

Original Article

The Effects of Aromatherapy on the Stress and Anxiety Levels of Nurses Working in Intensive Care Units

Nadiye Baris Eren, MSc, RN

Hitit University, Department of Nursing, Corum, Turkey

Gursel Oztunc, PhD, RN

Professor, Cukurova University, Department of Nursing, Adana, Turkey

Correspondence: Nadiye Baris Eren, Hitit University, School of Health, Department of Nursing, Corum, Turkey e-mail: nadiyebaris@hotmail.com

Abstract

Background: Stress is a condition that occurs when the physical and psychological borders of the organism are threatened. If stress is experienced continuously and intensively for a long time, it causes anxiety. Nursing is one of the professions which experiences intensive stress. In particular, increasing the quality of nursing care in intensive care units is directly related with decreasing nurses' stress and anxiety levels.

Aims: This study aims to investigate the effects of aromatherapy on the stress and anxiety levels of nurses working in intensive care units.

Methodology: The study is self-controlled and quasi experimental clinical study in nature. Sample of the study was 45 nurses working in the intensive care units which were surgical intensive care unit, coronary intensive care unit, neurology intensive care unit, cardiovascular surgery intensive care unit, medical intensive care unit, brain surgery intensive care unit and pediatric intensive care unit in two hospitals. The data were collected through the Personal Information Questionnaire developed by the researcher, Perceived Stress Scale, State-Trait Anxiety Inventory and Visual Analog Scale. Arterial blood pressure and pulse of nurses were measured before and after the application, and all the data were recorded. Statistical analysis was performed using SPSS 20.0 for Windows.

Results: The lavender applied to nurses was found to have no effects on stress and anxiety levels or vital signs ($p>0.05$). However there was a significant decrease in the nurses' state anxiety scores before and after the application in the experimental and control groups (experimental group $p<0.001$, control group $p<0.001$).

Conclusions: Aromatherapy did not have any effects on nurses' anxiety levels, but the 10 or 15 minutes breaks they spent in a quiet, lighted, and spacious room had positive effects, and thus decreased their state anxiety scores.

Keywords: anxiety, aromatherapy, complementary therapy, nurse, stress

Introduction

Stress is a situation which emerges as a result of pushing the limits and threatening of the physical and psychological borders of the organism; and it is a reaction mechanism shown by the body in order to protect itself (Baltas & Baltas, 2000). Experiencing stress continuously and for a long a time causes anxiety (Zulal, 2002). Anxiety is waiting for an unknown and incomprehensible danger and the feeling of uneasiness and tension caused by this (Sabuncu, Kose, Ozhan, Batmaz & Ozdilli, 2008). Experiencing anxiety continuously causes physical, psychological and social problems (Sabuncu et al., 2008).

The field of healthcare is considered to have a more stressful work environment because it serves people who experience intense stress, and the working professionals encounter stress experiences very frequently (Clegg, 2001).

The related literature indicates that studies on stress and anxiety have mostly been conducted with nurses (Pemberton & Turpin, 2008; Cooke, Holzhauser, Jones, Davis & Finucane, 2007). Nurses form the focus of the studies related to stress and anxiety because they are mostly women and thus have different roles and responsibilities out of work. On the other hand, because they spend more time with patients and

their relatives throughout 24 hours, they have a key role in the health team. Because of all these factors, the nursing profession is described as a stressful occupation (Akyar, 2009).

Studies have demonstrated that intensive care units are more stressful environments than the other working fields (Tekin Taparlı, 2004). Nurses working in intensive care units experience various stress experiences due to the differences in their working conditions (Sabuncu, Gulseven & Karabacak, 1999). Some factors which increase workers' stress include emergency patient admission, readiness for emergency treatment and care initiative, more clinical responsibilities undertaken in comparison to other colleagues, patients' bad or worsening prognosis, stimuli in the working environment, complicated technology, machine noises, rush, continuous strong light, etc. (Akbal-Ergun, Ozer & Baltas, 2001; Turgay, 2001). Individual differences in the perceived stress may cause some nurses to be more comfortable while others to experience a lot of tension. However, nurses should be calm, manage to handle their stress, and communicate with patients with a therapeutic approach (Batmaz, Pektekin & Dincsever, 1990).

Neuroendocrine mechanisms in the organism go into action in case of stress and anxiety. With the effects of these mechanisms, sympathetic nervous system is stimulated, and there is vasoconstriction in peripheral vessels and an increase in heart beat and contraction rate. As a result of this, blood volume and heart beat rate in the organism increase due to sodium and water retention in the body (Guyton & Hall, 2001).

Aromatherapy is a complementary treatment which is based on affecting the organism through receptors in the smelling tracts with essence oils obtained from aromatic plants (Umezu, 2000; Ali et al., 2015). These effects are considered to happen through the connections extending to limbic system and hypothalamus via tracts olfactorius, which is the main smelling tract (Koksoy, 2008). Limbic system takes most emotional input and transmits it to motor systems voluntarily or involuntarily. Gatti and Cajola (1923) report that smells, by affecting central system or reflex systems, have effects on respiration, pulse, and blood pressure (Buckle, 2003). Aromatherapy has positive effects on blood pressure and pulse (Choi & Lee, 2012). Essential lavender is the most frequently

preferred oil in aromatherapy and it is used widely (Huang, Liao, Wang, Huang & Wen, 2012; Johnson et al., 2016). Lavender has 14 active matters which have tranquillizer and relaxing features and it is reported to have many benefits such as decreasing stress and depression symptoms, restoring mood, increasing quality of sleep and easing anxiety (Saracoğlu, 2013; Cavanagh & Wilkinson, 2005; Karadag, Samancioglu, Ozden & Bakir, 2015).

A study which aimed to decrease student nurses' exam anxiety found that after lavender inhalation, state anxiety scores of the participants in the experimental group were lower than those of the participants in the control group (Kavurmacı, Kucukoglu & Tan, 2015). A study on Professional stress of nurses in intensive care units found that topical application of the essential oils of lavender and salvia sclarea decreased perceived stress levels of nurses working in intensive care units (Pemberton & Turpin, 2008). Although the related literature has studies at international level, there are no studies in our country which investigated the effects of aromatherapy on stress and anxiety of nurses working in intensive care units. This study aims to identify the effects of aromatherapy on stress and anxiety levels of nurses working in intensive care units.

Methodology

The study which is self-controlled and quasi experimental clinical study in nature was conducted with nurses working in the intensive care units of two hospitals located in Adana in Turkey. The researcher asked for an appointment from nurses who participated in the study either face to face or on the phone and decided on a date to meet. The nurses were involved in the study during the days they were on the dayshift (between 10 a.m. and 12 a.m.) in order to reduce the effects of the differences between day and night in terms of stress and anxiety and vital signs.

Target population of the study was all nurses who worked in the intensive care units in hospital A. Sample size was identified with power analysis and found 45. The study was conducted with 39 nurses from Hospital A. As the identified sample size could not be reached in the mentioned hospital because of designations and resignations, 6 nurses working in hospital B were included in the study as the B plan of the study.

This study was performed in intensive care units which are surgical, coronary, neurology, cardiovascular surgery, medical intensive care units in hospital A and brain surgery and pediatric intensive care units in hospital B.

The study was conducted between December 2013 and February 2014; the stages included the first stage (1 month in length), interval period (1 month in length), and second stage (1 month in length).

Although the study was started with 49 patients who met the research criteria, it was completed with 45 nurses because 2 nurses resigned, 1 nurse was appointed to another assignment, and 1 nurse did not want to go on.

The inclusion criteria consisted of volunteering to participate in the study, having no respiratory or cardiovascular disease, no scent allergies, not being pregnant, having no obstacles for smelling, not being disturbed by the smell of the essential oil, using no medicine which affects the heart rate and tension, and having no psychiatric disease. Based on the participants' statements, those who met these criteria were involved in the study. Criteria for terminating the study were having problems as a result of allergic reaction and respiration due to inhalation, coughing, nausea, or the participants' own desire to be excluded from the study.

The data were collected through the **Personal Information Form** which was prepared by the researcher and consisted of 13 questions regarding nurses' demographic and working features. **Perceived Stress Scale (PSS):** This study made use of 10-item version of the scale which was developed by Cohen et al. (Cohen, Kamarck & Mermelstein, 1983) and adapted to Turkish by Erci in 2006 (Erci, 2006). PSS was developed with a view to measuring the degree to which one perceives her life as unpredictable, uncontrollable or overloaded within the past one month. Higher total scores indicate higher perceived stress levels (Bilge, Ekti Genç, Ogce & Tuna Oran, 2009).

State Trait Anxiety Inventory I -II (STAI-I and II): Turkish form of the scale which was originally developed by Spielberger et al. (Spielberger, Gorsuch & Lushene, 1970) was developed by Oner and Le Compte (Oner & Le Compte, 1998). The inventory consisted of 40 questions; the first 20 questions measured state anxiety levels while the questions between 21

and 40 measured trait anxiety levels. Higher scores obtained from the scale indicate higher levels of anxiety and lower scores suggest lower levels of anxiety.

VAS/Pleasure (Visual Analog Scale): The participants were asked to score the level of relaxation between 1 and 10 after the application. While 1 indicated "no" relaxation, 10 indicated "a lot of" relaxation and the participants were asked to choose among the full scores given in the table.

The pilot study was conducted with 5 nurses working in intensive care units in hospital A on the first week of December 2013. As there was no need to revise the questionnaires, these participants were involved in the study with their data.

Ethical considerations

Before the study was conducted, official permission and approval were obtained from Cukurova University Medical Faculty Non-invasive Clinical Studies Ethics Committee, Faculty Deanship and Hospital Chief Physician.

Data collection

The study was conducted in two stages. In the first stage, the participants were asked to cast lots from a box of numbers which represented experimental (1) and control (2) groups. This way, the groups were identified through randomization. 28 nurses who were in the experimental group in the first stage were in the control group in the second stage. 17 nurses who were in the control group in the first stage were in the experimental group in the second stage. **Experimental Group:** Nurses in the experimental group were applied Nurs Lokman Hekim Brand Lavender oil (*Lavandula angustifolia*). The oil was put in a dark colored, 20 ml glass bottle which had an oil dropper. The bottle was labeled with number "1". **Control Group:** The nurses in the control group were applied sunflower seed oil. The oil was put into a 20 ml dark colored glass bottle. The bottle was labeled with number "2".

Implementation of the Study

The participants sat in a comfortable chair in a quiet, lighted and spacious room with 23-25°C on the average near the intensive care unit and they were asked to fill in the Personal Information Form, State Trait Anxiety Inventory and Perceived Stress Scale.

After the researcher measured the participants' arterial blood pressure and pulse, she asked them to wear a gown (similar to the one dentists use for their patients). Then, 5 drops of oil - lavender oil to the experimental group from the bottle Number 1, and sunflower seed oil to the control group from the bottle Number 2- were dropped on the gowns. The participants' position was arranged as 30 cm distance between their nose and chest. The participants were put in a relaxing position alone following the oil inhalation for 10 or 15 minutes. This application was done once. After this application, the participants were asked to fill in State Trait Anxiety Inventory and VAS. Then, the participants' arterial blood pressure and pulse were measured by the researcher again and recorded on the Application Entry Form.

The participants were taken to the application room one by one and left alone throughout the application. This way, they could be independent of each other. The experimental and control groups were not taken one after another. The room was cleaned and ventilated properly in order to prevent contamination.

The participants were told that aromatherapy was used for nurses working in intensive care units and thus the study expected to reveal the positive effects of aromatherapy on the stress and anxiety levels. They were not given any information about the type of oil used with the purpose of preventing the participants from affecting each other and enhancing an objective approach to the practice. The participants were told that they were going to be given information about the oil used when the study was completed and that they could cease the application in case of any disturbance. They were also told that the application would be done between 10 a.m. and 12 a.m. when they were on the day shift, the application composed of two stages, and the second stage would be performed 1 month later. Besides, they were informed that the application would last 10 or 15 minutes, their arterial blood pressure and pulse would be measured before and after application by the researcher, and they would need to fill in the questionnaires.

Statistical analysis

Statistical analysis of the data was performed using SPSS 20.0 package programming. Categorical measurements were presented using numbers and percentages and numerical measurements were summarized using means and standard deviations (median and minimum-

maximum when necessary). Comparison of the categorical measurements was performed with chi square test statistics. Whether numerical measurements displayed normal distribution was tested with Kolmogorov Smirnov test. Comparison of the numerical measurements was performed with Independent Groups t-test. State Trait Anxiety scores before and after the application were compared using Dependent Groups t-test. Statistical significance was taken (p) 0.05 in all tests (Secer, 2013).

Results

Average age of the participants was found to be 25.8 ± 5.2 years. The majority (71 %) were female, 29% were male, 20% graduated from Medical Vocational High School/Faculty of Open University, 42% had associate degree and 38% had bachelor's degree. Of all the nurses participating in the study, 73% were single and 27% were married. Nine nurses (20%) had children and most of them had nuclear families. 39 nurses (87%) worked in hospital A and had a working experience of 65.7 ± 56.1 months (approximately 5.5 years) on the average. As for the intensive care units they worked, 11 nurses (24%) worked in surgical intensive care, 8 nurses (18%) worked in coronary intensive care, and 9 nurses (21%) worked in medical intensive care units. The other nurses worked in neurology, cardiovascular surgery, pediatric or neurosurgical intensive care units. Average weekly working hours for the majority (87%) of nurses who were found to have 54 ± 50.5 months of working experience on the average, was more than 40 hours.

Of all the nurses, 73% stated that they chose the nursing profession willingly, 91 % loved their job, 96% were happy with the unit they worked in, and 87 % stated that working in the unit they were in was their own preference.

In the first stage of this two- stage study, 28 of the nurses (62%) were put in the experimental group and in the second stage they were put in the control group. 17 nurses who were in the control group in the first stage were then involved in the experimental group in the second stage. No significant differences were found in terms of the PSS scores, anxiety scores, and relaxation degrees of the patients they obtained in the experimental and control groups in the 1st stage, 2nd stage, and at the end of the whole process (see Table 1).

Table 1. Mean scores of Perceived Stress Scale, State Trait Anxiety Inventory I -II, Visual Analog Scale and comparisons between the experimental and control groups

Measures	STAGE I			STAGE II			At the End of Stages		
	Experiment al (n=28)	Control (n=17)	P	Experimental (n=17)	Control (n=28)	P	Experimenta l (n=45)	Control (n=45)	P
Mean± sd Median (Min-Max)	Mean ± sd Median (Min-Max)	Mean ± sd Median (Min-Max)		Mean ± sd Median (Min- Max)	Mean ± sd Median (Min-Max)		Mean ± sd Median (Min- Max)	Mean ± sd Median (Min- Max)	
Perceived Stress Scale	27.5±5.7 28 (14-40)	28.1±5.6 27 (16-39)	0.750 ^b	27±5.7 29 (15-34)	28.1±6.4 28 (12-40)	0.562 ^b	27.3±5,7 28 (14-40)	28.1±6 28 (12-40)	0.530 ^b
Before Application State Trait Anxiety Inventory I	37.5±9.2 38 (23-56)	41.6±12.6 41 (28-72)	0.210 ^b	39.5±10.9 39 (20-62)	38.9±9.3 37.5 (20-56)	0.841 ^b	38.2±9.8 38 (20-62)	39.9±10.6 38 (20-72)	0.441 ^b
After Application State Trait Anxiety Inventory I	31.6±7.3 30.5 (20-49)	32.7±6.8 31 (23-48)	0.608 ^b	32.4±8.4 32 (20-49)	33.6±6.2 33 (20-47)	0.575 ^b	31.9±7.7 31 (20-49)	33.3±6.3 33 (20-48)	0.348 ^b
State Trait Anxiety Inventory II	42.2±9 42 (22-57)	42.1±9.6 40 (25-60)	0.966 ^b	41.9±9.8 43 (24-58)	41.8±8.7 42.5 (20-57)	0.963 ^b	42.1±9.2 42 (22-58)	41.9±8.9 41 (20-60)	0.917 ^b
Visual Analog Scale	7.6±2.1 8 (2-10)	6.8±2.2 7 (3-10)	0.270 ^b	6.8±2.1 7 (2-10)	7.2±2 7 (3-10)	0.537 ^b	7.3±2.1 7 (2-10)	7.1±2.1 7 (3-10)	0.618 ^b

^b T test for independent groups

sd= standard deviation

min= minimum

max= maksimum

Table 2. Before and after application State Trait Anxiety Inventory I scores of nurses in the groups at the end of stages

Measures	At the End of Stages		P
	Before Application	After Application	
	Mean± sd Median (Min- Max)	Mean± sd Median (Min- Max)	
State Trait Anxiety Inventory I – experimental group (n=45)	38.2±9.8 38 (20-62)	31.9±7.7 31 (20-49)	<0.001 ^c
State Trait Anxiety Inventory I– control group (n=45)	39.9±10.6 38 (20-72)	33.3±6.3 33 (20-48)	<0.001 ^c

^c T test for dependent groups

Table 3. Before and after application arterial blood pressure and pulse compared to the group of nurses

Measures	At the End of Stages		
	Experimental Group	Control Group	P
	Mean± sd Median (Min-Max)	Mean± sd Median (Min-Max)	
Before Application– Systolic Blood Pressure	103.5±16.2 102 (72-168)	104±13.4 100 (84-140)	0.893 ^b
After Application– Systolic Blood Pressure	99.1±16.6 97 (68-155)	99.9±12.9 99 (73-124)	0.789 ^b
Before Application– Diastolic Blood Pressure	66.1±13.7 6 (46-123)	66.8±10.4 64 (48-96)	0.165 ^b
After Application– Diastolic Blood Pressure	62.8±10.8 62 (40-91)	62.5±8.7 62 (43-81)	0.805 ^b
Before Application– Pulse	81.9±11.3 82 (61-110)	85.3±11.9 84 (65-120)	0.906 ^b
After Application– Pulse	80.1±10.2 81 (57-99)	84.1±11.6 85 (61-105)	0.085 ^b

^b T test for independent groups

Table 4. Before and after application arterial blood pressure and pulse in the groups

Measures	At the End of Stages		P
	Before Application	After Application	
	Mean± sd Median (Min-Max)	Mean± sd Median (Min-Max)	
Systolic Blood Pressure – experimental group	103.5±16.2 102 (72-168)	99.1±16.6 97 (68-155)	0.010^c
Systolic Blood Pressure – control group	104±13.4 100 (84-140)	99.9±12.9 99 (73-124)	0.011^c
Diastolic Blood Pressure – experimental group	66.1±13.7 6 (46-123)	62.8±10.8 62 (40-91)	0.028^c
Diastolic Blood Pressure – control group	66.8±10.4 64 (48-96)	62.5±8.7 62 (43-81)	0.003^c
Pulse – experimental group	81.9±11.3 82 (61-110)	80.1±10.2 81 (57-99)	0.132 ^c
Pulse – control group	85.3±11.9 84 (65-120)	84.1±11.6 85 (61-105)	0.435 ^c

^c T test for dependent groups

State Trait Anxiety scores measured before and after the application in the 1st stage displayed a significant decrease in nurses' state anxiety scores in both groups after the application. ($p=0.001$ and $p=0.005$ for the experimental and control groups respectively). Similar to the first stage, second stage also displayed significant decrease in nurses' state anxiety scores after the application in both groups ($p=0.001$ and $p<0.001$ for the experimental and control groups respectively). At the end of the whole process, there was a significant decrease in nurses' state anxiety scores in both groups after the application ($p<0.001$ for both the experimental and control groups) (see Table 2).

While the participants' blood pressure and pulse values did not display any differences before and after the application in the experimental and control groups, an analysis of in-group changes showed that systolic and diastolic blood pressures of the participants decreased significantly in both groups (systolic blood pressure $p=0.010$ and $p=0.011$ for the experimental and control groups respectively; diastolic blood pressure $p=0.028$ and $p=0.003$ for the experimental and control groups respectively). However, no differences were found between the pulse values (see Table 3 and Table 4).

After the application, the participants told their views about the study to the researcher both verbally and in writing. Although 2 participants in the experimental group *found the smell of the essential oil a little bit heavy*, they reported to *feel relaxed after the application*.

One participant in the experimental group said that she *felt significantly relaxed*; one participant said she *felt very relaxed although she did not expect so*, and one participant said she *felt a little relaxed*.

On the other hand, two participants reportedly *had a headache*, 1 participant *had nausea*, and 1 participant *had burning eyes*.

One person from the control group said *doing something out of work made her feel better*, for one participant *relaxing was good*, and for another one *a quiet and calm environment made her feel better*.

While one person each from the experimental and control groups said there were *no differences after the application*, one person from each

group said they *felt even better although they were feeling good already*.

Discussion

Findings of the present study which investigated the effects of aromatherapy on the stress and anxiety levels of nurses working in intensive care units are discussed below. The majority (71 %) were female, and average age was 25.8 ± 5.2 years. Average weekly working hours for the majority (87%) of nurses working experience on the average, was more than 40 hours.

In the first and second stages of the study, no significant differences were found between the experimental and control groups in terms of the PSS scores, state anxiety scores before and after the application, and relaxation degrees of the participants who were involved in the experimental and control groups. At the end of the whole process, there were no significant differences between the experimental and control groups in terms of the scores obtained. Although there was a decrease in the state anxiety scores in the experimental and control groups before and after the application, the decrease was not statistically significant. Results in relation to the changes in the state anxiety scores before and after the application showed that there was a statistically significant decrease in the state anxiety scores at the end of the whole process in both groups ($p<0.001$ for both the experimental and control groups).

Pemberton and Turpin (2008) evaluated the effect of topical application of lavender and salvia sclarea essential oils on the professional stress of the nurses in intensive care units. Results showed that there was a decrease in the perceived stress levels of the nurses working in three 12-hour shifts in intensive care units. Ozdemir (2012) applied aromatherapy inhalation with a mixture of lavender, bergamot, and ylangylang oils, 5 minutes a day on the average and with a proportion of 5:3:2. It was reported that aromatherapy was effective in decreasing the state anxiety scores.

Statistical comparisons show that blood pressure and pulse values of the nurses in the experimental and control groups were found similar before and after the application, but the changes within groups indicated a significant decrease in the systolic and diastolic blood pressure values in both groups. On the other hand, no changes were found in the pulse values.

Parallel to the findings of the present study, Ozdemir (2012) found that there was a significant decrease in the experimental and control groups in terms of the systolic and diastolic blood pressure values of the patients with essential hypertension as a result of the aromatherapy inhalation applied. Moreover, there was a significant decrease in the pulse values of both groups. Arslan & Ozer (2016) found that there was a significant decrease in the intensive care patients' pulse values as a result of the aromatherapy applied. Cha, Lee & Yoo (2010) applied inhalation to patients with essential hypertension with the mixture of lemon, lavender and ylang-ylang (2:2:1) two times a day, for 2 minutes and throughout 3 weeks. Systolic blood pressure values in the aromatherapy group decreased significantly in comparison to the control group, but the change in the diastolic blood pressure values were not statistically significant.

No significant differences were found in the participants' VAS scores according to the stages and groups, but the participants stated that they were happy with the application.

Muzzarelli, Force & Sebold (2006) aimed to decrease anxiety scores of the patients who would receive colonoscopy and esophagogastroduodenoscopy by applying aromatherapy before application, but they found no differences in the patients' state anxiety levels. However, majority of the patients stated that they were happy with the smell of lavender.

Conclusions

Although there was a decrease in the anxiety levels of nurses in the control and experimental groups, there were no statistically significant relationships between them. This result indicates that aromatherapy did not have any effects on nurses' anxiety levels, but the 10 or 15 minutes breaks they spent in a quiet, lighted, and spacious room had positive effects, and thus decreased their state anxiety scores.

Suggestions for Future Research

Suggestions for future research may include the followings;

- (1) There should be a room with the environmental planning in intensive care units so that nurses can relax,
- (2) Aromatherapy should be repeated more than once (two times a week),

(3) The study should be replicated with the combination of different essential oil combinations,

(4) Other health professionals should also be involved in the study.

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