

## *Effect of Aromatherapy with Rosa Damascena Essential Oil on Nurses' Occupational Stress in the Emergency Department: A Randomized Controlled Trial*

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### Abstract

**Background:** Emergency personnel are frequently exposed to high-risk physical and psychological factors that lead to increased occupational stress.

**Objectives:** This study aimed to evaluate the effect of aromatherapy with rosa damascena essential oil on nurses' occupational stress in the emergency department.

**Methods:** This randomized controlled trial was conducted among sixty nurses in the trauma center of Besat Hospital, Tehran. The participants were selected by the convenience sampling method, and then randomly assigned to the aromatherapy with essential oil of Rosa damascena and control groups. Intervention in the experimental and control groups consisted of inhalation cotton swabs impregnated with two drops of essential oil of 40% Rosa damascena (Gole Mohammadi) and cotton soaked with two drops of distilled water as a placebo for 2 minutes, respectively. Nurses' stress level was assessed by the Nursing Stress Scale before and after the intervention. To analyze the data, independent t-test, paired t-test, and ANCOVA were performed in SPSS, version 22.

**Results:** The mean age of the nurses was  $29.07 \pm 5.495$  years, and the majority of them had a bachelor's degree. The results of this study showed that stress scores in the experimental group were lower than those in the control group after the intervention ( $p < 0.0001$ ). The effect size was -1.5, which was large and desirable. Nurses' occupational stress scores in the experimental group diminished significantly after the intervention ( $p = 0.012$ ).

**Conclusion:** It is recommended to use complementary therapies such as aromatherapy with rose essential oil to reduce occupational stress in nurses. Further studies with larger sample sizes and in other occupational groups are recommended.

**Keywords:** aromatherapy, emergency, nurses, rosa damascena, stress

### Introduction

The work environment always affects the person. In other words, occupational and psychological traits are constantly interacting and dynamic. In the meantime, health care, especially in hospitals, is considered to be a stressful work as healthcare workers serve those who experience severe stress themselves, and frequently, nurses are exposed to phenomena such as patients' suffering, pain, death

and severe stress. Nurses are among those who experience a lot of stress [1,2]. Being responsible, spending long hours with patients and their companions, and playing a key role in the healthcare team are among the factors leading them to experience excessive stress. Therefore, nursing is considered a stressful profession [2]. The results of a systematic review and meta-analysis showed that the overall prevalence of

occupational stress in nurses working in Iranian hospitals is 60% [3]. Studies have shown that emergency departments and trauma centers are more stressful environments than other parts of the hospital. Some of the factors that increase the level of stress in emergency nurses include the admission of emergency patients, the need to be prepared for emergency treatment, greater clinical responsibility than other occupations, poor patient prognosis, workplace stimuli, the need to use high-tech devices, the sounds of devices, the crowd of patients, and high workload [4].

Stress is associated with increased heart rate and blood pressure, stomach problems, headaches, heart attacks, arrhythmias, and even sudden death. Chronic stress, on the other hand, is associated with impaired focus, irritability, fatigue, heart disease, increased unhealthy behaviors such as smoking, eating disorders, depression, and low levels of social support [5].

In addition to physical health disorders, mental health problems can also have adverse effects on employees' efficiency and productivity, thereby resulting in increased absenteeism, impaired personal communication, decreased levels of immunity, and increased physical complaints, which can affect the quality of work of employees, and thus, the productivity of the organization [6]. Despite working in a stressful environment and experiencing acute and chronic problems, nurses should strive to be calm, manage their stress, and interact with patients with a therapeutic approach [6].

One way to lower stress is to use drug therapy. Despite the positive effects of sedatives in reducing stress, most of them have side effects, such as dependence and drug tolerance, if used long-term. Therefore, due to the temporary effects and side effects of pharmacological therapy, there is a growing tendency towards using non-pharmacological methods, and some studies have been conducted in this regard. Complementary medicine methods include aromatherapy, acupuncture, massage therapy, muscle relaxation, and music therapy [7-10]. Cost-effectiveness, ease of administration, non-invasiveness, non-pharmacological nature, and no chemical side effects are the advantages of the methods used in complementary medicine [9].

Several studies have shown the positive effects of herbal products on reducing pain [9], stress [1], depression and headache [11] and improving health and the quality of life [1]. Today, aromatherapy is one of the most popular treatments, which has become a growing field in nursing because it is a combination of science and art [1]. Aromatherapy is a low-risk, effective, and non-invasive procedure that does not require specific time or equipment and has been adopted as a therapeutic approach by the World Health Organization [12].

The aroma molecules of plants are capable of being absorbed by the airways (respiration) and the skin (topical use). Chemical molecules decrease the activity of the sympathetic nervous system and simultaneously stimulate the parasympathetic nervous system, and in turn, reduce stress [1]. Herbal essential oils used in aromatherapy include Rose, lemon, lavender, white sandal wood, mandarin, geranium, and orange [13].

Various studies have used aromatherapy to alleviate nurses' occupational stress and anxiety [1,14]; however, the raw material used for aromatherapy in various studies has usually been the aroma of lavender [1,2,12,14], chamomile, clary sage, and lavender with jojoba [5]. In some studies, the effects of aromatherapy with rose essential oil on the intensity of pain [15,16], patient anxiety [16], nurses' fatigue [17], and the sleep quality of athletes before tournaments [18] have been investigated. *Rosa damascena* is one of the most important species of roses in the world and one of the most famous herbs in gardening history. The essential oils and fragrances of this flower contain ester, ketone, aldehyde, and terpene compounds. These compounds exert a lot of psychological effects by stimulating the olfactory center in the brain. Some studies have revealed that the scent of this flower is also useful for improving postpartum depression, rheumatic pain, anxiety, psychosomatic disorders, premenstrual pain, and memory function [19]. However, the researchers did not find a study investigating the effectiveness of rose aromatherapy on nurses' occupational stress. Therefore, due to the benefits of Mohammadi flower and the limited studies regarding its effect on nurses' occupational stress, the researchers aimed to investigate the effect of aromatherapy

with rose (gol-e-mohammadi) essential oil on nurses' occupational stress.

### Methods

This single-blind two-group randomized controlled trial was performed in 2018. Only the statistical analyzer was blinded to the groupings. The sample size was estimated to be 26 nurses in each group with a 95% confidence level, 80% test power, and 0.8 relative error (Cohen's d) based on Cohen's sample size determination table [20,21]. However, 30 nurses were considered in each group with a probability of 15% drop-out rate. Therefore, 60 nurses working in the Trauma Center of Besat Hospital, Tehran, Iran were recruited by the convenience sampling method, and then randomly assigned to the experimental and control groups by throwing a coin.

The inclusion criteria comprised of no disorder in the sense of smell, no use of sedatives, anti-anxiety drugs or any other psychiatric drugs, no history of allergy to plant scent, willingness to participate in the study, no migraine and other chronic headaches, no history of anxiety disorders or any other psychiatric disorders, and non-use of perfume or cologne on the intervention day. The exclusion criteria included unwillingness to continue to participate in the study and use of perfume or cologne by the nurses during the study.

A demographics checklist and the Nursing Stress Scale (NSS) questionnaire were used to collect data. The demographic checklist included items

on gender, marital status, educational level, monthly income, work experience, work experience in the emergency department, and number of children.

The NSS questionnaire was designed by Gray-Toft and Anderson in 1981 and is used to measure nurses' occupational stress and the frequency and main sources of stress [22]. The NSS-57 scale is a revised version of the NSS. The final version of the questionnaire includes 57 items in nine sub-scales rated based on a five-point Likert scale (1='never stressful', 2='occasionally stressful', 3 = 'frequently stressful', 4 = 'extremely stressful', and 5 = doesn't apply). Each subject has to choose one of the options depending on the frequency of experience of the situation (Table 1). For analysis, the scores of the items are summed up and the possible scores range from 57 to 285. A score between 57 and 114 indicates low stress, a score between 114 and 171 indicates moderate stress, and a score above 171 indicates high stress. In previous studies, Cronbach's alpha coefficient was used to examine the internal consistency of the revised scale, which yielded coefficients ranging from 0.93 to 0.96 [4] and the sub-scales' reliability ranged from  $\alpha = 0.88$  (conflict with head nurses) to  $\alpha = 0.65$  (discrimination). The validity and reliability of this tool were also confirmed in the study of Rezai et al. Rezai used the test-retest method to determine scientific confidence, which reported a high correlation coefficient ( $r = 74\%$ ) [23].

**Table 1: Sub-scales of the revised Gray-Toft and Anderson Nursing Stress Scale (NSS-57)**

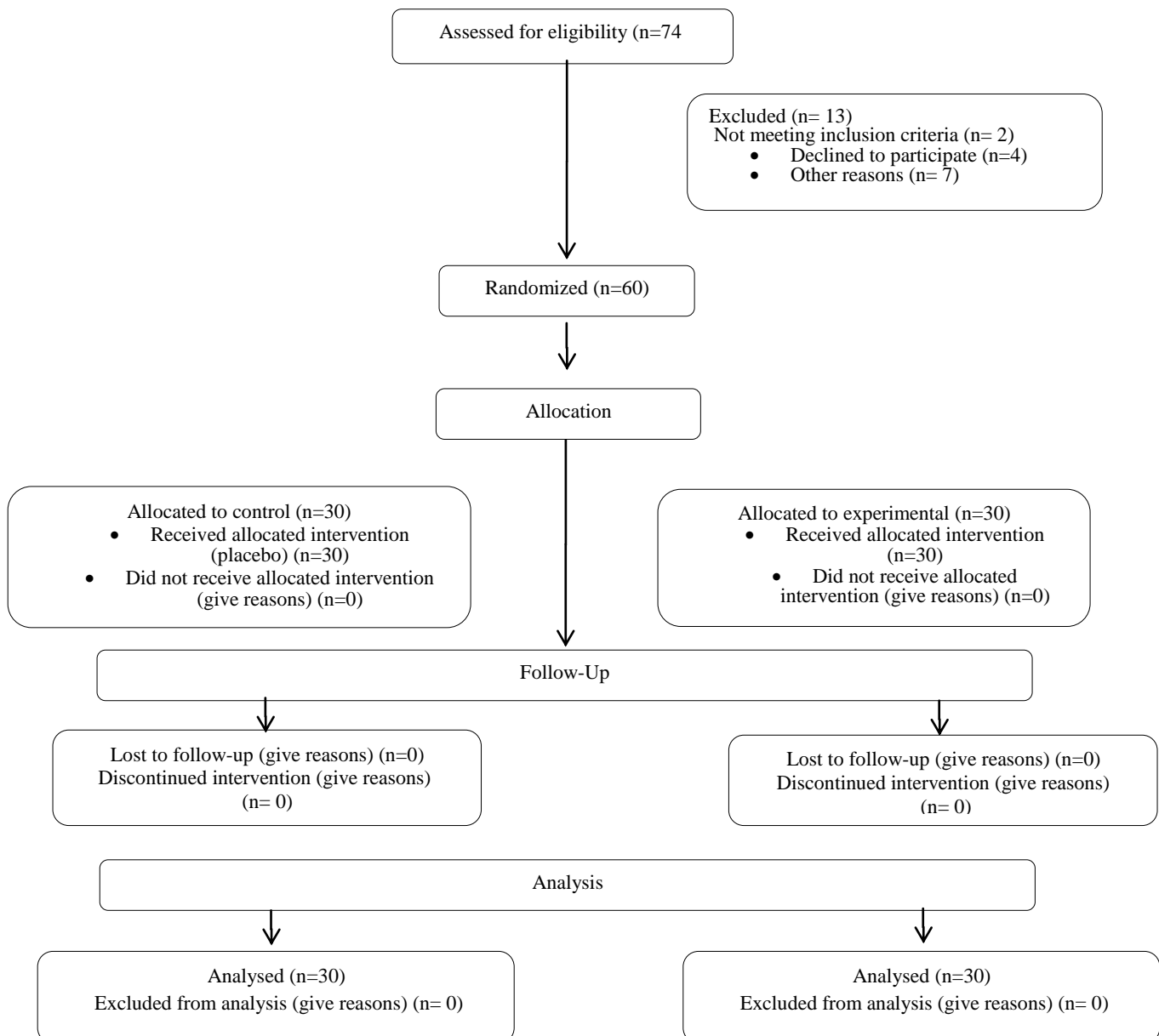
Sub-scales	Items
Death and dying	53, 47, 37, 27, 17, 9, 1
Conflict with physicians	48, 38, 28, 10, 2
Inadequate emotional Preparation	19, 11, 3
Problems relating to peers	50, 22, 21, 20, 12, 4
Problems relating to supervisors	54, 49, 46, 41, 31, 30, 5
Workload	57, 55, 51, 45, 42, 41, 32, 23, 13
Uncertainty concerning the treatment	43, 39, 36, 33, 29, 24, 18, 14, 6
Patients and their families	56, 52, 44, 35, 34, 25, 15, 7
Discrimination	26, 16, 8

The time of sampling and intervention was before nurses started working. All the interventions were performed by the researcher (MSc student in Emergency Nursing and experienced in the emergency department). Each person was asked if they had any history of anxiety disorders or drug

use, and the person would not be included in the study if the response was positive. After explaining the intervention procedure by the researcher, the demographic checklist and the NSS were completed by the nurses. After completing the pre-test, the researcher provided

each nurse with a cotton dipped in two drops of 40% rose essential oil (produced by Barij Essence Pharmaceutical Company of Kashan having a factory registration number of 1028, which manufactures herbal medicines) contained in a small 10-cc container for intervention in the experimental group. In the control group, cotton soaked in two drops of distilled water was given to each subject. The nurses were then asked to inhale it for 10 minutes at a distance of 5 cm [23].

It should be noted that a private and quiet room was provided for sampling and intervention. Also, the room for the control group was independent and separate from the room for the experimental group. Although the rose essential oil had a familiar smell to most nurses, none knew what group they were in. Ninety minutes after the intervention, the NSS was completed again by each nurse (Chart 1).



**Chart 1: The study process**



Finally, the data were analyzed using SPSS version 22. Kolmogorov-Smirnov test was used to assess the normality of the data. To compare the demographic characteristics between the two groups, the independent t-test and Fisher's exact test were used. Independent t-test was used for inter-group comparisons and paired t-test was used for intra-group comparisons. A P-value of less than 0.05 was considered significant. Chart 1 shows the process of the study.

The researchers committed themselves to implement the Helsinki Declaration. After explaining the research objectives to the nurses, informed consent was assigned by them and they were assured that their entry into the study would be completely voluntary and that their information would be kept confidential. The nurses were free to withdraw from the study at any time. Other ethical considerations of this study were lack of harm and loss and protection of life, health and dignity of the subjects. At the end of the study, the

nurses had the right to be informed of the outcome of the study and to share the benefits of the results, such as access to interventions that were identified beneficial in the study. The principles of the Committee on Publication Ethics (COPE) were also followed in this study.

### Results

The mean age of the nurses was  $29.07 \pm 5.495$  years (age range: 22 to 44 years), and the majority of them were female (56.7%), single (50%), and had a bachelor's degree (91.7%). None of them had an olfactory dysfunction, anxiety disorder, allergies, headaches, or history of taking anti-anxiety drugs. According to Table 2, no significant difference was noted between the two groups in terms of age, gender, marital status, educational level, work experience, and work experience in the emergency department ( $p > 0.05$ ).

**Table 2: Demographic information of the participants separately for each group**

Variable	Experimental group	Control group	P-value*
	Mean $\pm$ SD	Mean $\pm$ SD	
Age	29.40 $\pm$ 6.71	28.73 $\pm$ 4.01	0.46
Work experience	8.57 $\pm$ 7.84	6.60 $\pm$ 5.94	0.71
Work experience in the emergency department	4.30 $\pm$ 4.38	4.83 $\pm$ 5.39	0.63
	Frequency (%)	Frequency (%)	P-Value**
Gender	Male	9(30)	0.067
	Female	13(43.3)	
Level of education	BSc	27(90)	1.00
	MSc	3(10)	
Marital status	Single	19(63.3)	0.070
	Married	11(36.7)	

\*Mann-Whitney U

\*\*Fisher's exact test

Independent t-test showed no significant difference in the mean of occupational stress between the two groups before the intervention ( $p=0.066$ ), while there was a significant difference in this respect post-intervention ( $p < 0.0001$ ). The effect size was -1.5 that was large and desirable. Paired t-test exhibited a significant difference in the occupational stress scores of the nurses before and after the intervention in the experimental

group ( $p=0.012$ ), while in the control group this difference was not significant ( $p= 0.816$ ; Table 3). Independent t-test revealed that the mean scores of the dimensions of nurses' occupational stress (except the dimensions of death,  $p = 0.020$  and problems relating to peers,  $p = 0.013$ ) were not significantly different in the two groups before the intervention ( $p > 0.05$ ; Table 4).

**Table 3: Comparison of the mean nurses' occupational stress before and after the intervention in two groups**

Nurses' job Stress	Group	Experimental	Control	t	P-Value and df
		Mean± SD	Mean± SD		
Before intervention		140.40±32.66	154.50±25.09	-1.87	P = 0.066 df = 54.38
After intervention		129.93±17.91	154.96±16.44	-5.53	P < 0.0001 df = 56
t		2.67	0.23		
P-Value and df		P= .012 df = 29	P = 0.816 df = 27		

**Table 4: Comparison of the mean dimensions of nurses' occupational stress in the experimental and control groups before and after the intervention**

Group	Occupational stress Dimensions	Experimental	Control	t	P-Value
		Mean± SD	Mean± SD		
Death	Before	16.37± 4.67	18.90± 3.47	-2.38	0.020
	After	14.33± 2.94	18.60± 2.22	33.39*	<0.0001
Conflict with physicians	Before	12.30± 3.68	13.47± 2.87	-1.36	0.177
	After	10.67± 2.34	12.73± 2.18	-3.540	0.001
Inadequate emotional Preparation	Before	7.13± 2.55	8.13± 2.49	-1.63	0.108
	After	6.60± 1.59	7.79± 1.95	-2.578	0.013
Problems relating to peers	Before	12.83± 4.73	15.83± 4.34	-2.56	0.013
	After	13.03± 3.20	16.59± 2.44	14.31*	<0.0001
Problems related to supervisors	Before	18.30± 5.19	19.90± 3.86	-1.35	0.181
	After	15.93± 3.84	18.63± 2.92	-3.066	0.003
Workload	Before	22.57± 6.38	23.77± 6.14	-0.83	0.410
	After	21.00± 3.65	24.60± 3.39	-3.959	<0.0001
Uncertainty concerning the treatment	Before	23.17± 6.14	24.57± 4.59	-0.97	0.335
	After	20.87± 3.13	24.10± 3.57	-3.729	<0.0001
Patients and their companions	Before	7.50± 1.73	7.87± 1.68	-0.83	0.409
	After	9.07± 2.07	8.60± 2.01	0.887	0.379
Discrimination	Before	19.10± 4.65	21.23± 4.10	-1.85	0.064
	After	18.43± 3.46	21.67± 2.92	-3.800	<0.0001

\*:ANCOVA; F

### Discussion

This study aimed to investigate the impact of aromatherapy with rose essential oil on emergency department nurses' occupational stress. The results showed no significant difference in demographic variables and occupational stress between the two groups prior to the intervention. However, following the intervention, the mean occupational stress in the experimental group was lower than that in the control group ( $p < 0.0001$ ). This finding demonstrates the effectiveness of aromatherapy with rose essential oil in reducing emergency department nurses' occupational stress.

The results also indicated that the effect size for occupational stress in the experimental group was large and desirable; thus, it can be argued that the clinical application of this technique has scientific support and substantiated evidence. In this regard, Ghods et al. reported that aromatherapy with lavender essential oil after two weeks resulted lowered nurses' occupational stress [14]. Also, Pemberton and Turpin showed that the topical application of the of lavender and *Salvia sclarea* essential oils occupational diminished stress in nurses working in intensive care units (ICUs) [24].

Sangwin also found that aromatherapy with lavender, *Salvia sclarea*, and chamomile combined with jojoba oil reduced stress in the intervention group [5]. Ghaffarzadegan et al. reported that taking Ginkgo biloba pills for two weeks reduced occupational stress in nurses working in burn wards and ICUs [25]. Paula et al. also pointed to the effectiveness of aromatherapy with lavender and Chamomile (*Matricaria recutita*) essential oils in reducing stress [12].

Cho et al. showed that aromatherapy with lavender essential oil after two days reduced stress in ICU patients [26].

It should be noted that the findings of the present study are inconsistent with the findings of some studies. For example, Eren et al. reported that aromatherapy with lavender essential oil did not have a significant effect on occupational stress in nurses working in the ICU [2]. Also, Montibeler et al. showed that aromatherapy massage with the essential oils of lavender and geranium resulted in a significant decrease in biological parameters such as blood pressure and heart rate in surgical nurses, while in the psychological aspects of stress measured with the Work Stress Scale and the List of Stress Symptoms, no significant change was found [1]. Differences in sample size, study populations, and types of substance used for aromatherapy may be the possible causes of inconsistency in results.

The findings of the present study showed that the mean score of nurses' occupational stress after aromatherapy significantly decreased from 140.40 to 129.93 in the experimental group, whereas in the control group there was no significant change after receiving placebo, such that the score was 155.96 before the intervention and 154.96 after the intervention. This finding indicates that aromatherapy with rose essential oil has psychological effects in reducing nurses' occupational stress. In this regard, Mohebifar et al., in a study conducted with a comprehensive evidence-based clinical review approach, reported that the use of rose essential oil had physiological and psychological effects of sedation, analgesic, and anti-anxiety [16]. Other studies have investigated the effect of rose essential oil on factors such as pain, anxiety, fatigue, and sleep quality. For instance, studies have shown that the use of aromatherapy with lavender and rose essential oils reduces fatigue in emergency nurses

[17] and reduces the severity of labor pain [15]. Also, Barati et al. have shown that rosewater reduces anxiety in hemodialysis patients [27]. There is also evidence that aromatherapy with rose essential oil reduces the severity of pain after surgery in the children [28] and lowers the severity of pain after dressing in burns patients [19].

Findings of this study showed that the mean scores of nurses' occupational stress and its subscales (except for the sub-scales of death and problems relating to peers) were not significantly different between the experimental and control groups in the pre-intervention phase. However, there was a significant difference in all the sub-scales (except for patients and their companions) after the intervention, and the scores in the experimental group were lower than those in the control group. This finding confirms the effectiveness of rose essential oil in reducing nurses' occupational stress. It should be noted that in the studies reviewed by the researchers either they used different tools for measuring occupational stress or the sub-scale scores were not reported. Therefore, it was not possible to compare the results with other studies regarding the sub-scales.

One of the limitations of this study was the limited sample size that led to a significant difference in some sub-scales of nurses' occupational stress including the sub-scales of death and conflict with colleagues in the pre-intervention phase, although there was no significant difference between the overall scores and the scores of most sub-scales between the two groups. Therefore, further studies with a larger sample sizes are recommended to control this confounder. Also, Gray-Toft and Anderson's Occupational Stress Scale was used to measure nurses' occupational stress. In future studies, to examine the level of stress more accurately, it is suggested to examine hemodynamic factors such as heart rate, blood pressure, respiration, or other more objective parameters as complementary criteria for the assessment of nurses' occupational stress..

### **Conclusion**

Overall, the results indicated that the use of complementary medicine such as aromatherapy helped to reduce occupational stress in the nurses.



In fact, using non-pharmacological methods such as aromatherapy with rose essential oil is a cost-effective, inexpensive, low-risk, and practical way to control the occupational stress of nurses, especially emergency department nurses, with no side effects. As a result, aromatherapy can be used as a complementary method along with other therapies or even as an alternative way of controlling occupational stress.

According to our results, aromatherapy with rose essential oil is effective in reducing emergency department nurses' occupational stress. Thus, this aroma can be used to reduce nurses' occupational stress in the emergency department and even in other hospital wards and promote their efficiency and performance. Further studies are recommended to investigate the effectiveness of aromatherapy with various essential oils including rose essential oil on vital symptoms, anxiety, and headache in health care providers and patients.

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#### Conflict of interest

We declare no conflicts of interest regarding the publication of this paper.

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