

## Original Article

# The Effect of Aromatherapy Performed to Nursing Students on the Level of Test-Taking Anxiety and Academic Achievement

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### Abstract

**Background:** Being an important process in terms of academic, social and professional developments; test-taking anxiety is also an important problem for the academic life of nursing students and the most serious barrier for educational success.

**Aim:** This study was conducted for the purpose of determining the effect of aromatherapy on test-taking anxiety and achievement of students.

**Methodology:** The randomized-controlled study was conducted with 82 nursing students. Aromatherapy was performed to students in the intervention group before an exam via inhalation by pouring one liter of water and 10 drops of lavender oil in a vapor device spreading cold vapor. On the other hand, water vapor was simultaneously applied by using another vapor device in the control group.

**Results:** As a result of the study, the STAI mean scores of the students who received aromatherapy were determined to be lower than those who did not receive ( $p < 0.05$ ). It was also determined that lavender inhalation did not affect the test achievement ( $p > 0.05$ ); however, there was a significant and negative correlation between the test grade point averages and STAI scores of the students.

**Conclusions:** Aromatherapy inhalation is very cheap and easy method. The results of this study showed that lavender oil inhalation can reduce test-anxiety in nursing students. The students and nursing educators can be suggested to try lavender inhalation to reduce test-taking anxiety.

**Key Words:** Aromatherapy, Nursing Students, Test-Taking Anxiety

### Introduction

The process of educating nursing students has become more complex and stressful because of advances in technology, patient demographics, national safety standards, high expectations in the classroom and clinical environments, and nursing faculty shortages (Melo et al., 2010). Nursing students are experiencing stressful learning environments from multiple sources, which consequently impede their success (Moscaritolo, 2009).

Tests are important assessment processes that students should cope with in the educational process (Vitasari et al., 2010). Being the most common type of anxiety in children and adolescents; test-taking anxiety is an intense

feeling that starts before a test, emerges with various physical and psychological changes and may have a negative effect on performance of individual during the test (Nur & Leyla, 2011). Increasing success expectancy in families and society creates pressure on students and increases their test-taking anxiety (Yıldırım, 2000). Having a direct effect upon achievement; test-taking anxiety is affected by stressful conditions in the academic process and may increase the risk of experiencing burnout.

Being an important process in terms of academic, social and professional developments; test-taking anxiety is an important problem for the academic life of

nursing students and the most serious barrier for educational success (Ayyıldız et al., 2014). In the literature; the approach of lecturers, families and friends, as well as the interest in course/profession, studying and test environment and the skill of coping with problems may cause test-taking anxiety (Safdari et al., 2007).

By the characteristics of their age period; nursing students not only struggle for developing their own identity and proving themselves, but also feel anxiety about making future-related decisions in order to receive education according to their interests and talents. This anxiety results in the failure of students to focus on tests, use their potential and have an expected/requested academic achievement. In their study concerning the test-taking anxiety of nursing students; Buyukyilmaz et al., (2009) determined that students, who considered themselves very insufficient for coping with worrisome educational conditions, wanted to pass tests and thought that studying environment affected test achievement, had higher scores of test-taking anxiety. In another study, it was stated that nursing students experienced a higher anxiety due to both problems experienced as a university student and the greater burden of theoretical and clinical education (Arabacı et al., 2015).

It is required to eliminate such anxieties in order to reveal the present achievement status of students. Different methods have been applied to reduce test anxiety such as cognitive-behavioral therapy, instruction of problem solving skill, religious activities and pray. Various studies investigated the effectiveness of one of these alternatives, namely aromatherapy, in reducing psychological and physiological responses to a state anxiety situation (Jafarbegloo et al., 2015, Kavurmaci et al., 2015; Ko et al., 2013; Kutlu et al., 2008; Lyra et al., 2010; Mc Coffery et al., 2009). Recently aromatherapy, as a method for reducing anxiety, has developed remarkably in comparison with other methods in most countries. (Lemon, 2004, Toda & Morimoto, 2008). Aromatherapy is a natural treatment method utilizing the chemical structure and effects of essential oils. It has various applications such as massage, inhalation, compress, and baths.

It is usually used for relieving, relaxing, and resting the body (Tseng, 2005).

The oil extracted from lavender is fragrant volatile herbal oil that is routinely used in aromatherapy. This scented plant belongs to Labiatae (mint) family and has antibacterial, antifungal, anti-flatulence, muscle-relaxing, and analgesic properties (Cavanagh, & Wilkinson 2002; Kutlu et al., 2008). Different studies have shown that aroma of lavender is sedative and has effects on improvement of behavioral disorders and anxiety. (Lemon, 2004, Toda & Morimoto, 2008). Some studies have shown that aroma of lavender can stimulate cognitive performance and hence increase consciousness and concentration (Jafarbegloo et al., 2015). Researchers believe that aroma of lavender strengthens student's ability to encounter and pass their examinations. This aroma stimulates brain and raise psychological ability through increasing alpha waves of brain (Moss et al., 2003; Park & Lee, 2004). Additionally, small clinical trials have explored the antidepressant effectiveness of lavender oil, showing that lavender oil used in aromatherapy has a favorable effect on mood and can condense relaxation as observed in the increased beta power in EEG activity and reducing workplace stress-related symptom (Cavanagh & Wilkinson, 2015; Chen et al., 2002; Field et al., 2008).

In related studies in the literature; it is stated that aromatherapy performed to nursing students before tests significantly decreases their stress and anxiety levels. There is a limited number of related studies in Turkey, which has generated the need for conducting such a study.

The purpose of this study is to determine the effect of lavender oil, applied to second-year nursing students before an exam, on level of test-taking anxiety and academic achievement.

## **Methods**

***Study Design, Setting and Sample:*** The study was conducted with second-year nursing students at a university (N:95). During the final exam of the course of internal medicine nursing, students that met the inclusion criteria were separated into two similar classes as A and B (50 m<sup>2</sup>) and while the

group A was included in the intervention group (n=40), the group B was included in the control group (n=42) by drawing lot. The students who are not within scope of the study (n= 13) took the exam in another class. The students who were not allergic to aromatic oils, were not diagnosed with Chronic Obstructive Pulmonary Disease, had no obstacle for smelling and agreed to participate in the study were included in the study. On the other hand, students, who were pregnant, had a nasal flu, and did not agree to participate in the study, were excluded from the study.

**Instrumentation:** In the study, the data were collected by the researchers using a questionnaire with 15 questions determining students' socio-demographic characteristics, feelings before exams and how they would cope with test-taking anxiety, as well as The state-trait anxiety inventory (STAI). The STAI was applied. The vapor application continued until the questionnaire and the scale were completed and then the exam of students was started upon completion of vapor application.

STAI is an instrument that quantifies adult anxiety. This particular instrument is used to simplify the separation between state anxiety and trait anxiety, feelings of anxiety and depression. Being developed by Spielberger et al. (1970); STAI consists of 20 questions. State anxiety items include: "I am tense; I am worried" and "I feel calm; I feel secure." Trait anxiety items include: "I worry too much over something that really doesn't matter" and "I am content; I am a steady person." All items are rated on a 4-point scale (e.g., from "Almost Never" to "Almost Always"). Higher scores indicate greater anxiety. While the lowest score to be obtained from the entire test is 20, the highest score is 80. In this study, all the test scores were used. Higher scores obtained from inventories signify that students have a lower attitude toward tests and a higher anxiety level. Turkish translation and reliability and validity studies of STAI were conducted by Oner and the KR-20 Cronbach Alpha value was determined as 0.87 for the entire test (Oner, & Le, 1983) The cronbach alpha coefficient of the inventory was determined as high as 0.91 in this study.

**Procedure:** Aromatherapy was performed to students in the intervention group via inhalation by pouring one liter of water and 10

drops of lavender oil in a vapor device spreading cold vapor. Lavender oil was a water-based product and was supplied from a company named Awe-Cemre. On the other hand, water vapor was simultaneously applied by using another vapor device in the control group. Vapor device was operated for 30 minutes in both groups and the doors and the windows of both classes were kept closed during the application. 15 minutes after taking the students into the class, the questionnaire determining their socio-demographic characteristics and the Test Anxiety Inventory (STAI) were applied. The vapor application continued until the questionnaire and the scale were completed and then the exam of students was started upon completion of vapor application.

**Data Analysis:** The obtained data were evaluated in the SPSS 16.0 program. While percentage calculation and chi-square were used as statistics, student t test or Mann-Whitney U test were used to analyze the difference between the mean scores of two groups, one-way analysis of variance (ANOVA) or Kruskal-Wallis analysis of variance were used to compare more than two groups and Pearson correlation analysis was used to determine the correlation between contin

**Ethical Considerations:** In the study, an approval from the Non-Invasive Trials Ethics Committee of a university (2016-03/15), an institutional permission from the school where the study was conducted (57395821/669) and voluntary informed consents from students were received. The study was conducted in accordance with the principles of the Declaration of Helsinki.

## Results

It was stated that 75.0% of the students in the intervention group were female, 62.5% were aged between 17-19 years, 55.0% were high school graduates, and 52.5% stayed at a dormitory. 78.5% of the students in the control group were female, 64.2% were aged between 17-19 years, 61.9% were high school graduates, and 57.2% stayed at a dormitory. The students in the intervention and control groups were similar in terms of their socio-demographic characteristics (Table 1,  $p>0.05$ ).

In the intervention group, 57.2% of the students stated that they studied sufficiently, 17.8% studied partially, 25.0% studied insufficiently; whereas, in the control group, 54.6% of the students stated that they studied sufficiently, 19.5% studied partially, and 25.9% studied insufficiently. The students in intervention group stated that they prayed, smoked before the exam, and drank tea or coffee to cope with test-taking anxiety and the students in the control group showed similar behaviors. The difference between the groups was not statistically significant ( $p > 0.05$ ). The students in the intervention group experienced less hyperalertness,

distractibility, tension ( $p < 0.05$ ), irritability ( $p < 0.05$ ), pessimism, and failure than students in the control group ( $p > 0.05$ , Table 2).

The students who received aromatherapy were observed to have lower mean scores of STAI than those who did not receive it (Table 3,  $p < 0.05$ ). It was determined that lavender inhalation did not affect test achievement ( $p > 0.05$ ); however, there was a significant and negative correlation between the grade point averages and STAI scores of the students. As the students' test-taking anxiety scores decreased, the academic achievement mean scores increased. (Table 4,  $p < 0.05$ ).

**Table 1 Distribution of the Socio-Demographic Characteristics of the Students in Intervention and Control Groups**

| Demographic Characteristics    | Groups                      |                         |
|--------------------------------|-----------------------------|-------------------------|
|                                | Intervention (n=40)<br>n(%) | Control (n=42)<br>n (%) |
| <b>Gender</b>                  |                             |                         |
| Female                         | 30(75.0)                    | 33 (78.5)               |
| Male                           | 10(25.0)                    | 12 (21.5)               |
| <i>p</i> - Value               | 0.186                       |                         |
| <b>Age Group</b>               |                             |                         |
| 17-19 years                    | 25 (62.5)                   | 27 (64.2)               |
| 20-22 years                    | 12 (30.0)                   | 14 (33.3)               |
| Older than 23 years            | 3 (7.5)                     | 4 (2.5)                 |
| <i>p</i> - Value               | 0.86                        |                         |
| <b>Average Age</b>             | 19.4±1.75                   | 20.7±1.13               |
| <i>p</i> - Value               | 0.443                       |                         |
| <b>School of Graduation</b>    |                             |                         |
| High School                    | 22(55.0)                    | 26 (61.9)               |
| Anatolian High School          | 7 (17.5)                    | 9(21.5)                 |
| Medical Vocational High School | 6 (15.0)                    | 4 (9.5)                 |
| Other                          | 5(12.5)                     | 3(7.1)                  |

|                        |          |           |
|------------------------|----------|-----------|
| <i>p</i> - Value       | 0.649    |           |
| <b>Residence place</b> |          |           |
| Dormitory              | 21(52.5) | 24 (57.2) |
| Student House          | 12(30.0) | 13(30.9)  |
| Family's House         | 7 (17.5) | 5 (11.9)  |
| <i>p</i> - Value       | 0.189    |           |

**Table 2 Distribution of the Feelings Experienced by Students in Intervention and Control Groups before the Exam**

| <b>Feelings Experienced</b> | <b>Intervention<br/>(n= 40)(%)</b> | <b>Control<br/>(n= 42)(%)</b> | <i>p</i> - Value |
|-----------------------------|------------------------------------|-------------------------------|------------------|
| <b>Hyperalertness</b>       |                                    |                               |                  |
| Experiencing                | 10 (25.0)                          | 11 (26.1)                     | 0.370            |
| Not Experiencing            | 30 (75.0)                          | 31(73.9)                      |                  |
| <b>Distractibility</b>      |                                    |                               |                  |
| Experiencing                | 9 (22.5)                           | 12(28.5)                      | 0.543            |
| Not Experiencing            | 31(77.5)                           | 30(71.5)                      |                  |
| <b>Tension</b>              |                                    |                               |                  |
| Experiencing                | 8 (20.0)                           | 17 (40.4)                     | 0.036            |
| Not Experiencing            | 32(80.0)                           | 25(59.6)                      |                  |
| <b>Irritability</b>         |                                    |                               |                  |
| Experiencing                | 7 (17.5)                           | 13 (30.9)                     | 0.038            |
| Not Experiencing            | 33 (82.5)                          | 29 (69.1)                     |                  |
| <b>Pessimism</b>            |                                    |                               |                  |
| Experiencing                | 5 (12.5)                           | 8 (19.0)                      | 0.631            |
| Not Experiencing            | 35 (87.5)                          | 34 (81.0)                     |                  |
| <b>Failure</b>              |                                    |                               |                  |
| Experiencing                | 6 (15.0)                           | 9 (21.4)                      | 0.536            |
| Not Experiencing            | 34 (85.0)                          | 33 (78.6)                     |                  |

**Table 3 Comparing the Mean scores Obtained by the Students in Intervention and Control Groups from the Test Attitude (TA) and STAI**

| Groups                 | Test Attitude (TA)              | Mean Test Scores ( $\bar{x} \pm SD$ ) |
|------------------------|---------------------------------|---------------------------------------|
|                        | Mean scores( $\bar{x} \pm SD$ ) |                                       |
| Intervention<br>(n=40) | 33.43±11.12                     | 74.91±0.51                            |
| Control<br>(n=42)      | 39.42±10.91                     | 72.84±0.93                            |
| t                      | 2.199                           | 0.172                                 |
| p- Value               | 0.048                           | 0.543                                 |

**Table 4 Correlation Coefficients of the Scores Obtained by the Students from Test Attitude (TA) and State Anxiety Inventory (STAI)**

| Academic Achievement | Test Anxiety Inventory (STAI) |          |
|----------------------|-------------------------------|----------|
|                      | r                             | p- Value |
|                      | - 0.258                       | 0.032    |

### Discussion

Test anxiety is a phenomenon that can affect as many as 40% of students. Many nursing students are under great stress from long hours of study, a rigorous curriculum, and balancing work and family life. These stressors can lead to anxiety in many areas of the student’s life, most notably in situations where he or she is being evaluated. Studies reveal that nursing students experience a higher test-taking anxiety than students receiving education in other health sciences due to the intensity of the nursing curriculum (Beggs et al., 2011; Evans et al., 2010).

In related studies, it was determined that nursing students experienced fear, panic, anxiety, concentration disorder and failure due to anxiety during the exam and these symptoms had a negative effect on physical and emotional well-being and academic achievement (Prato & Yucha, 2013; Richard, et al., 2009; Vitasari et al., 2010). Test anxiety is the experience of distress, worry, or fear before, during, or after a test and can result in poor performance. This anxiety is increased when goals are affected by the performance on the test, as is the case in most

nursing programs. Test anxiety causes mental distraction, difficulty with memory recall, and physical symptoms such as nausea, diarrhea, headache, and a quickened heart rate (Brewer, 2002; Crow et al., 2008; Godbey & Courage, 2004). In the present study, it was observed that the students in the intervention group receiving aromatherapy before the exam had fewer symptoms like hyperalertness, distractibility, tension, irritability, pessimism, and failure that would negatively affect the academic achievement.

There are studies concerning the factors that affected academic achievement of students in nursing education and the quest for increasing the student success still continues. Examining the related literature; it was determined that nursing students received practices like hypnotherapy (Ainswort et al., 2013), music therapy (Lai et al., 2008), progressive muscle relaxation exercises (Kanji et al., 2006) and aromatherapy (Ko et al., 2013; Kutlu et al., 2008; McCaffrey, et al., 2009; Lyra et al., 2010) to have a decreased test-taking anxiety and their results were effective. One of the most preferred integrative methods for decreasing the test-taking anxiety is aromatherapy. In many studies, it was

determined that aromatherapy significantly decreased the test-taking anxiety of nursing students. In their study examining the effect of aromatherapy inhalation containing the mixture of May chang, lavender and rosewood tree on anxiety, stress and serum cortisol levels of nursing students; Ko et al., (2013) determined that the five-session aromatherapy significantly decreased the scores of anxiety, physical and psychological stress.

Mc Caffery et al., (2009) identified that the use of lavender and rosemary essential oil sachets decreased test-taking anxiety and heart rate of nursing students. Lyra et al., (2010) investigated the efficacy of aromatherapy in decreasing stress and anxiety levels in undergraduate health science students. Result of their study revealed that aroma group had a significant decrease in stress and anxiety levels.

In their randomized, controlled, prospective study, (Kutlu et al., 2008) determined that lavender inhalation decreased test anxiety of nursing, midwifery, and health official students and the difference between experimental and control groups was statistically significant. In the study conducted (Kavurmaci et al., 2015) with 154 nursing students during the final exam of internal medicine nursing for the purpose of examining the effect of lavender inhalation on the test-taking anxiety and achievement; they determined that aromatherapy decreased the anxiety level before the exam; however, it had no effect upon test achievement.

In the randomized single blind study conducted by (Jafarbegloo et al. 2015) with 33 nursing students, they applied lavender vapor inhalation to the intervention group and water vapor inhalation to the control group for half an hour before the exam and stated that aromatherapy had no effect on the exam scores of students; however, the students in the intervention group liked the scent spreading before the exam.

In parallel with the results of studies, this study determined that lavender inhalation applied before the exam decreased the test-taking anxiety of nursing students, but it had no effect on test grade point averages.

The results of the studies proved the fact that lavender inhalation has a noticeable effect on decreasing of test anxiety of nursing students.

Lavender oil has been used curatively for centuries because of its soothing, sleep-inducing and anxiolytic effects (Woelk & Schlaefke, 2010). Small clinical trials have explored the antidepressant effectiveness of lavender oil, showing that lavender oil used in an aromatherapy has a favorable effect on mood and can condense relaxation as observed in the increased beta power in EEG activity and reducing workplace stress-related symptoms (Chen et al., 2015; Field et al., 2008). Various substances in essential oils used in aromatherapy are involved in the blood circulation via inhalation or topical ways and show psychological, physical, and cellular effects.

**Limitations of the Research:** There hasn't been any limitations for this study. It could be recommended to repeat the study in different classrooms with different essential oils as double blind.

**Conclusion:** Test-taking anxiety is high among nursing students and the consequences of test failure can keep some students from realizing their goal of becoming a nurse or an advanced practice nurse. The results of this study showed that lavender oil inhalation can reduce test-anxiety in nursing students. Lavender aroma created a positive class atmosphere, thus reducing the level of anxiety of the students. This study determined that aromatherapy caused positive psychological effects and improved students' success in the examination. Aromatherapy should be used not only for test-taking anxiety but also in other situations that cause anxiety in nursing faculty. It could be recommended to repeat the study in different classrooms with different essential oils as double blind.

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