

The Effects of Aromatherapy with *R.Damascena* mill L. on Fatigue and Physical Discomfort of Operating Room Nurses

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Abstract

Background: Facing with emergencies in operating rooms can lead to nurses' fatigue and physical discomfort. The evidence shows that aromatherapy can effect on fatigue and physical discomfort.

Aim: This study was performed with aim to investigate the effect of aromatherapy with *R.Damascena* essential oil on fatigue and physical discomfort in operating room nurses.

Method: This randomized controlled clinical trial was conducted in 2023 on 60 operating room nurses in Qom University of Medical Sciences, Qom, Iran. Participants were divided into two equal intervention and control groups using the random blocking method. The intervention group received *R.Damascena* essential oil and the control group received normal saline as a placebo. In the intervention group, two drops of essence and in the control group, two drop of normal saline were applied to cotton ball, and the participants were asked to attach it to their clothes or scarf at a distance of ten centimeters below the chin and inhale it for 10 min. Fatigue and physical discomfort were assessed before and after aromatherapy.

Results: After the intervention, the mean intensity of fatigue and physical discomfort significantly reduced with a mean decrease 18.38% ($t=6.62, p<0.001$) and 27.75% ($t=5.19, p<0.001$), respectively. There was significant difference between the intervention and control groups regarding fatigue ($t=-2.78, p=0.007$) and physical discomfort ($t=-3.47, p=0.001$).

Implications for Practice: Aromatherapy with *R.Damascena* can reduce fatigue and physical discomfort in operating room nurses. Therefore, it is recommended to use aromatherapy along with other interventions to improve fatigue and physical discomfort.

Keywords: Aromatherapy, Fatigue, Operating Room Nurse, Physical Discomfort, *R.Damascena*

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Introduction

Nurses are responsible for the main burden of care and medical services; therefore they are one of the most important members of the healthcare system. Facing with emergencies in operating rooms, working in the closed environment, and having high work technique and large volume of work can lead to the fatigue and physical discomfort of nurses (1-4). The study of Zadi et al. (2018) revealed high level of fatigue in operating room nurses (4). Fatigue and physical discomfort of nurses are directly related to the occurrence of professional errors such as wrong procedure and diagnosis (5). Currently, debate exists among health care professionals regarding appropriate strategies for fatigue management (6).

Fatigue is an unpleasant mental feeling that forms a range of feelings of weakness to burnout that interferes with the ability to play personal roles and activities (7). Nurses who suffer from fatigue may not perform to their optimum, which affects patient care (8). The evidence indicates the relationship between fatigue and physical discomfort (9). Physical discomfort is a disorder with physical symptoms that has a psychological origin. The most common symptoms of this disorder include fatigue, lack of energy, sleep problems, and various pains, including back pain and headache. This disorder is so uncomfortable and interferes with job performance (10-12).

There is some evidence that aromatherapy affects the brain and nervous system, similar to the influences of medications (7). *R.Damascena*, known as Gole Mohammadi in Iran, is the most popular species of Rosaceae family which aids meditation and prayer. Moreover, aromatherapy with *R.Damascena* could be a cost-effective and practical intervention that may effectively reduce fatigue (13, 14). The results of Rakhshandeh et al.'s study (2010) indicated the positive effects of aromatherapy with *R.Damascena* on muscle relaxation (13). The result of Varvani et al.'s study (2017) demonstrated that aromatherapy with Lavender and *R.Damascena* essential oil can improve the fatigue of emergency nurses (15). Moreover, aromatherapy can be effective in reducing fatigue in patients with multiple sclerosis (14).

The operating room professions are of high importance, and limited studies have assessed the effect of *R.Damascena* on the fatigue and physical discomfort in operating room nurses. Therefore, this study was conducted with aim to investigate the impact of aromatherapy with *R.Damascena* on the fatigue and physical discomfort of operating room nurses.

Methods

This randomized control clinical trial was conducted in 2023 on all operating room nurses in Qom University of Medical Sciences, Iran. The sample size was calculated according to fatigue and physical discomfort parameters. The sample size was determined to be 30 qualified operating room nurses in each group, considering the mean and standard deviation of the fatigue severity of emergency nurses ($S_1=5.3$, $S_2=6.2$, $\mu_1=42.2$, $\mu_2=47.3$) in the study by Varvani et al. (15) and using the formula of comparing the means, with $\alpha=0.05$ and $\beta=0.1$. The inclusion criteria were willingness to participate in the study, having a healthy sense of smell, no history of allergies to plant aromas, not taking sedatives, and no history of chronic headaches or allergic diseases. The exclusion criteria entailed unwillingness to continue cooperating in the study and using perfume and cologne.

Approval was obtained from the Ethics Committee of Semnan University of Medical Sciences, and the study was registered in the Iranian Registry of Clinical Trial. Afterwards, sampling was performed under the ethical considerations of the Helsinki Declaration (16).

First, the questionnaire of personal and professional characteristics (including age, gender, marital status, education, and work experience) was completed for each individual by a research colleague. Next, operating room nurses were selected by convenience sampling and were allocated into two equal intervention and control groups. Participants allocated to two equal groups of intervention (A) and control (B) using blocking randomization method. In this method, 6 blocks of 4 were used (ABAB=1, BABA=2, ABBA=3, BAAB=4, AABB=5, BBAA=6). First, blocks of 4 were written on pieces of paper, and then the pieces of paper were placed in envelopes and numbered on the envelope to conceal random assignment. Then, the choice of each envelope was randomly determined by throwing a dice.

Brief Fatigue Inventory (BFI) and physical discomfort researcher-made questionnaire were used to record fatigue and physical discomfort rates of operating room nurses, respectively. In the intervention group, two drops of 40% *R.Damascena* essence (produced by Barij Essence

Pharmaceutical Co., Kashan, Iran) were applied to cotton ball, and the participants were asked to attach it to their clothes or scarf at a distance of ten centimeters below the chin and inhale it for 10 min. The same treatment protocol was also utilized in the control group using normal saline as a placebo instead of *R.Damascena* essence. Immediately after aromatherapy, fatigue and physical discomfort rates of the participants were measured again. Aromatherapy was performed in a private room of the OR department at morning shift.

The BFI consists of 10 questions which measure fatigue severity. The first question shows presence or absence of unusual fatigue in the past week by answering yes or no. The subsequent questions ask about current fatigue rate, usual fatigue rate in the past 24 hours, the highest rate of fatigue experienced in the past 24 hours, the effect of fatigue experienced in the past 24 hours on overall performance, mood, walking, interaction with others, and enjoying the life, each measured by a scale from 0 to 10. The score 0 represents no fatigue and the score 10 represents the worst fatigue. Finally, overall fatigue of each individual is obtained as sum of the score of question 2 to 10 divided by 9. The result 0 shows lack of fatigue, 1-3.9 indicate mild fatigue, 4-6.9 moderate fatigue, 7-9.9 severe fatigue, and 10 very severe fatigue. The validity of this inventory has been confirmed using concurrent criterion validity (17). Its reliability has also been confirmed with Cronbach's alpha coefficient of 0.9 (18-20). Additionally, somatic symptoms related to physical discomfort was assessed using a researcher-made questionnaire (consisting of 15 items) depending on the nurse's wellbeing on a three-point Likert scale. The items of this tool is designed based on the Patient Health Questionnaire-15 (PHQ-15) confirmed by some studies (21-23). The answers to each item include no problem at all (0), a mild problem (could be ignored if not thinking about it) (1), and severe problem (interferes with daily activities) (2). The total score can range from 0 to 30, with higher scores indicating greater severity of somatic symptoms. To survey the face validity, the level of difficulty and clarity of the items were examined by 10 nurses. The appropriateness of the items of this questionnaire was confirmed by 10 nurses by using the content validity index (CVI). At this stage, the CVI of each item (at least 0.9) was reported excellent. The results of the correlation between the questionnaire and the PHQ-15 confirmed the simultaneous validity of the physical discomfort questionnaire. In other words, the correlation coefficients of the factors of two questionnaires were significant at least at the level of 0.05. The reliability of the questionnaire was confirmed with Cronbach's alpha coefficient of 0.89 and test-retest correlation coefficient of 0.9.

Data were analyzed by SPSS software (version 22) and descriptive statistics (including frequency, percentage, mean, standard deviation) and analytical tests. The normality of quantitative variables was checked using the Kolmogorov-Smirnov test, and normal distribution was confirmed. The Chi-square test was used to compare gender, marital status and level of education variables. Independent t-test was applied to compare the mean severity of fatigue, physical discomfort, age and work experience between the two groups. Paired test was used to compare the mean severity of fatigue and physical discomfort within the two groups. A 95% confidence interval ($\alpha=5\%$) was considered for the performed tests. $p<0.05$ was considered statistically significant.

Ethical Consideration

This study was approved by the Institutional Review Board and the Ethics Committee of Semnan University of Medical Sciences, Semnan, Iran (IR. SEMUMS.REC.1402.075) and was registered in the Iranian Registry of Clinical Trials (IRCT20140428017468N7). This study followed ethical considerations according to the Helsinki Declaration. All participants were informed about the purpose of the study and that they could leave the study at any time. They also signed a written informed consent from at the beginning of the study.

Results

A total of 60 patients enrolled in the study and data from 30 patients in the intervention group and in the control group 30 were analyzed (Figure 1). The mean age of participants in the intervention and control groups was 28.16 ± 2.21 and 28.33 ± 4.17 years, respectively. Majority of participants (56.7%) in the intervention group were male and majority of participants (53.3%) in control group were female. The mean work experience in the intervention group was 4.00 ± 2.37 years and in the control group 4.96 ± 3.28 years. The operating room nurses in the two groups were homogeneous in terms of age, gender, marital status, level of education, and work experience ($p>0.05$) (Table 1).

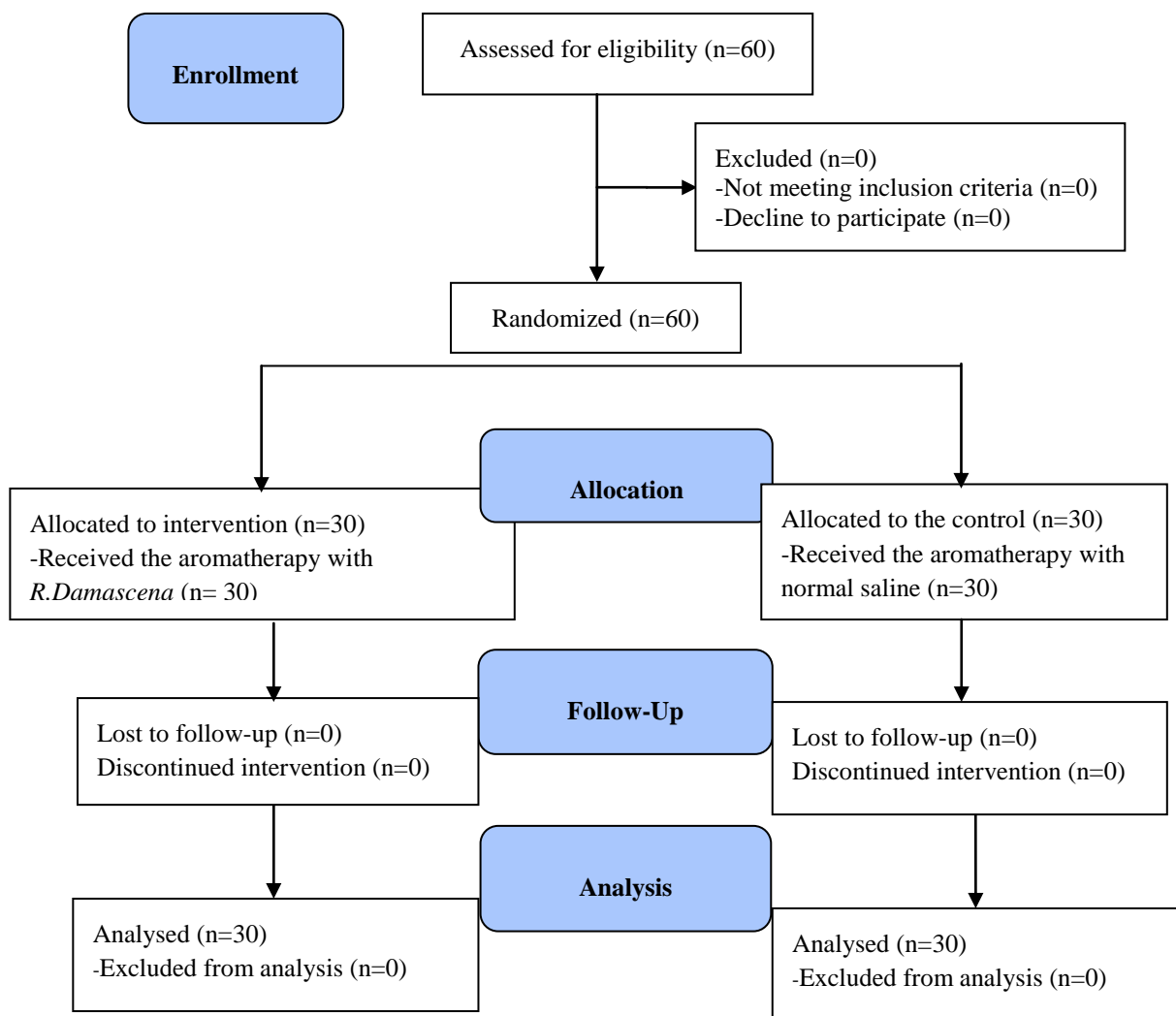


Figure 1. Consort flow chart diagram of the study

Table 1. Participants' demographic characteristics in the intervention and control groups

Variable	Groups		Test results	P-value
	Intervention N (%)	Control N (%)		
Age (Mean ± SD)	28.16 ± 2.21	28.33 ± 4.17	t = -0.19	0.847 *
Gender				
Male	17 (56.7)	14 (46.7)	χ ² = 0.60	0.438 **
Female	13 (43.3)	16 (53.3)		
Marital status				
Single	23 (76.7)	16 (53.3)	χ ² = 3.59	0.058 **
Married	7 (23.3)	14 (46.7)		
Level of education				
Bachelor	25 (83.3)	20 (66.7)	χ ² = 2.22	0.136 **
Associate	5 (16.7)	10 (33.3)		
Experience of work (Mean ± SD)	4.00 ± 2.37	4.96 ± 3.28	t = -1.30	0.197 *

*Independent t-test, **Chi-square

The independent t-test results did not demonstrate any statistically significant difference between the intervention and control groups in terms of severity of fatigue before aromatherapy ($p > 0.05$) (Table 2). However, the severity of fatigue after aromatherapy was significantly different between the two

groups ($t=-2.78$, $p=0.007$) (Table 2). The paired t-test indicated a significant reduction in the severity of fatigue with a mean decrease 18.38% among operating room nurses in the intervention group ($t=6.62$, $p<0.001$) (Table 2).

Table 2. The mean severity of fatigue in the intervention and control groups

Measurement time point	Groups (Mean \pm SD)		Intergroup comparison	
	Intervention	Control		
Before aromatherapy	4.84 \pm 0.85	4.65 \pm 0.81	$t = 0.89$	$p=0.372^*$
After aromatherapy	3.95 \pm 0.85	4.56 \pm 0.85	$t = -2.78$	$p=0.007^*$
Intragroup comparison	$t=6.62$	$p<0.001^{**}$	$t=0.96$	$p=0.344^{**}$

*Independent t-test, **Paired t-test

There was no statistically significant difference between the intervention and control groups in terms of mean score of physical discomfort before aromatherapy ($p>0.05$), while mean score of physical discomfort after aromatherapy was significantly different between the two groups ($t=-3.47$, $p=0.001$) (Table 3). The paired t-test revealed a significant decline in the physical discomfort with a mean decrease 27.75% of the operating room nurses in the intervention group ($t=5.19$, $p<0.001$) (Table 3).

Table 3. The mean score of physical discomfort in the intervention and control groups

Measurement time point	Groups (Mean \pm SD)		Intergroup comparison	
	Intervention	Control		
Before aromatherapy	5.26 \pm 2.30	5.63 \pm 1.90	$t = -0.67$	$p=0.504^*$
After aromatherapy	3.80 \pm 1.90	5.40 \pm 1.65	$t = -3.47$	$p=0.001^*$
Intragroup comparison	$t = 5.19$	$p < 0.001^{**}$	$t = 1.75$	$p = 0.09^{**}$

*Independent t-test, **Paired t-test

Discussion

The purpose of the present study was to examine the effect of aromatherapy with *R.Damascena* on fatigue, and physical discomfort of operating room nurses. Our results revealed a significant effect of aromatherapy with *R.Damascena* on fatigue and physical discomfort of operating room nurses compared to aromatherapy with normal saline. The results of this study represented that nurses' fatigue under aromatherapy with *R.Damascena* was lower than aromatherapy with normal saline. Our results are in line with the study by Varvani Farahani et al. (2017) concerning the effect of aromatherapy with *R.Damascena* on the fatigue of emergency ward nurses (15). Another study conducted by Wang et al. (2022) indicated that aromatherapy improved fatigue in adults who suffer from chronic diseases (24). The study of Sung-Hee (2004) demonstrated that aromatherapy can be effective in reducing the fatigue in postpartum mothers (25). The results of Fukui et al.'s study (2007) revealed that *R.Damascena* had physiological and psychological relaxation effects on healthy college students (26).

Our results demonstrated that aromatherapy could decrease physical discomfort of operating room nurses. Some evidences have investigated the impact of aromatherapy with *R.Damascena* on human wellbeing, which is consistent with the results of our study. The findings of Mahdood et al. (2021) demonstrated that the sleep quality of operating room nurses increased after aromatherapy with *R.Damascena* essence (27). Moreover, the results of Davaneghi et al. (2017) demonstrated that *R.Damascena* extract could be effective in decreasing primary dysmenorrheal symptoms (28). A systematic review and meta-analysis study by Nasiri et al. (2021) revealed that aromatherapy with *R.Damascena* could alleviate adults' acute low back pain severity (29). Also, the result of Niazi et al.'s research (2011) demonstrated that topical Rose oil reduced headache intensity (30). The results of Takasi et al.'s study (2024) indicated the reducing effect of aromatherapy with *R.Damascena* on the severity of nausea and vomiting (31). Kabiri et al. (2018) demonstrated that aromatherapy can lead to improving fatigue in patients with knee osteoarthritis (32).

The muscle relaxation property of *R.Damascena* is due to the chemical components of this plant, including ethyl acetate and n-butanol, which have been introduced as active pharmaceutical compounds that play a role in the anti-fatigue effects of *R.Damascena* (13). In addition, the analgesic effects of *R.Damascena* are attributed to its flavonoid components, which have pain alleviating effects

(33, 34). Active ingredients of *R.Damascena*, such as nonadecane, beta-citronellol, hencosane, geraniol, and docosane can play an essential role in reducing pain (30). Evidence has indicated that aroma of *R.Damascena* increases parasympathetic activity and decreases fatigue (35).

The main strength of this study was extensive review of the literature to survey the effect of aromatherapy with *R.Damascena* on physical discomfort in health individuals. One of the limitations of this study was limited follow-up of staffs. Moreover, since aromas of *R.Damascena* and normal saline were different, blinding was not possible for the study participants. Therefore, further researches are recommended to examine the long-term effects of this aromatherapy intervention on wellbeing among operating room nurses.

Implications for practice

Aromatherapy with *R.Damascena* was observed to reduce the severity of fatigue and physical discomfort among operating room nurses. Therefore, it is recommended that the aromatherapy can be used along with other interventions to improve the nurse's fatigue and physical discomfort.

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Conflicts of interest

The authors declared no conflict of interest.

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Authors' Contributions

Meysam Hosseini Amiri: conception, design, data collection, data analysis and drafting the manuscript. Nayyereh Raiesdana: conception, design, supervision of project, and revising the manuscript. Hanieh Bahadori: data collection and revising the manuscript. All authors contributed to the writing of the manuscript and discussed on the manuscript.

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