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Comparison of the Effects of Lavender Essential Oil and Sesame Oil on Sleep Quality of Nurses

A.A. Ghods (PhD)[1], M. Emadi khalaf (MSc)[2], M. Mirmohamadkhani(PhD)[3], N. Sotodehasl (PhD)[3*]

1.Nursing Care Research Center, Semnan University of Medical Sciences, Semnan, I.R.Iran
2.Semnan University of Medical Sciences, Semnan, I.R.Iran
3.Research Center for Social Determinants of Health, Semnan University of Medical Sciences, Semnan, I.R.Iran

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ABSTRACT

BACKGROUND AND OBJECTIVE: Sleep disorders in nurses due to rotational shiftwork and diversity of the working time are highly prevalent, which can be improved by aromatherapy. In this study, we aimed to evaluate the effect of aromatherapy with lavender essential oil on sleep quality of nurses covered by social security.

METHODS: This clinical trial study was conducted in 78 nurses randomly divided into two groups of lavender and sesame oil (placebo). The participants used lavender essential oil and sesame oil for two hours in early hours of their shift for four weeks. Pittsburgh Sleep Quality Index (PSQI) was employed to evaluate sleep quality of both groups pre-intervention and at the end of the second and fourth weeks of the intervention (IRCT: 201407176342N4).

FINDINGS: According to the results, mean ages of the lavender and placebo groups were 34.87±4.85 and 36.49±5.38 years, respectively. Moreover, there was no significant difference between the two groups regarding anthropometric variables (i.e., the mean height, weight, and overtime working hours). In addition, the groups were homogenous in terms of gender, marital status, work shift, department, and educational level. The results indicated no significant difference between the lavender and sesame groups regarding the mean scores of sleep quality (7.79±3.78 vs. 7.44±4.24); this mean was not significantly different between the groups at the end of the second and fourth weeks, as well.

CONCLUSION: In this study, lavender essential oil had no significant impact on sleep quality of the nurses.

KEY WORDS: *Sleep, Lavender, Nurses*.

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***Corresponding author: N. Sotodehasl**
Address: Research Center for Social Determinants of Health, Semnan University of Medical Sciences, Semnan, I.R.Iran
Tel: +98 23 33654170
E-mail: sotodeh1@yahoo.com

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Introduction

Nursing profession plays a pivotal role in healthcare improvement and maintenance, which is currently identified as the science and art of patient care (1). Various factors are at play in reducing sleep quality of nurses including rotational shiftwork, diversity of work time patterns, being active at different times of the day, and lengthy shifts at hospital and workplace. Evidence suggests low sleep quality in nurses, compared to other members of the society (2, 3). Sleep is considered as one of the most essential needs of humans, which determines physical and psychological well-being and recovery from illness (4); sleep is regulated by the circadian rhythm. The circadian biological clock of the body is approximately 24.5-25.5 hours; however, humans change this rhythm to 24 hours through interaction with environmental factors. Ambient lighting is one of the most crucial environmental factors for regulation of this rhythm. In circadian rhythm disorders, there is an imbalance between sleep cycle of the individual and requirements of his/her social life, which leads to a serious disturbance in his/her functions, resulting in discomfort and suffering. Work shift, night shift, or frequent changes in work shift lead to disturbance in sleep pattern (5).

On the other hand, this rhythm is one of the most important factors in maintenance of physical function (e.g., body temperature, heartbeat, blood pressure, electrolyte level, blood flow, and food consumption). The human body secrets growth hormones during sleep, supporting immunological, cardiovascular, and metabolic systems. Therefore, the performance of these systems is perturbed by sleep disorders (6). Some of the influential factors in sleep quality of nurses were rotational shift working, changes in working time, long working hours at hospital and work place, and being active at different times of the day. According to the literature, sleep quality of nurses is at a lower level compared to other members of the society (2, 3).

Sleep disorders caused by shift working might lead to professional errors (e.g., medication administration errors, inability to make decisions in critical situations, lack of proper communication with clients, service leave, personal dissatisfaction, reduced cognitive functioning, paramnesia, and low preparation and attention) and other problems such as car accidents, indiscriminate use of sleep medications, and physical injury during drowsiness. This matter would consequently lead to decreased quality of nursing services, prolonged recovery process, and lack of accurate and timely care (7). In this regard, in a study by Ghalichi et al., the prevalence of sleep disorders among shift workers and day workers was estimated at 48% and 40%, respectively. In addition, the highest prevalence of low sleep quality among shift workers was observed in nurses (64%) (8).

Sedatives and sleeping pills can improve sleep quality and increase sleep duration (12). However, they can have few side effects including drug dependence and increased drug tolerance. As a result, application of non-pharmacological interventions is preferable, and several studies were conducted to find safe and non-medical substitute interventions with fewer side effects. One of the most common methods of complementary and alternative medicine is aromatherapy (13).

This method has gained progressive popularity in the United States and Europe (16). One of the widely used essential oils in this method is lavender, which has anti-anxiety, anti-bactericidal, anti-fungal, anti-flatulence, antispasmodic, anti-inflammatory effects, and anti-histamine properties (17). Former studies performed on the effects of lavender on sleep quality in different groups yielded conflicting results. In a study by Chien et al., it was concluded that lavender could improve sleep quality in middle-aged women (18). Similarly, Najafi et al. asserted that lavender has positive effects on sleep quality of hemodialysis patients (19). However, Lytle et al. suggested that lavender essential oil had no significant effects on sleep quality of patients admitted to intensive care unit (ICU) (20). A study by Borromeo demonstrated that sleep quality of patients admitted to coronary care unit (CCU) did not significantly change under the influence of lavender essential oil (21).

According to the results of Cho et al., sleep quality did not significantly change in aromatherapy group (22). Considering the prevalence of sleep disorders among nurses, which could have a serious negative impact on their profession, finding cost-effective methods with few side effects seems to be imperative. Given the conflicting results of previous studies, this study aimed to evaluate the effect of lavender essential oil on sleep quality of nurses.

Methods

This clinical trial, with a pretest-posttest design, was conducted in nurses working at different

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departments of Imam Reza and Fayaz Bakhsh Hospitals, who were covered by social security, in Tehran, Iran (IRCT:201407176342N4). Study protocol was approved by the Ethics Committee of Babol University of Medical Sciences, Babol, Iran, and the authorities of the hospitals. Objectives of the study were explained to the participants, and written informed consent was obtained from the participants after assuring them of confidentiality of the data. In addition, the participants were allowed to withdraw from the study at any time.

Afterwards, the participants, who were selected through simple random sampling, were divided into two groups. Working department and age were blocked during sampling to have age- and department-matched groups. The inclusion criteria were 1) having at least Bachelor's degree in nursing; 2) having at least one year's clinical experience; 3) not having asthma and allergies; 4) not experiencing a major problem at least one month before the intervention; 5) not having renal or hepatic problems; 6) not consuming drugs or alcohol; and 7) not working at ICU. The exclusion criteria were unwillingness to continue participation in the study and allergy to the aroma of lavender essential oil. Pittsburgh Sleep Quality Index (PSQI) was used in this study to evaluate sleep quality, with scores ranging between 0 and 21. A total score of five or more is interpreted as poor-quality sleep. The reliability of this scale was calculated to be 83%, and its validity (with sensitivity and specificity of 89.6% and 86.5%, respectively) was reported by the designers of this scale to be at a higher level, compared to the control group (23). Reliability and validity of PSQI were determined to be high (α=0.89) in a study by Ghoreishi et al., which was employed in other studies (11). In this study, after confirming the Cronbach's alpha reliability of the PSQI (α=80.5%), it was completed by all the participants. Afterwards, the samples were randomly divided into two groups of lavender and sesame oil (placebo). The participants were trained to pour 0.5 ml of the essential oil in a container at the beginning of each shift, and then attached it to the button of their uniform (20 cm from their nose). The participants carried the essential oil for two hours at the early hours of their shift for four weeks. The PSQI was completed by the participants again at the end of the second and fourth weeks. Kolmogorov-Smirnov test was used to evaluate the distribution of numerical variables. In addition, data analysis was performed using descriptive (i.e., mean and standard deviation) and inferential (i.e., t-test, paired t-test, Chi-square, and Mann-Whitney U test) statistics. $P<0.05$ was considered statistically significant.

Results

In total, 78 nurses (39 in each group) were enrolled in this study. No significant differences were observed between the mean age of the lavender and placebo groups (34.87±4.85 and 36.49±5.38 years, respectively). Additionally, no significant difference was observed between the two groups regarding overtime work (hours per month; 90.5±32.3 and 86.2±44.2; p=0.625), height (167.5±8.9 and 166.1±9.0; p=0.426), and weight (70.4±11.1 and 71.9±13.0; p=0.590). The groups were not significantly different in terms of gender, marital status, work shift, educational level, and department. Furthermore, no significant difference was observed between the groups regarding mean sleep quality. Similarly, no change was noted in the sleep quality of lavender and sesame oil groups at the end of the second and fourth weeks (table 1). In addition, comparison of sleep quality variations showed no significant difference between the groups at different observations (table 2). The results indicated a significant difference between the observations before the intervention and at the end of the second week of the intervention regarding mean sleep quality ($p<0.001$); nevertheless, this difference was not significant between the second and fourth weeks. Moreover, in the placebo group, there was not a significant difference between the observations before the intervention and at the end of the second week, and between the second and fourth weeks (table 3).

Table 1. Comparison of the mean score of sleep quality of the lavender and sesame essential oil groups based on observation time

Group / Time of observation	Lavender Mean±SD	Sesame oil (placebo) Mean±SD	P-value
One day before intervention	78.3±79.7	24.4±44.7	0.694
End of the second week	51.2±97.5	39.3±15.6	0.791
End of the fourth week	29.2±69.5	81.2±05.6	0.539

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Table 2. Comparison of the lavender and sesame oil groups in terms of differences in mean and standard deviation of sleep quality based on observations

Observation \ Group	Lavender Mean±SD	Sesame (placebo) Mean±SD	P-value†
The first* and second** observations	428.0±821.1	460.0±282.1	0.305
The first and third***	417.0±103.2	464.0±385.1	0.160
The second and third	232.0±282.0	194.0±103.0	0.800

*One day before intervention, **End of the second week, *** End of the fourth week, † Mann-Whitney U

Table 3. Differences in mean and standard error of sleep quality in lavender and sesame oil groups based on various observations

Group observation	Sleep quality	Mean±SD	†P-value
Lavender	The first* and second**	428.0±821.1	<0.001
	The first and third***	417.0±103.2	<0.001
	The second and third	0.0±282.232	0.232
Sesame oil (placebo)	The first and second	460.0±282.1	0.005
	The first and third	464.0±385.1	0.015
	The second and third	194.0±103.0	0.599

* One day before intervention, ** End of the second week, *** End of the fourth week, † Paired t-test

Discussion

According to the present results, a significant difference was observed between the groups at the end of the fourth week compared to the pre-intervention observation. The mean score of sleep quality of nurses was 7.62±3.99, which is indicative of poor-quality sleep. In a study by Bagheri et al., sleep quality of nurses of Imam Hossein Hospital of Shahrood, Iran, was reported to be low (mean: 10.1±5.3) (7). Quite in line with that study, in a study by Huth et al., it was revealed that the mean sleep quality of nurses of Akron Hospital, Ohio, the United States, was 11.03±44.21 for day workers and 11.5±2.93 for shift workers. However, no significant difference was noted between these two groups and sleep quality was reported as poor (24). In this regard, no significant difference was observed in sleep quality of nurses of lavender and placebo groups before the intervention and two and four weeks after the intervention.

Although sleep quality of nurses was gradually improved after the intervention and showed a significant difference, this change was also witnessed in the placebo group, that is, there was a significant difference in mean sleep quality between the observations before the intervention and two and four weeks after the intervention. In a study by Laytle et al. on the effect of lavender essential oil on sleep quality of ICU patients as measured by Richard Campbell's Z Scale, mean score of intervention group was non-significantly higher than control group (48.25 vs. 40.10; P=0.31; with higher mean scores indicating higher sleep quality) (20). Moreover, in a study by Borromeo on the effect of lavender essential oil on sleep quality of CCU patients, no significant difference was observed in sleep quality of the samples (21).

The results of the mentioned study were in congruence with our findings. In a study by Chien et al., total mean score of sleep quality as estimated by PSQI was significantly reduced in test group, while no significant difference was noted in control group (18). In addition, the results of Najafi et al. indicated a significant difference between the total mean score of sleep quality of test (7.3±93.483) and control (13.4±50.249) groups (19).

The last two studies had no placebo groups, and comparison was made with a control group, which received no interventions. In the current study, the sleep quality was significantly different in the lavender group pre- and post-intervention. However, sleep quality showed a significant difference pre- and post-intervention in the placebo group, as well. Similarly, the placebo effect of lavender was reported in a study by Rahnama et al. The results of that study, which was conducted on the effect of lavender essential oil on anxiety level induced by IUD insertion, indicated a

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significant difference pre- and post-intervention in the lavender and sesame oil (placebo) groups (25). Sleep quality of nurses was significantly improved in both lavender and sesame groups. Although the difference between the sleep quality scores pre- and post-observation was greater in the lavender group, this difference was not significant. Therefore, it can be concluded that the effectiveness of lavender is not greater than sesame oil.

It seems that these changes in sleep quality of nurses might be due to placebo effect of lavender and sesame oil. Another possibility is the effectiveness of sesame oil. Despite all the reports on ineffectiveness of sesame oil in previous studies and its application as a placebo, it could improve sleep quality of the samples. Therefore, future studies are recommended to use a completely neutral control group (e.g., water). The limitations of the present study include not controlling for psychological problems of nurses during the study, which was out of the scope of the study. According to the current study, lavender essential oil was not able to improve sleep quality in nurses any more than sesame oil, and both could be equally effective. Thus, due to conflicting results of the former studies on this subject, performing further studies is recommended to confirm our findings.

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