and Randomization

First, the participants were selected by the principal investigator using a sequential sampling method. Then, participants who met the inclusion criteria were randomly divided into the two groups of damask rose ($n = 40$) and placebo ($n = 40$) via the stratified randomization method (stratified by gender, specialization, duration of working experience, and recruiting hospital). The randomization sequence was computer-generated, using Stat Trek software, and group allocation was conducted by the OR assistant, using sequentially numbered droppers of identical appearance. All the data were kept confidential until the end of the trial.

Outcome Measures

The study instrument comprised of four parts including a demographic and work-related questionnaire, the SAI, the PSQI, and the adverse events form; all the parts were completed by the participants under the supervision of the principal investigator.

Demographic characteristics and work-related questionnaire was completed before the random allocation of the participants at baseline (T1) and consisted of the following information: (1) age,

(2) gender, (3) marital status, (4) number of family members, (5) monthly income, (6) specialization, (7) duration of working experience, (8) number of working shifts per week, (9) academic degree, (10) employment status, and (11) recruiting hospital.

The SAI is a 20-item self-completed questionnaire that aims to measure the subjective feelings of apprehension, tension, nervousness, worry, and activation/arousal of the autonomic nervous system by the item on a four-point Likert scale (1, not at all; 2, somewhat; 3, moderately so; and 4, very much). The total score of SAI ranges from 20 to 80, with higher scores indicating greater anxiety.³⁸ To only include participants with moderate anxiety, anxiety was categorized based by score on a previous study as follows: mild (20 to 31), below moderate (32 to 42), above moderate (43 to 53), relatively severe (54 to 64), severe (65 to 75), and very severe (more than 76).³⁹ The Persian version of SAI is a commonly used instrument and its validity and reliability have been confirmed in previous studies.^{40,41} This questionnaire was completed at three time points including before random allocation of the participants at baseline (T1), 90 minutes after the end of the first aromatherapy session (T2), and on the 31st day of the study (T3).

The PSQI is a nine-item self-completed questionnaire on sleep disturbances experienced over the previous 30 days. This questionnaire consists of seven components, including subjective sleep quality, sleep latency time, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction with four open questions and five multiple-response items. The score of each component ranges from 0 to 3, resulting in a total score of 0 to 21. Higher scores represent lower sleep quality and vice versa. To distinguish poor from good sleep quality, a cut-off score of 5 was suggested.⁴² Hence, sleep quality was categorized as poor (score more than 5) and good (score less than or equal to 4). The Persian version of PSQI whose validity and reliability were approved previously was used in this study.⁴³ This questionnaire was completed at T1 and T3.

The occurrence of adverse events was evaluated by recording all adverse events. For this purpose, adverse events were inquired about by daily phone calls. Due to the short-term follow-up, laboratory monitoring was not planned to evaluate adverse events.

Intervention

The intervention for the two groups was performed during the same time period. First, the potential participants completed the SAI and the PSQI in their morning shifts under the supervision of the principal investigator. Then, the participants who had moderate state anxiety and poor sleep quality were considered eligible, and their SAI and PSQI scores were recorded as baseline data (T1). Subsequently, the eligible participants were requested to complete the demographic characteristics and work-related questionnaire. Finally, they were randomized to damask rose and placebo groups.

The participants in the damask rose group received the essential oil of damask rose, while those in the placebo group received paraffin oil. Natural pure oil of damask rose produced by Barij Essence Pharmaceutical Co., Kashan, Iran, was used. The ingredient of this oil was reported as *Rosa damascena* and was standardized based on at least 3.3 mg citronellol in 100 g of product. The paraffin oil was produced by Mahdaru Balk and Medicinal Plants Co., Alborz, Iran. The placebo oil was identical to damask rose in terms of appearance and waxy nature; however, its scent was different. To evaluate the adverse events of damask rose or paraffin oil, two sessions of aromatherapy among 10 participants in a pilot study were conducted. Based on the findings, the inhalation neither product had any adverse events.

On the first day of the intervention, a cotton ball impregnated with two drops of either paraffin oil or damask rose oil (equal to 0.14 mL) was presented to the participants, and then they were asked to put it at a distance of 5 cm from their nose and inhale the

aroma for 10 minutes through normal breathing at their own convenience.³² This intervention was performed as the first aromatherapy session in a private room of the OR department at the beginning of the morning shift (7:30 to 8:00 am) under the supervision of the principal investigator. The SAI was completed again 90 minutes after the end of this aromatherapy session (T2). The participants could perform their roles at the interval of the first aromatherapy session and completing the SAI.

A prepared and unnamed dropper containing 150 drops of either paraffin oil or damask rose oil was provided to each participant on the first aromatherapy session. They were asked to pour five drops of the product (equal to 0.34 mL) on an absorbent cloth napkin measuring 10 × 10 cm using the prepared dropper, and then attach the napkin to the side of their pillow with a pin before their night's sleep. They also requested to fix the napkin at a distance of about 20 cm from their nose and leave it in place for about 8 hours (10:00 pm to 06:00 am).²⁹ This intervention was performed from the night of the first aromatherapy session until 30 consecutive nights.

The participants in the two groups received a 15-minute face-to-face instruction on how to report adverse events and do aromatherapy using simple and understandable sentences in the first aromatherapy session by the principal investigator, who had completed a workshop on aromatherapy administration. Also, a compact disk was presented to the participants in the first session, which consisted of instructions about the administration of products. They were also encouraged to commit to the intervention during the 30 consecutive nights and were requested to observe routine sleep care (ie, reducing ambient noises and light). Likewise, they were reminded of the intervention via daily phone calls at 8:00–9:00 pm by the principal investigator during the 30 days. Moreover, the administration method of products was checked through phone calls to address any problems related to the intervention. In addition, adverse events were recorded during daily phone calls. The SAI and the PSQI were completed again in the morning shift on the 31st day of the study (T3).

Statistical Analysis

Statistical analyses were performed using the statistical package for the social sciences (SPSS Statistics for Windows, version 22.0, IBM Corp., Armonk, NY). The homogeneity of the groups was assessed using the independent samples *t*-test for continuous variables (ie, age, number of family members, duration of working experience, and number of working shifts per week), Fisher's exact test or Chi-square test for nominal variables (ie, gender, marital status, specialization, recruiting hospital, and employment status), and Mann-Whitney *U* test for ordinal variables (ie, monthly income and academic degree). The normal distributions of state anxiety and sleep quality were confirmed using Kolmogorov–Smirnov test. To eliminate the confounding effect of the baseline values (T1) of state anxiety and sleep quality, the analysis of covariance (ANCOVA) was used to compare the mean changes of state anxiety and sleep quality between the two groups. Repeated measures analysis of variance (rANOVA) was applied to determine the effects of the intervention on state anxiety over time in each group. Since the rANOVA showed significant changes, the Bonferroni post-hoc test was used for pair-wise comparisons. Also, scores of sleep quality in each group were compared by paired samples *t*-test. A *P*-value of less than .05 was considered significant in all the analyses.

Results

Follow-up

Out of 132 eligible participants, 48 did not meet the inclusion criteria and four refused to participate in the study. Of the 80 included

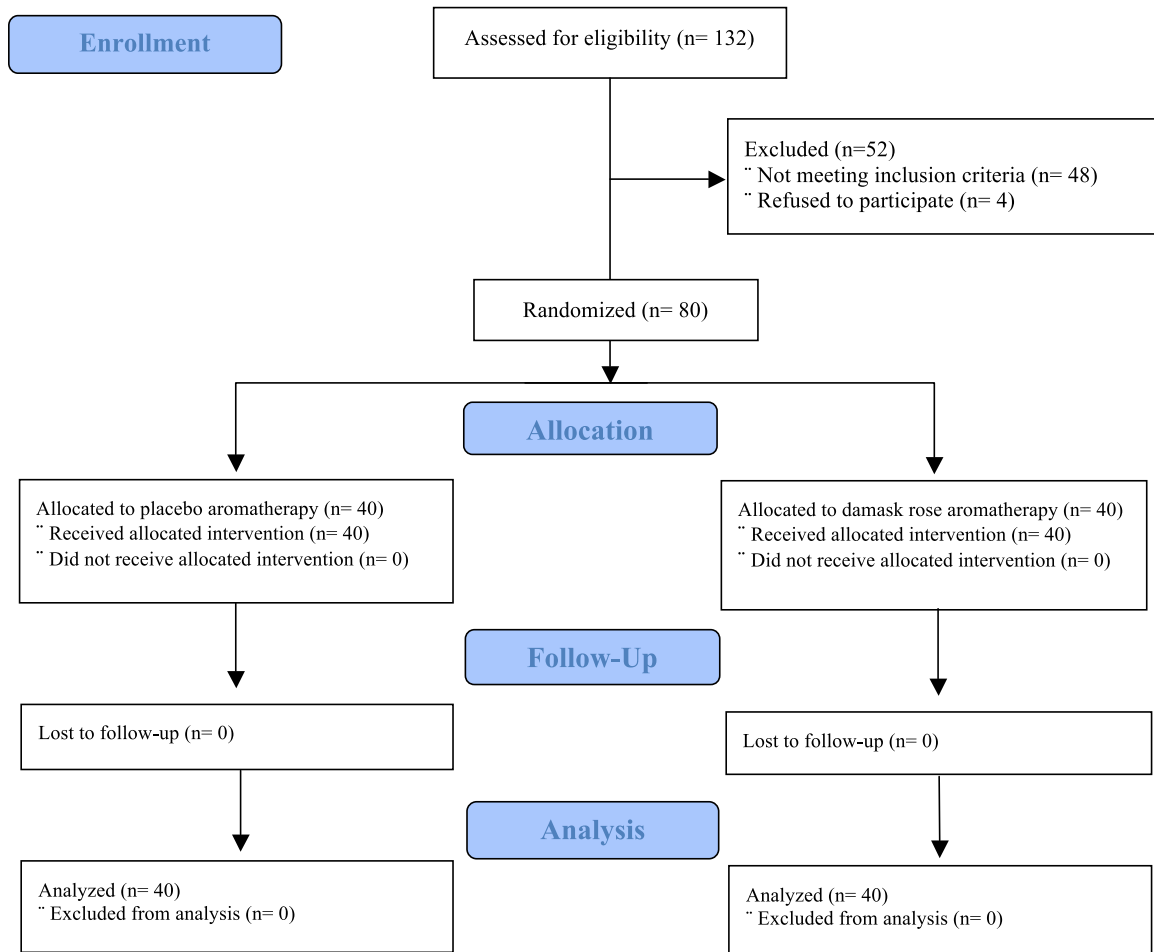


Figure 1. The CONSORT flow diagram of the groups' enrollment, allocation, intervention, follow-up, and analysis. This figure is available in color online at www.jopan.org.

participants, all adhered to the study protocol and were included in the final analysis (Figure 1).

Demographic and Work-related Data

There were no significant differences between the groups in terms of demographic and work-related characteristics (Table 1).

Primary Outcomes

Based on the inter-group results obtained by the ANCOVA test, the mean changes of state anxiety were significant compared to T1 both at T2 and T3 in favor of the damask rose group ($P < .001$ in two cases). Also, according to the intragroup results of rANOVA, the score of state anxiety decreased significantly in the two groups over time ($P < .001$; Table 2, Figure 2).

Based on the inter-group comparison performed by the ANCOVA test, the mean change in sleep quality was significant compared to T1 at T3 in favor of the damask rose group ($P < .001$). Likewise, according to the intra-group results of the paired samples *t*-test, the differences in the mean scores of sleep quality between before-and-after values were significantly decreased (improved) in the two groups ($P < .001$; Table 2).

Secondary Outcome

In the damask rose group, some adverse events with minor severity were reported during the study. These adverse events included

headache ($n = 1$), dizziness ($n = 2$), and nausea ($n = 3$), which mostly disappeared within few hours after the occurrence. In the placebo group, the participants reported identical adverse events with a similar severity to those in the damask rose group, including headache ($n = 2$), dizziness ($n = 2$), and nausea ($n = 2$).

Discussion

In this study, the potential effects of 30-day aromatherapy with damask rose oil on state anxiety and sleep quality of OR personnel in an Iranian population during the COVID-19 pandemic was investigated. According to the results, the anxiolytic effect of aromatherapy with damask rose oil was significantly greater than with paraffin oil at T2 and T3. The results also showed more anxiety reduction in the damask rose group compared to the placebo group as the intervention progressed.

The present study provided initial evidence supporting the effect of damask rose aromatherapy in reducing the state anxiety of OR personnel. Previous related studies have mainly focused on the effect of damask rose aromatherapy on the anxiety of patients with acute or chronic conditions.^{22,23,29,39,40,44–46} Based on the available literature, few studies have evaluated the anxiolytic effect of damask rose on healthy individuals.^{32,34} In line with our findings, Gholami et al. demonstrated that job-induced state anxiety was relieved more in emergency department nurses who had received inhalation aromatherapy with two drops (0.14 mL) of 40% damask rose essential oil for 10 minutes compared to those who had inhaled the same amount of placebo (distilled water).³² On the contrary, in a posttest-only control

Table 1

Comparison of the Demographic and Work-related Characteristics of the Operating Room Personnel Between the Damask Rose and Placebo Groups (N = 80)

Variables	Placebo group* (n = 40)	Damask rose group** (n = 40)	Test results	P-value
Age (year)	33.05 ± 7.60	31.52 ± 7.82	0.884 [†]	.379
Number of family members	3.62 ± 1.10	3.37 ± 1.23	0.956 [†]	.342
Duration of working experience (year)	8.57 ± 7.15	7.47 ± 7.57	0.668 [†]	.506
Number of working shifts per week	7.50 ± 1.58	7.30 ± 1.52	0.576 [†]	.567
Gender	Male 13 (32.5)	9 (22.5)	Fisher's exact	.453
	Female 27 (67.5)	31 (77.5)		
Marital status	Married 18 (45.0)	17 (42.5)	Fisher's exact	1.000
	Single 22 (55.0)	23 (57.5)		
Specialization	Surgical technologist 15 (37.5)	26 (65.0)	Fisher's exact	1.000
	Nurse anesthetist 13 (32.5)	14 (35.0)		
Recruiting hospital	Shahid Beheshti Hospital 4 (10.0)	16 (40.0)	0.520 ^{††}	.771
	Boo Ali Sina Hospital 23 (57.5)	4 (10.0)		
	Be'sat Hospital 0 (0.0)	20 (50.0)		
Academic degree	Associate 10 (50.0)	4 (18.2)	762.500 ^{†††}	.530
	Bachelor 10 (50.0)	6 (27.3)		
	Master 28 (70.0)	12 (45.5)		
Employment status	Permanent 3 (7.5)	24 (60.0)	1.141 ^{††}	.767
	Temporary-to-permanent 4 (10.0)	5 (12.5)		
	Contractual 5 (12.5)	4 (10.0)		
	Paramedics conscription law 11 (27.5)	7 (17.5)		
Monthly income	Good 24 (60.0)	10 (25.0)	965.500 ^{†††}	.266
	Moderate 5 (12.5)	19 (47.5)		
	Weak 11 (27.5)	11 (27.5)		

All values are expressed as mean ± standard deviation or number (percentage).

* Received inhalation aromatherapy with placebo (paraffin oil) for 30 consecutive days.

** Received inhalation aromatherapy with damask rose oil for 30 consecutive days.

† Independent samples t-test.

†† Chi-square test.

††† Mann-Whitney U test.

group study, Haehner et al. found no significant effect for 30-minute room fragrance with 100 mL of damask rose oil on the state anxiety of healthy adults in comparison with the nonfragrance environment immediately after the end of intervention.³⁴ This discrepancy can be attributed to differences in study design and population, time of anxiety measurement, type of administered damask rose (brand and concentration), and duration and time of aromatherapy administration.

Based on the results of this study, sleep quality significantly improved in the damask rose group compared to the placebo group at T3. Also, the improvement of sleep quality was more notable in the damask rose group compared to the placebo group. These findings

substantiate the available data regarding the effect of damask rose aromatherapy on improving patients' sleep quality.^{28–30,35} However, previous studies found no significant effect for inhalation aromatherapy with damask rose on the sleep quality of healthy individuals,^{47,48} which is inconsistent with our findings. In this regard, a quasi-experimental study indicated that four-night aromatherapy with three drops of damask rose essential oil was not effective on the quality of male indoor football players' sleep before the competition.⁴⁷ Similarly, another quasi-experimental study among female students showed that those who inhaled damask rose essential oil for seven nights did not have a higher level of sleep quality compared to the

Table 2

Comparison of the State Anxiety and Sleep Quality of the Operating Room Personnel Between the Damask Rose and Placebo Groups (N = 80)

Variables		Placebo group* (n = 40)	Damask rose group** (n = 40)	Changes compared with T1			P-value
				Placebo group	Damask rose group	Test results	
State anxiety ¹	T1	46.67 ± 1.56	45.95 ± 1.54	-	-	-	-
	T2	47.25 ± 1.57	41.65 ± 1.35 ^a	0.60 ± 0.39	-4.33 ± 0.39	78.247 [†]	<.001
	T3	45.35 ± 1.63 ^b	39.27 ± 1.31 ^{a, b}	-1.28 ± 0.55	-6.71 ± 0.55	47.924 [†]	<.001
	Test results	84.734 ^{††}	12.478 [†]				
	P-value	<.001	<.001				
Sleep quality ²	T1	9.07 ± 0.55	8.62 ± 0.55	-	-	-	-
	T3	8.05 ± 0.55	5.67 ± 0.39	-0.95 ± 0.27	-3.01 ± 0.27	27.453 [†]	<.001
	Test results	5.670 ^{†††}	7.119 ^{†††}				
	P-value	<.001	<.001				

Abbreviations: T1, before random allocation as baseline; T2, 90 minutes after the end of the first aromatherapy session; T3, 31st day of the study.

All values are expressed as mean ± standard error.

¹ Measured by the Spielberger state anxiety inventory (the total score ranges from 20 to 80, with higher scores indicating greater anxiety (42)).² Measured by the Pittsburgh sleep quality index (the total score ranges from 0 to 21, with higher scores represent lower sleep quality (46)).

* Received inhalation aromatherapy with placebo (paraffin oil) for 30 consecutive days.

** Received inhalation aromatherapy with damask rose oil for 30 consecutive days.

† Analysis of covariance, considering baseline values as covariates.

†† Repeated-measures analysis of variance with the Bonferroni post-hoc test.

††† Paired samples t-test.

^a Significant compared with T1.^b Significant compared with T2.

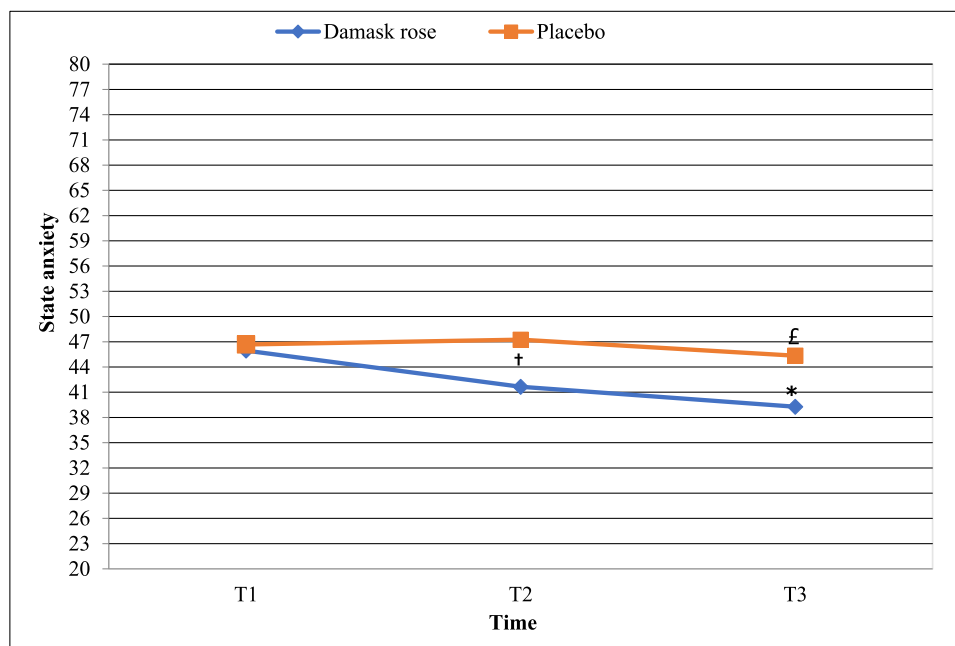


Figure 2. Comparison of the state anxiety of operating room personnel between the damask rose and placebo groups at T1 (before random allocation as the baseline), T2 (90 minutes after the end of the first aromatherapy session), T3 (31st day of the study). (†Significant compared with T2 [$P < .001$], ‡Significant compared with T1 [$P < .001$], *Significant compared with T1 and T2 [$P < .001$]). This figure is available in color online at www.jopan.org.

control group.⁴⁸ The type of damask rose and the duration and time of aromatherapy, as well as study design and population could account for the mentioned discrepancies.

Although a growing body of literature has documented the positive effects of damask rose on anxiety and sleep quality, the mechanism through which it can affect these outcomes has not been fully addressed.^{18,19} The antianxiety and hypnotic properties of damask rose are attributed to the chemical composition of this plant.^{15,16} In animal models, 2-phenylethanol and citronellol were introduced as the pharmacologically active constituents for the anxiolytic effect of damask rose.⁴⁹ Moreover, damask rose contains steric, ketone, aldehyde, and terpene compounds, which all can reduce anxiety by stimulating the olfactory center in the brain.²³ Also, damask rose contains quercetin and kaempferol as two key flavonoids which can bind to gamma-aminobutyric acid receptors to exert antianxiety and sedative effects.¹⁵ Likewise, flavonoids of damask rose have hypnotic activities due to their affinity to central benzodiazepine receptors.^{15,16} Besides, the hypnotic effects of damask rose might be due to its ethanolic and aqueous extracts, which showed to significantly increase the pentobarbital-induced sleeping time in mice the same as diazepam.⁵⁰ In addition, it was reported that the ethanolic extract of damask rose significantly induced sleep at an earlier stage and prolonged the duration of sleeping time in an animal model.⁵¹

Moreover, it seems that inhaling damask rose aroma increases parasympathetic activity and reduces sympathetic activity.⁵² In healthy adults, the inhalation of damask rose caused a 40% and a 30% decrease in sympathetic activity and adrenaline concentration, respectively.⁵³ Moreover, it seems that the inhalation of damask rose oil can directly affect the stress system activity by glucocorticoid receptor resistance and cognitive function.⁵⁴ Likewise, it was hypothesized that aromatherapy with damask rose can improve sleep quality by reducing anxiety.²⁹ Similarly, it seems that damask rose aromatherapy can alleviate sleep disorders by the reduction of pain severity, as two meta-analyses indicated the analgesic effects of this intervention and pain is a risk factor for sleep disorders.^{55,56}

Study Implications

The findings of the present study could provide valuable evidence regarding the usefulness of aromatherapy with damask rose among OR personnel. Likewise, the present study improved our understanding of the value of damask rose aromatherapy among health care personnel. Overall, the intervention was safe and only some participants reported minor adverse events during the intervention. Hence, considering its nonpharmacological nature, low cost, and easy usage, aromatherapy with damask rose, along with other routine care or treatments, can be used by OR personnel during unexpected stressful situations like the COVID-19 pandemic.

Study Limitations

To the best of our knowledge, this is the first study to evaluate the effects of aromatherapy with damask rose on the anxiety and sleep quality of health care personnel. However, the study findings should be interpreted with caution due to some limitations. First, this study was conducted on a small sample of Iranian OR personnel. Second, the participants were not completely blinded due to the different scents of damask rose oil and paraffin oil; however, the participants of each group were intervened separately in a different room of the OR department to prevent them from seeing each other during the intervention or inhaling the product of another group. Finally, a long-term follow-up could not be performed; therefore, safety evaluations using laboratory parameters was not planned for recording the adverse events.

Conclusions

Inhalation aromatherapy using the damask rose was effective in reducing state anxiety and improving sleep quality among OR personnel during the COVID-19 pandemic. However, further trials with larger sample sizes and a blinded design are suggested to obtain more accurate results. Future studies are recommended to use the same study protocol and compare the effects of damask rose essential

oil with other herbal products or pharmacological agents that are commonly used for managing anxiety and sleep disturbances. Moreover, for a reliable analysis of outcomes, the use of physiological or objective measures in addition to self-completed questionnaires can be beneficial.

Acknowledgments

This study has been adapted from an MSc thesis in Operating Room supported by Hamadan University of Medical Sciences. The authors also appreciate all the respected operating room personnel who voluntarily gave their time to participate in this study.

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