

Original Research Article

Effects of Aroma Inhalation on Anxiety and Vital Signs of Nursing Students during Their First Blood Drawing Practice

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ABSTRACT

The study was conducted as a randomized controlled experimental study and aimed at determining the effects of aroma inhalation (orange and lavender oil) on anxiety and vital signs experienced by 1st-grade nursing students when they drew blood from each other for the first time. Of the first-grade students attending Manisa School of Health Sciences Department of Nursing, 72 who agreed to participate in the study comprised the study sample. Data were collected using the Student Demographic Information Form, Visual Analogue Scale (VAS), State-Trait Anxiety Inventory (STAI) and Vital Signs Follow-up Form in April 2014. Mean State-Trait Anxiety Inventory scores obtained in the classroom, before and after the blood drawing process in laboratory settings were 39.97 ± 5.31 , 40.77 ± 5.48 , 41.58 ± 6.34 in the experimental group and 41.27 ± 6.25 , 40.02 ± 5.79 , 43.25 ± 5.83 in the control group respectively. No significant differences were determined between the two groups in terms of their scores for the vital signs. The study findings revealed that aroma inhalation had no effects on nursing students' anxiety levels and vital signs during their first blood drawing experience.

Keywords: Aroma Inhalation, Aromatherapy, Anxiety, Nursing students.

INTRODUCTION

Nursing is a profession combining theoretical knowledge and practice. [1] Therefore, nursing education is a process that requires theoretical knowledge, observation and skills, and comprises both theoretical and practical education. [2] Demonstration is an important technique used to gain students skills. Laboratory setting is a bridge between classroom learning and clinical practices. In order for students to convert the target behavior into a skill, they should perform the interventions on inanimate models in the laboratory under the supervision of an instructor or on each other to create a setting similar to the actual

one. [3] These applications may lead to a high level of stress and anxiety among students, making students' learning in effective. [1] Ahmadnejad et al. reported that Spielberger (1966) and Hamilton (1975) determined a strong relationship between learning and anxiety. [4] While moderate level of anxiety is necessary for learning, high levels of anxiety result in decreases in learning. [4,5]

In several studies, it has been reported that students suffer anxiety before their first clinical experience. [4,6-9] They also suffer anxiety and stress during their first practices in the laboratory. [1,10]

Nursing students should improve their clinical competence in a laboratory setting before applying it in the actual patient care environment. [11] Students routinely perform some implementations on each other after they practice them on inanimate models in a skills laboratory. Blood drawing is among these applications too. Performing intravenous intervention on an actual human body for the first time is very stressful for students. In order to reduce stress and prevent anxiety during practicing an intravenous intervention, it becomes necessary to calm down practitioners. [10] Several methods are used to reduce anxiety. Aromatherapy, one of these methods used since ancient times, is the therapeutic use of concentrated essential oils extracted from herbs, flowers and has its roots in herbal medicine to treat various diseases. [12-15] Essential oils can be absorbed into the body via the skin (topically) and/or the olfactory system (inhaled). [15-17]

Aromatherapy is thought to have a therapeutic effect due to both the psychological effect of the scent and the physiological effects of the inhaled volatile compounds. Inhaled volatile compounds show their effects through the limbic system, particularly the amygdala and hippocampus. [18] Inhalation of aromas is known to cause physiological and psychological changes in the human body. [19] Aroma inhalation affects mental and physical stability. An essential oil is absorbed into the lung and blood through the nose. It can reduce depression, stress and chronic fatigue by activating the limbic system and hormones and increasing emotional reaction through the sense of smell. [1]

Lavender (*Lavandula Angustifolia*) is a relaxant commonly used in aromatherapy. Several animal and human studies have demonstrated that it has a sedative effect when inhaled. The relief of anxiety and tension, and improvements in mood prove the sedative nature of lavender.²⁰ The effects of lavender and

orange (*Citrus Aurantium*) oils on anxiety through aroma inhalation have been demonstrated in many previous studies. [1,21-23]

To create the beneficial effects of aromatic oils on the human body, numerous methods are used. Aromatherapy, based on the use of aromatic oils, is used in massage, room scenting, aroma, compress, mist-inhalation, hammam (public bathing place) and sauna, skin care, bathing, and in all applications in which water is used for treatment. [24,25] The aroma inhalation method preferred in this study is the simplest and shortest way to create the effects of aromatic oil on the human body.

Aromatherapy performed through the inhalation of aromatic oils constitutes an important part of any aromatherapy technique. To perform this method, an aroma lamp, a diffuser and hot water containers are used. In order to obtain a quick, short term aromatherapy effect, a simple inhalation, diffusion, steam inhalation or potpourri method is used. [24] The diffusion method implemented in this study is widely preferred. The method is performed by inhaling oil molecules or particles prayed into the air by electric diffusion tools. The method is also performed by inhaling oil molecules or particles from evaporating essential oil dropped in warm water in an aromatherapy bowl. It is also preferred since it refreshes the smell of the room. [17,24]

The study was conducted to investigate the effects of lavender (*Lavandula Angustifolia*) and orange (*Citrus Aurantium*) essential oils on anxiety and vital signs of 1st-grade nursing students when they drew blood from each other for the first time after they successfully performed the intervention on inanimate model at least once.

METHODS

Aim: The study aimed at determining the effects of aroma inhalation on (orange and lavender oil) anxiety and vital signs experienced by 1st-grade nursing students

when they drew blood from each other for the first time.

Study design: At the end of this randomized controlled experimental study conducted with 145 1st-grade students studying in this department, 72 of the students who volunteered to participate in the study were equally assigned into 2 groups: the experimental group (n=36) and the control group (n=36).

The groups were formed by the student number in the list of students in the classroom. The first half of the list formed the experimental group; the other half formed the control group. Of the students, those who were allergic to fragrance, suffered asthma and/or did not wish to participate in the study were excluded from the study. They were not included in the control group either.

Considering that being in the implementation area might affect their anxiety, the students who agreed to participate in the study, did not have asthma or fragrance allergy were first informed about the study and then were asked to fill in the Student Demographic Information Form, Visual Analogue Scale (VAS) and the State-Trait Anxiety Inventory (STAI) in the classroom before going to the laboratory.

In order to accurately obtain data on the vital signs of the participants, measurements were performed under the same conditions under the supervision of a teaching staff. Heart rate, systolic and diastolic blood pressure were measured with the Omron electronic sphygmomanometer when the students' the arm was supported at heart level. To perform reliable measurements, blood pressure was measured in both arms and recorded on the "Vital Signs Follow-up Form". The mean value of the two measurements was used for the evaluation. Then, the students were taken to the 56-m² skills laboratory for aromatherapy implementation.

In order to make sure that the environment is free of inhalation effect, first the control group then the experimental

group were taken to the laboratory. The students were retold about the implementation process in the laboratory setting. While the experimental group was informed, aroma inhalation was started, which took about 20 minutes. Before the blood drawing procedure, in order to determine the anxiety level, the students were asked to fill in the "Visual Analogue Scale (VAS)" and "State-Trait Anxiety Inventory (STAI)" again and to measure the blood pressure and pulse rate in both arms of under the supervision of the teaching staff and finally to write the results of the measurements in the "Vital signs Follow-up Form". Then the blood drawing process was carried out. After the blood drawing process was over, the same measurements were repeated.

Study Setting

Aromatherapy Implementation Environment

Aromatherapy application was conducted in the 56-m² skills laboratory. During the process, the doors and windows were kept closed and the room temperature was maintained between 22 and 26 ° C.

Aromatherapy Implementation

Only the experimental group underwent aromatherapy implementation. Aromatherapy was conducted through the diffusion method (diffusing aroma into the air in the environment), one of the most widely used methods. For diffusion, a ceramic diffuser was used. At 5-minute intervals during the implementation, one drop of lavender oil (*Lavandula Angustifolia* Herb Oil) and one drop of orange oil (*Citrus Aurantium Dulcis* Peel Oil) were added to 100 ml of hot distilled water in an aroma lamp heated at the bottom with a candle. The oils used in the study and their certificates of analysis were obtained from the Talya Herbal Products Industry & Trade LTD. Co.

Data Collection Tools

The Student Demographic Information Form was used to collect data on the students' socio-demographic characteristics, the Visual Analogue Scale

(VAS) and State-Trait Anxiety Inventory (STAI) were used to collect data on the students' anxiety levels, and the Vital Signs Follow-up Form was used to record the students' blood pressure and pulse rate values.

Student Demographic Information Form: The form questions the students' socio-demographic characteristics.

Visual Analogue Scale (VAS): The scale is used to assess the severity of anxiety. It is usually a 10-cm long, horizontal or vertical line beginning with the statement "I am totally relaxed, and I do not fear" and ending with the statement "I am very uncomfortable and I am very afraid". The severity of anxiety is rated between 0 and 10, "0" indicating the absence of anxiety and "10" indicating the most severe anxiety. The participants are told to mark any figure between "0" and "10".

State-Trait Anxiety Inventory (STAI):

The inventory developed by Spielberger, Gorsuch and Lush Main (1970) consists of two subscales: state anxiety and trait anxiety. Each subscale has 20 items. While the state anxiety inventory assesses how a person feels at a specific time in certain conditions, the trait anxiety inventory assesses how a person feels in general independently of the conditions he/she is in. [26] In this study, the 20-item "State Anxiety Inventory" was used.

The State-Trait Anxiety Scale was adapted into Turkish by Öner and Le Compte (1977). They also conducted the validity and reliability study of the Turkish version of the scale. State and trait anxiety scores are calculated separately.

Scores for the negatively keyed items are reversed, and 1 point is converted to 4 points, 2 to 3, 3 to 2, and 4 to 1. The State Anxiety Inventory has ten reversed items (items 1,2,5,8,10,11,15,16,19,20). These items were scored reversely (4-3-2-1). The remaining items (items 3,4,6,7,9,12,13,14,17,18) were non-reversed

items. These items were scored without reversing the scores (1-2-3-4). The possible total score to be obtained from both scales ranges from 20 to 80. While higher scores indicate higher anxiety levels, lower scores refer to lower anxiety levels. According to Spielberger et al, scores between 0 and 19 indicate the absence of anxiety, between 20 and 39 indicate mild, between 40 and 59 indicate moderate, between 60 and 79 indicate severe anxiety. They also report that individuals whose score is 60 or more need professional assistance. [27]

Vital Signs Follow-up Form: It is a table used to record the values referring to the students' vital signs in the classroom and laboratory settings.

Ethical Consideration

The study was conducted in Manisa School of Health Sciences, Department of Nursing in April 2014. In order to perform the study, written permission was obtained from the Non-Drug Clinical Research Ethics Committee of School of Medicine, Celal Bayar University. The participation was completely voluntary, and thus written consents were obtained from the participating students.

Data Analysis

The data were analyzed with numbers, percentages, means, analysis of variance and Student's t test using the SPSS 15.0 software package.

Evaluation of the data related to the socio-demographic characteristics of the 72 students revealed that their mean age was 19.36 ± 1.07 years. It also revealed that of the students, 61% in the experimental group and 58.3% in the control group were in the 18-19 age group, 63.9% in both groups were female, 61.1% in the experimental group and 44.4% in the control group were Anatolia High School graduates, and 97.2% in the experimental group and 94.4% in the control group did not have any chronic diseases.

RESULTS

Table 1 Socio-demographic Characteristics of the Students in the Experimental and Control Groups (n = 72)

	Experimental(n=36)		Control (n=36)	
	n	(%)	n	(%)
Age				
18-19 years	22	61.0	21	58.3
≥20 years	14	39.0	15	41.7
Gender				
Female	23	63.9	23	63.9
Male	13	36.1	13	36.1
School graduated from				
High school	10	27.8	12	33.3
Medical vocational high school	3	8.3	7	19.4
Anatolia High School*	22	61.1	16	44.4
Others	1	2.8	1	2.8
Chronic disease				
Yes	1	2.8	2	5.6
No	35	97.2	34	94.4

*High school where the education is in English, French or German

Table 2 Comparison of Pre- and Post-Implementation Vital Signs in the Experimental and Control Group Students

		EXPERIMENTAL	CONTROL	
		X±Ss	X±Ss	
1st measurement(a)	Pulse Rate	91.08 ± 10.90	88.81 ± 12.90	t=0.83, p*=.406
	Systolic Blood Pressure	117.98 ± 11.92	116.76 ± 11.92	t=0.43, p*=.665
	Diastolic Blood Pressure	65.50 ± 8.71	65.05 ± 5.84	t=0.25, p*=.800
2nd measurement (b)	Pulse Rate	87.86 ± 12.00	88.69 ± 10.88	t= -0.30, p*=.759
	Systolic Blood Pressure	117.26 ± 11.85	116.45 ± 12.51	t=0.28, p*=.780
	Diastolic Blood Pressure	66.98 ± 7.13	68.31 ± 7.38	t=-0.77, p*=.439
3rd measurement (c)	Pulse Rate	86.12 ± 10.91	83.52 ± 1.69	t=0.97, p*=.333
	Systolic Blood Pressure	115.59 ± 9.69	113.69 ± 12.85	t=0.70, p*=.481
	Diastolic Blood Pressure	67.86 ± 7.12	66.87 ± 8.29	t=0.54, p*=.590

p* t test for independent samples

a=Measurement in the classroom

b=Before the blood drawing process in the laboratory (in the experimental group, after the implementation of aroma inhalation)

c=After the blood drawing process in the laboratory

As is seen in Table 2, no significant differences were observed between the groups before and after aroma inhalation in terms of their vital signs ($p > 0.05$).

Table 3 Anxiety Levels in the Experimental and Control Groups Measured With the VAS

	EXPERIMENTAL	CONTROL	
	X±Ss	X±Ss	
1st measurement (a)	2.25 ± 2.43	2.77 ± 2.30	t=-0.94 p*=.348
2nd measurement (b)	3.16 ± 3.01	3.38 ± 2.84	t=-0.32 p*=.749
3rd measurement (c)	1.15 ± 2.16	1.61 ± 2.24	t=-0.88 p*=.381
	F=8.27 p**<0.05 c<a=b	F=12.74 p**<0.05 c<a=b	

p* t test for independent samples

a=Measurement in the classroom

b=Before the blood drawing process in the laboratory (in the experimental group, after the implementation of aroma inhalation)

c=After the blood drawing process in the laboratory

As is seen in Table 3, the mean total anxiety scores of the participants determined in the classroom before the

implementation of aroma inhalation using the VAS were 2.25 ± 2.43 and 2.77 ± 2.30 in the experimental and control groups

respectively. The scores determined in the laboratory setting were 3.16 ± 3.01 and 3.38 ± 2.84 in the experimental and control groups respectively prior to the blood drawing process (before aroma inhalation was applied to the experimental group), and 1.15 ± 2.16 and 1.61 ± 2.24 after the blood drawing process (Table 3).

The results indicate that aroma inhalation did not lead to a difference

between the groups in terms of their mean VAS scores ($p > 0.05$). The variance analysis revealed that although there was a decrease in VAS scores after the blood drawing process, the differences between the three measurements conducted in the classroom and in the laboratory before and after the implementation of aroma inhalation were not significant in both groups ($p^{**} < 0.05$, $c \leq b$).

Table 4 Comparison of Mean State Anxiety Scores of the Experimental and Control Group Students

	EXPERIMENTAL X±Ss	CONTROL X±Ss	
1 st measurement (a)	39.97 ± 5.31	41.27 ± 6.25	t= -0.95 p*= .422
2 nd measurement (b)	40.77 ± 5.48	40.02 ± 5.79	t= 0.56 p*= .804
3 rd measurement (c)	41.58 ± 6.34	43.25 ± 5.83	t= -1.16 p*= .585
	F=1.22 p**>0.05	F=7.19 p**<0.05 a=b<c	

p* t test for independent samples

a=Measurement in the classroom

b=Before the blood drawing process in the laboratory (in the experimental group, after the implementation of aroma inhalation)

c=After the blood drawing process in the laboratory

As is seen in Table 4, the mean state anxiety scores of the participants determined in the classroom before the implementation of aroma inhalation were 39.97 ± 5.31 and 41.27 ± 6.25 in the experimental and control groups respectively. The scores determined in the laboratory setting were 40.77 ± 5.48 and 40.02 ± 5.79 in the experimental and control groups respectively prior to the blood drawing process, and 41.58 ± 6.34 and 43.25 ± 5.83 after the blood drawing process (Table 4). The results indicate that aroma inhalation did not affect the state anxiety scores ($p > 0.05$).

According to the results of the variance analysis, there were no statistically significant differences between the results of the three measurements in the experimental group ($p^{**} > 0.05$). On the other hand, in the control group, while there were no differences between the first two measurements, their mean state anxiety scores increased during the third measurement conducted in the laboratory after the blood drawing process ($p^{**} < 0.05$, $a=b < c$).

DISCUSSION

In basic nursing practices, students are often confronted with unusual and stressful applications. [1] In order to ensure effective learning, the stress and anxiety suffered by students should be reduced. Various methods can be used to reduce anxiety. Given the studies conducted on anxiety during the recent years, it is seen that aromatherapy, one of the complementary and alternative therapies, is widely used. [1,10,21,28-31]

The most common method of use of essential oils is through the sense of smell in aromatherapy. There is some evidence that essential oils are absorbed in the body through olfaction and that inhalation of oils can alter emotional states and stimulate memories. [32]

The comparison of the experimental and control groups in terms of vital signs is shown in Table 2. In the study, there were no statistically significant differences between the experimental and control groups in terms of vital signs determined before and after the blood drawing process

in the laboratory setting ($p>0.05$). In previous studies, the results on the effects of aroma inhalation on vital signs differ from one study to another. In their study investigating the effect of aroma inhalation on anxiety experienced by nursing students during their first intravenous injection practices, Kim and Hwangbo (2010) reported no statistically significant differences between the students in terms of their systolic and diastolic blood pressure values. [10]

In their study, Kim and Kwon (2010) reported that heart rate and systolic blood pressure values significantly decreased in the experimental group. [1] Oh, Kim and Park (2008) reported that the VAS scores of the experimental group were lower than were those of the control group after aroma therapy. They also reported that the systolic blood pressure values and pulse rates decreased significantly in the experimental group, but their diastolic blood pressure remained same. [33]

The comparison of the mean scores obtained from the Visual Analogue Scale (VAS) revealed that there was no statistically significant difference between the mean anxiety scores of the two groups ($p>0.05$, Table 3). The comparison of the mean state anxiety scores revealed that there were no statistically significant differences between the two groups in terms of the mean state anxiety scores they obtained before and after the blood drawing process in the laboratory setting ($p>0.05$, Table 4). As is in Table 3 and Table 4, the students' mean VAS and anxiety scores were low or moderate.

That the students' mean anxiety scores were low might be due to the fact that they practiced the implementation on the inanimate models and that they were free to choose the person they would practice the implementation on, which may have eased their anxiety. That the level of anxiety suffered by the students was low may suggest that aroma inhalation did not have any effects. Mean anxiety scores obtained after the blood drawing process

were higher in both groups than were those obtained in the previous two measurements. The mean score may have increased due to the increased anxiety levels of the students who failed to draw blood.

There are numerous studies about the effects of aromatherapy on nursing students' anxiety and stress suffered during the first implementation performed in a clinical or laboratory setting or while they take an exam. In the literature, while some studies indicate that aromatherapy affects anxiety, some studies indicate the opposite.

Kutlu, Yılmaz and Çeçen (2008) reported that aroma inhalation (lavender) decreased examination anxiety. [21] McCaffrey, Thomas and Kinzelman (2009) reported both lavender and rosemary essential oils used in a sachet could reduce test anxiety in graduate nursing students. [28] Cho and et al. (2013) reported that the aromatherapy group's anxiety level was significantly lower than that of the group who used the conventional nursing intervention, and that the systolic and diastolic blood pressure levels of both groups did not show a significant difference by time. In their study conducted to investigate the effects of aromatherapy on the anxiety levels of patients in the preoperative period, Fayazi, Babashahi and Rezaei (2011) reported a statistically significant difference between the experimental and control groups in terms of their mean anxiety scores. [29,31]

In their study, Soden et al. (2004) reported that neither aromatherapy nor massage had a lasting benefit in reducing anxiety. [34] In their study conducted to investigate the effects of lavender oil on anxiety, Muzzarelli, Force and Sebold (2006) determined no significant difference between the mean anxiety scores of the experimental and control groups. [30] "In their study, Kim and Kwon (2010) also reported that they found no significant differences between the experimental and control groups in terms of the mean VAS and anxiety scores." [1]

In their study, Kim and Hwangbo (2010) determined no statistically significant relationship between the mean VAS and STAI scores, which are the subjective indicators of anxiety. [10] Our results are consistent with the results of all these afore mentioned studies.

These differences in results may have been resulted from the differences between sample groups, types of aromatic oils used, application methods, application environments and durations of the applications.

Limitations of the study

The study is limited to 1st-grade students, attending Manisa School of Health Sciences, Department of Nursing; thus, the results cannot be generalized to all students. Therefore, it is recommended that future studies should include different sample groups.

CONCLUSION AND RECOMMENDATIONS

The research findings revealed that the implementation of the aroma inhalation had no effects on nursing students' anxiety levels and vital signs during their first blood drawing experience. Other studies on invasive procedures (i.e. intramuscular injection, subcutaneous injection) causing stress on students can be conducted in laboratory settings.

The results in the literature are not consistent with each other. Therefore, it is recommended that future studies should be conducted with larger sample groups using various aromatic oils and different aromatherapy methods.

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