Randomized Trial Evaluating the Aroma Inhalation on Physiological and Subjective Anxiety Indicators of the Nursing Students Experiencing the First Intravenous Injection

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Abstract

Purpose: *The purpose of this study was to identify the effects of aroma inhalation on the anxiety levels of nursing students who are practicing their first intravenous injections. Method: Participants recruited were in sophomore nursing students. Convenient sampling was conducted. The experimental group was exposed to lavender, chamomile roman, bergamot, and geranium inhalations. Three physiologic indicators, systolic blood pressure, diastolic blood pressure, and pulse rate were measured. Two subjective self- reported instruments - ten centimeters bar sharped visual analogue anxiety scale and STAI(State Trait Anxiety Inventory) made by Spielberger - were used also.* ***Results:*** *The pulse rate in control group was 101.8 pulse /min and in the experimental group was 92.3pulse/min. The results were statistically significant between two groups. (t=2.05, p=.04).* ***Conclusion:*** *The effect of aroma inhalation was partially valid. Aroma therapy is recommended as a mean to overcome high stress and anxiety levels that students face in nursing programs.*

Keywords: *nursing students, anxiety, aroma therapy, the fundamental of nursing, intravenous injection.*

1. Introduction

When learning the fundamental of nursing, students in the beginning nursing education course, are taught nursing principles and fundamental practices which they'll apply in the various clinical settings [1,2]. The fundamental of nursing is the most basic and fundamental of all nursing courses and it will be based on professional nursing skills. Nursing students can feel nervous when they doing medical procedures that are not familiar and even more so when the procedure invasive. Intravenous injection into real human bodies is the most invasive procedure they have experienced up to this time. Practicing the first intravenous injection into a real body is very stressful for students. It provokes great anxiety among nursing students [3].

According to Kabat-Zinn, an optimal level of arousal is necessary to best complete a task such as needed for an exam, performance, or competitive event [4]. It means adequate tension and stress make people effective. However, when the anxiety or level of arousal exceeds that optimum, the result is a decline in performance. A person who is overwhelmed by anxiety has decreased efficiency of learning, becomes depressed, less motivated, is destructive to his or her own body and so on. Thus nursing educators have to recognize the negative aspects of such an invasive procedure. Excessive anxiety disrupts learning, demoralizes self-esteem and

unfortunately can derail the students' motivation their entire nursing major. It is necessary to intervene to prevent anxiety and relieve stress during an intravenous practice.

Aromatherapy is known as one of the effective methods to decrease anxiety. It has been reported that it is useful in nursing as well as education, cosmetics [5,6]. It is a holistic remedy using herbal essence oils for promoting mind and body health [7,8]. It tightly connects with the limbic system which relate to human emotions and affections. So aroma therapy is studied and applied to emotional problems such as decreasing stress, treating insomnia, depression of cancer patients, and reliving anxiety of uterine leiomyoma patients before surgery [9,10]. Yipa and Tam gave massages to the elderly who complained of moderate-to-severe knee pain [11]. They used it with ginger and orange essential oil. They reported it seemed to have potential as an alternative method for short-term knee pain relief. Aroma foot massage was shown to decrease anxiety, pain and cause sleep satisfaction for patients during colonoscopy procedures under conscious sedation [12]. The hemodialysis patients that inhaled mixed essential oils with lavender and sweet orange for 7days felt better and showed less anxiety [13]. It was also said that aroma massage decreased the level of anxiety and increased self-respect [14].

But there were no consistent outcomes, especially for physiological indicators, of the studies dealing with aromatherapy. In some cases researchers noticed aromatherapy influenced systolic BP, pulse and VAS [15,16]. Others recorded different findings [9].

Therefore, this study attempted to identify if aromatherapy is applicable to the nursing education field and if it is effective to decreasing anxiety in nursing students. In addition, it was investigated which physiological indicators are sensitive to aroma treatment.

2. Purpose and hypothesis

The main aim of this study was to identify the effect of aroma inhalation on anxiety of nursing students who were practicing their first intravenous injection. The major hypothesis of this study is that 'the anxiety of nursing students treated with aroma inhalation will be lower than non-treated students'.

The five sub-hypotheses were as follows:
- The systolic blood pressure of nursing students treated with aroma inhalation will be lower than non-treated students.
- The diastolic blood pressure of nursing students treated with aroma inhalation will be lower than non-treated students.
- The pulse of nursing students treated with aroma inhalation will be lower than non-treated students.
- The VAS (Visual Analog Scale) of nursing students treated with aroma inhalation will be lower than non-treated students.
- The STAI (State Trait Anxiety Inventory) of nursing students treated with aroma inhalation will be lower than non-treated students.

3. Operational Definition

3.1. Anxiety

In this study, anxiety was defined operationally as the value measured by three physiological indicators, systolic pressure, diastolic pressure, and pulse. Also, two self-

reported subjective scale, VAS (Visual Analogue Scale) and STAI (State Trait Anxiety Scale) were measured.

3.2. Aromatherapy

Aromatherapy was a remedy therapy that uses a diffuser with essential oils of lavender, roman chamomile, bergamot, and geranium. Three diffusers containing 1 drop of each essential oil in 100ml distilled water were used in the 193cm^3 classroom. They were located in each corner of the classroom. Only experimental participants were exposed to the aroma for at least one hour.

4. Method

4.1. Research Design

This study was an equivalent control group pre-posttest non-synchronize design. The research design is shown in Figure 1.
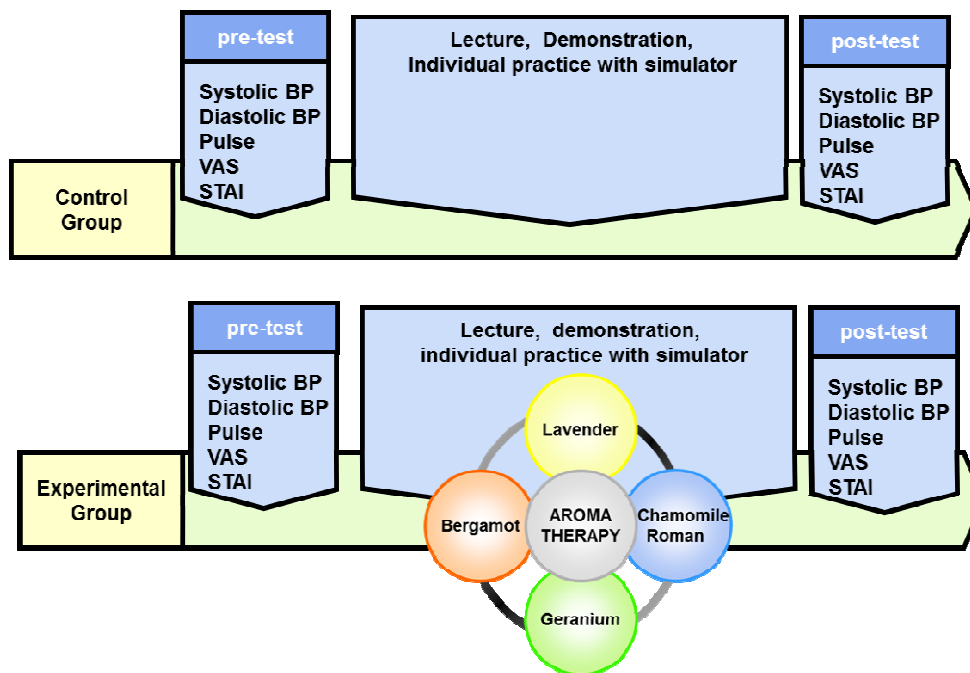

Figure 1. Research Design

4.2. Procedure and recruiting

The study was conducted between September and November in 2004 in Deajeon, South Korea. It used convenient sampling and randomized assignment. 47 sophomore nursing students (45 females, 2 males) were recruited, who were taking a fundamental of nursing course. After receiving explanations about the purpose and procedure of the study, they participated voluntarily. The written informed consent was obtained from each participant

prior to initiation. To eliminate hawthorn effect, informed consents were collected 2 months in advanced of the experiment.

To equalize the academic ability between the two groups, they were arranged in a randomized way. They were ranked academically by former semester scores. The top student was placed in first group; the second ranked student was placed in the second group, third was in the first group and forth was the second group and so on. The students who ranked as an even number belonged to one group; odd number were in another group. The experimental group was selected at random in the two groups.

To control a diffusion effect, the experimental group was studied right after the control group. The research was conducted the same day and participants were not permitted to exchange information.

Because one student didn't complete her paper work, she was cut from the experiment. 46 students were finally analyzed.

4.3. Pre-test

On arrival in the classroom, students were checked for their anxiety by measuring systolic blood pressure, diastolic blood pressure, and pulse rate. And participants reported how much anxiety they felt by scoring VAS (visual analogue scale) and STAI (State Trait Anxiety Scale). These procedures were carried out by the experimental group students as well as by the control group students. These data samples were collected to validate the homogeneity between both groups before treatment.

4.4. Treatment

All students were given a lecture, watched video and demonstration, and had individualized practice with a simulator. Additionally, the experimental group was treated with the aromatherapy.

4.5. Post-test

After they felt ready to inject to a real human body, students started injecting their partners. Post- test was conducted just before the practicing intravenous injection. The students also repeatedly were checked for the five indicators, which were the same as the pretest.

4.6. Instruments

4.6.1. Physiological parameters: The physiological parameters were a systolic and diastolic blood pressure and a pulse. They were measured by mercurial sphygmomanometer, JL-M5, made in Germany for checking blood pressure. A pulse oxymeter, Handheld Pulse Oximeter, was used by clipping it on an index finger. It ranged within 2% accuracy.

4.6.2. Subjective indicators: The subjective indicators were two self-reported inventories in subjective indicators; STAI, VAS. First, the widely used Spielberger State Trait Anxiety Inventory (STAI) was used to measure state and trait anxiety [17]. It is a 20-item, 4-point anxiety checklist. It is also possible to calculate a total score of anxiety and it ranged from 20 points to 80 points. The higher score means higher anxiety state, lower score doesn't mean lower anxiety state. The Cronbach's alpha was assessed .93 in pretest and .91 in posttest.

The second indicator was a 10cm-length visual analog scale. The scale is a bar with two extreme anxiety states. The end at 10 points represented "I feel extreme and severe anxiety",

while the opposite end at 0 meant "I'm fully relaxed". Students were asked to check the point that represented their anxiety.

4.6.3. Data analysis: Data were evaluated with the SPSS 17.0 program. Demographic characteristics, academic scores, and anxiety scores were described by frequency, percentile, mean, and standard deviation. Comparing the means of five anxiety scales scores between experimental and control groups were analyzed by t-tests.

5. Results

5.1. Homogeneity test of experimental group and control group

The results of the verification of homogeneity for sex, academic score, and five anxiety scales in pretest are listed in Table 1. Over 90% of each group was females. The average age of the experimental group was 20.69 years and that of the control group was 20.25 years (t=1.01, p=.93). Former semester academic scores were with no significant differences between the two groups (t=1.12, p=1.02). In pretest, there were no significant differences in anxiety indicators; systolic blood pressure (t=1.11, p=.27), diastolic blood pressure (t=0.50, p=.61), pulse rate (-0.80, p=.42), VAS (t=-0.53, p=.59) and STAI(t=-0.66, p=.50) between the experimental and control groups. Therefore, it is proved that two groups were homogenous statistically.

Table 1.   The Homogeneity test for characteristics and pre-test anxiety score between experimental group and control group (N=46)

Character-istics	Categories	Experi. group(n=23) Frequency (%) or Mean ±SD	Contr. group (n=23) Frequency (%) or Mean ±SD	t / X^2	p
Sex	Male	2(8.7)	2(8.7)		
	Female	21(91.3)	21(91.3)	0.0	1.0
Age		20.69±1.02	20.25±0.45	1.01	0.93
Academic Score		3.42±0.36	3.43±0.42	1.12	1.02
Physiological Anxiety Indicators	Systolic BP	111.0±11.1	110.3±8.5	1.11	.27
	Diastolic BP	72.8±10.8	74.3±9.5	0.50	.61
	Pulse rate	81.3±10.5	79.1±8.5	-0.80	.42
Subjective Anxiety Indicators	STAI	47.2± 9.5	45.7±9.4	-0.53	.59
	VAS	4.3± 1.9	3.9±2.4	-0.66	.50

5.2. Effects of aroma therapy on anxiety of nursing students

Analyzing the posttest data, the anxiety indicators assessed by the students were as follows:
The three physiological anxiety indicators were slightly lower in the experimental group

than in the control group < Table 2>. The mean systolic BP and diastolic BP of the experimental group were 125.2±12.0mmHg and 76.3±10.0 mmHg, compare to 126.5±6.9 mmHg and 78.0±8.0 mmHg in the control group. The differences between the two groups were not statistically significant (t=0.45, p=.65, t=0.64, p=0.52). Only pulse rate was showed significantly differences (t=2.05, p=.04). The pulse rate in the experimental group is 92.3±17.5 beat/min while 101.8±13.4 beat / min in the control group.

The two subjective anxiety indicators also are slightly lower in the experimental group than in the control group Table 2. STAI did not show a statistically significant relationship between the two groups (t=0.03, p=.97) and VAS was too (t=1.32, p=.19).

Table 2. Comparisons of post-test score between two groups (N=46)

Characteristics	Variables	Experi. group (n=23) Mean ±SD	Contr group (n=23) Mean ±SD	t	p
Physiological Anxiety Indicators	Systolic BP Diastolic BP Pulse	125.2±12.0 76.3±10.0 92.3±17.5	126.5±6.9 78.0±8.0 101.8±13.4	0.45 0.64 2.05	.65 .52 .04
Subjective Anxiety Indicators	STAI VAS	55.2±6.3 6.1±3.7	55.3±9.4 6.8±4.0	0.03 1.32	.97 .19

5.3. Comparisons of gap between pre-test and post-test scores in the two groups

To further evaluate the study, the gap was investigated between pre-test and post-test scores between the two groups. The results are listed in Table 3. All indicators were elevated in the posttest. This means that regardless of treatment, all nursing students felt more anxiety just before practicing intravenous injection. All anxiety levels in the two groups were entirely increased. The gap of the pretest and the posttest anxiety levels is different with each group. In the experimental group, anxiety scores increased less than in the control group.

There were significantly statistical differences in two variables; pulse rate and VAS. The posttest pulse rate in the experimental group was increased slightly as much as 11.0±3.2 beats/min in contrast to 22.7±4.6 beats/min in the control group (t= -2.08, p=. 03) (Table 3).

The score gap of pretest and posttest in VAS is significantly statistically different in the two groups, too. The gap of the VAS score (3.9±1.7) in the control group was larger than in the experimental group (2.5±1.3)(t=-1.65, p=.04).

Table 3. Comparisons of gap between pre-test and post-test score in two groups (N=46)

Variables	Group	Gap, posttest minus pretest ± SD	T	P
Systolic BP	Experi Control	14.2±2.3 16.2±1.7	-.31	.19
Diastolic BP	Experi	3.5±1.0	-.55	.52

Pulse	Control	3.7±1.2		
	Experi	11.0±3.2	-2.08	.03
	Control	22.7±4.6		
STAI	Experi	15.0±4.2	-.46	.09
	Control	19.6±3.1		
VAS	Experi	2.5±1.3	-1.65	.04
	Control	3.9±1.7		

According to the findings of the study, using blended essential oils of lavender, roman chamomile, bergamot, and geranium, aroma inhalation was partially verified to reduce the anxiety level of the nursing students who were practicing intravenous injection for the very first time.

6. Discussion

This research evaluated the efficacy of the aroma therapy to reduce anxiety levels for nursing students who performed their first intravenous injections, using physiologic and subjective indicators. The students in the experimental group showed the lower pulse rate in comparison to the students in the control group. Among the physiologic indicators, systolic and diastolic blood pressures were not statistically significant (t=0.45, p=.65, t=0.64, p=.52) as to none of subjective indicators were statistically significant.

The outcome of this study was consistent with previous studies; the study by Kim, Kim, & Park showed that the level of anxiety among hemodialysis patients was reduced by using a aroma necklace [13]; Lee's study also showed the aroma massage partially reduced the anxiety and stress of the nursing students prior to the first clinical practice [18]; The students' anxiety prior to the presentation was reduced when aromatherapy was used in the classroom [19].

However, there are researches with contradictory results. According to Hur, Cheong, Yun, Lee and Song, the aromatherapy was not effective for reducing anxiety of mothers who were having labor pain, and the length of labor was not shortened [20].

Although this study was able to support the aromatherapy's efficacy for reducing anxiety levels, more studies are needed. If more studies support aromatherapy for reduction of anxiety levels, aromatherapy could be used for patient care in the clinical settings and for teaching nursing students more effectively.

Aromatherapy is very simple and convenient. This is the reason to use it in clinical or educational fields. The studies for aromatherapy use their unique mixture of different aromas. It has many different kinds of aromas and different delivery methods. Therefore it is difficult to standardize aromatherapies for each different target populations in each different situation. If future studies evaluate certain target populations who already were known to have benefits from aromatherapy in certain situation, it may be possible to standardize the aromatherapy. This is one of the essential processes for building up the evidence-based nursing. This study could be the foundation of the protocol that can be used to provide aromatherapy prior to the intravenous injection practice procedure for nursing students.

This study also confirmed that intravenous injection practice increased the anxiety of the nursing students especially at the very first time. Educators in nursing field should recognize this fact and consider developing strategies that can reduce nursing students' anxiety.

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