



## Effect of Lavandula Angustifolia Extract to Prevent Test Anxiety (A Study on Students at Two Time Intervals)

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### ABSTRACT

*Background and Aim:* Test anxiety is a category with which most students are familiar; in some cases, it reduces their academic performance and has a negative effect on their health. *Lavandula angustifolia* is a plant whose effect on reducing anxiety and stress and other psychiatric disorders has been studied. In this research, its extract has been used to prevent students' test anxiety at two-time intervals.

*Research method:* This research was a clinical trial study on 45 first-year high school students. All students completed the TAI Anxiety Test Questionnaire and then randomly were divided into three groups: control, short-term consumption and long-term consumption. The fresh extract of *Lavandula angustifolia* (prepared by hydrodistillation) was provided to the second and third groups to be used as edible in two periods of three days and twenty days at the time of examinations. The students of the two experimental groups completed the TAI questionnaire again after the end of the period. The answer sheets were analyzed using covariance analysis.

*Results:* The analysis of the findings showed that there was a significant difference between the scores of the control group and the two groups of "long-term consumption" and "short-term consumption" ( $P < 0.05$ ), but between the two experimental groups (in two short-term and long-term intervals) no significant difference exists in the change of this index by students ( $P > 0.05$ ).

*Conclusion:* According to the findings, it can be concluded that *Lavandula Angustifolia* Extract is effective in reducing the test anxiety, but the duration of consumption (in the three-day and twenty-day intervals) has no effect on this reduction.

**Keywords:** Lavandula Angustifolia Extract - Test anxiety - Short term consumption - Long-term consumption

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### INTRODUCTION

Anxiety is an unpleasant emotion that we all have experienced to some extent in form of words such as worry, anxiety, tension and fear [1].

Due to physical, psychological and social changes, the adolescence is one of the most critical periods in a person's life, which can affect the health and future of the person. Usually, mental disorders are common among adolescent students.

The results of a research in girls' high schools in Mashhad showed that about 24% of girls had anxiety and 28% of them had severe stress [2].

### Test anxiety

Test anxiety is a kind of self-centered preoccupation that is characterized by a weak "self-image" and a person's doubts about their abilities, often associated with negative knowledge, non-concentration, adverse physical reactions, and academic failure. In other words, when a person experiences anxiety and dismay about his mental performance and ability in the test, such a feeling will diminish his actual performance so we can say he/she has been subjected to test anxiety [3].

Dr. Kobra LashkariPoor et al in 2005 [4] conducted a research entitled Relationship between Test Anxiety and Academic Performance in Zahedan Secondary School Students. The results of the research indicated a high prevalence of test anxiety in junior high school students and also showed a negative effect of anxiety on academic performance.

Therefore, they concluded that paying attention to pathology, implementing preventive programs and timely treatment of students seems necessary and in particular, empowerment of school counselors to identify and provide psychological services, and, if necessary, referral to Treatment centers is of paramount importance.

Lavender with the scientific name of *Lavandula Angustifolia* is from the plant family of Labiateae; it is an evergreen Shrub, with multiple rectangular stems and bilateral and narrow leaves that covered with white cottony fluffs and has a cluster of purple flowers. From the chemical composition aspect, it has the essential oil (over 3%) which contains more than 40 compounds and the most important ones include: linalyl acetate (30 to 60 percent), cineole (10%), linalool, nerol and so on. From the viewpoint of the ancient medicine, lavender has a warm and dry temperament and is used as a carminative, curing the muscle spasms, anti-depressants, strengthening the stomach and relieving the nerves and so on [5].

Lavender is a plant that its anti-anxiety and sedative effects on the different populations have been studied widely in [6].

In 2012, Sahar Khosh Kesht et al [7] tested the effect of aromatherapy with *Lavandula angustifolia* extract on nursing students. In this research, the *Lavandula angustifolia* extract was given to the students for inhalation for a few minutes before the test. The anxiety level was measured before and after the aromatherapy and after the exam.

In the mentioned study, the aroma has had no significant effect in reducing anxiety, but it is suggested that the effect of a longer-lasting aromatherapy on anxiety reduction should be investigated [7].

In the present research, we aimed to investigate the effect of *Lavandula angustifolia* therapeutic scent in two different periods of time, for three days before the exam and 20 days before the exam on high school students of the first period.

## MATERIALS AND METHOD

Preparing *Lavandula angustifolia* (hidrodistillation) HD extract

2900 grams of fresh plant of *Lavandula angustifolia* on 18th and 19th of May, 2017, were taken from medicinal plants field of Semnan Agricultural Jihad Training Center; we separated the leaves from the stem and then preparing *Lavandula angustifolia* HD extract was done by distillation apparatus in four stages.

The *Lavandula angustifolia* HD extract was poured in 60 ml and 250 ml containers and delivered to the students. A graded scale was given to all students for accurate measurements. The long-term consumption group should mix and drink 10 ml of *Lavandula angustifolia* HD extract in a glass of water for twenty nights each night after dinner.

The short-term consumption group should mix and drink 10 ml of *Lavandula angustifolia* HD extract in a glass of water for three nights, every night after dinner.

## Data Collection Tool

Using the TAI Test Anxiety Questionnaire prepared by Dr. Abolqasemi, the questionnaire was approved by the responsible institutions in the education organization.

## Sampling method and sample size

This research was carried out as a clinical trial on first grade high school girl students in Hijrat high school in Semnan.

For this purpose, from among the students of the school, people who were interested in participating in the project were identified. The number of students was 45 people.

To conduct pre-test, a few days before the beginning of the exams, the TAI test anxiety questionnaire was distributed between 45 students participating in the research plan and the answer sheets were gathered.

Then the students were divided into three groups:

- **First group:** the control one who did not receive *Lavandula angustifolia* HD extract and completed only the questionnaire (2 times with the rest of the students). 15 people;

- **Second group:** These students received 10 ml of oral *Lavandula angustifolia* per night and for 20 days. 15 people;

- **Third group:** These students received oral *Lavandula angustifolia* HD extract for 3 days and each night and night by 10 ml. 15 people;

Post-test: All three groups completed the same questionnaire after the completion of the course. For the second and third group who should have used *Lavandula angustifolia* HD extract, it was obligatory to complete the consent form by parents.

## Applied software and statistical methods

The condition of homogeneity of variances as well as the normality of the data distribution were studied using the Lone test and the Kolmogorov-Smirnov test. Also, for examining the research hypotheses, the covariance analysis was used.

**FINDINGS**

The findings of demographic variables showed that the average age of subjects was 13.58 ± 0.753 (13 years and 7 months and 2 days), and their age ranged from 12 to 15; it has been presented in Table (1) in separated groups. Also, 60% of subjects were in grade 7, 33.3% in the eighth grade and 6.7% in grade nine.

**Table 1.** age distribution of subjects by separate groups (n = 45)

Group	Minimum	Maximum	M	SD	N
Long term consumption	12	15	13/27	0/704	15
Short term consumption	13	15	14/2	0/676	15
Control	13	15	13/27	0/458	15
Total	12	15	13/58	0/753	45

In Table 2, descriptive characteristics of test anxiety have been presented in three groups, in each of the pre-test and post-test situations. As it can be seen, the "test anxiety" in the experimental group of long-term consumption in the post-test has decreased from 46.47 to 22.27 in comparison with the baseline; also, in the short-term consumption experiment group, the value of this index in the post-test has been reduced from 48.53 to 24.73, also in the control group in the post-test it has changed from 34.4 to 37.6.

**Table 2.** Descriptive indices of test anxiety by separate groups

Index	test anxiety			
	Pre-test		Post-test	
Group	M	SD	M	SD
Long term consumption	46.47	8.935	22.27	11.54
Short term consumption	48.53	7.952	24.73	12.618
Control	34.4	6.295	37.6	7.199

The homogeneity condition of variances and the normal distribution of data were verified using the Lone test and the Kolmogorov-Smirnov test. Therefore, for investigating the research hypotheses, the covariance analysis test was used. Therefore, in Table 3, the results of the Covariance analysis test for studying changes in the test anxiety scores have been presented in two stages of measurement (pre-test and post-test) in two experimental groups. The results indicate that the test anxiety level in each of the two experimental groups was significantly

different in the pre-test and post-test ( $p < 0.05$ ); also with respect to the reported eta coefficients, the effect size of the 20 days of consumption of the Lavandula angustifolia extract in reducing the test anxiety was equal to 29.8% and this effect size was calculated during consumption over a three-day period equal to 42.5%; it indicates the acceptable effect size.

**Table 3.** Covariance analysis test for studying test anxiety by separate groups

Source	group	SS	Df1	Df2	MS	F	p	$\eta$
test anxiety	Long term consumption	2447.647	1	27	2447.647	11.483	0.002	0.298
	Short term consumption	2702.078	1	27	2702.078	19.933	0.0001	0.425

Also, the results of covariance analysis to examine the difference between the three groups in changing the test anxiety index show that there is a significant difference between the three groups in changing this index ( $P < 0.05$ ) (see Table 4).

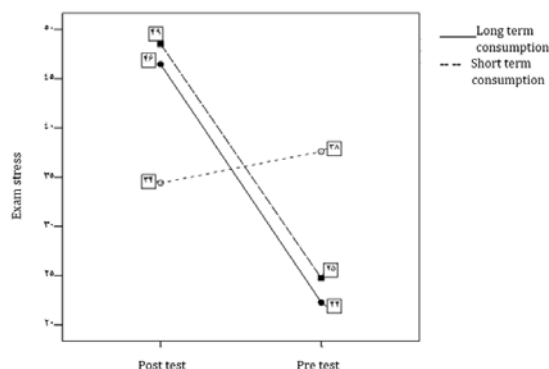
**Table 4.** Statistical test of covariance analysis for comparing the groups with analyzing the test anxiety

Source	SS	df1	df2	MS	F	sig	$2\eta$
Test anxiety	2807/906	2	41	1403/953	7/274	0/002	0.262

In table 5, the results of Tukey's post hoc test are presented in three groups for paired comparison of "test anxiety" scores in three groups. The results show that there is a significant difference between the scores of the control group and the two groups of "long-term consumption" and "short-term consumption" ( $p < 0.05$ ); but between the two experimental groups (in the time interval between consumption of Lavandula angustifolia extract), there is no significant difference ( $p > 0.05$ ); there is no significant difference in the changes in this index ( $p > 0.05$ ); the visual representation of these changes has been presented in Diagram (1).

**Table 5.** Tukey test for paired comparison of three groups in test anxiety changes

Index	Group (I)	Group (J)	MD (I-J)	SE	Sig
Test anxiety	Long term consumption	Short term consumption	-9/73	4/667	0/255
		Control	*-36/3	4/667	0/002
	Short term consumption	Long term consumption	-9/73	4/667	0/414
		Control	*46/03	4/667	0/001
					*P<0/05



**Diagram 1.** Displaying the change in test anxiety in the pre-test and post-test by three groups

## DISCUSSION AND CONCLUSION

In the course of growth, children and adolescents experience a wide range of anxieties; sometimes these anxieties are so severe that they make their everyday and educational life difficult. The test anxiety is a common type of performance anxiety that, according to various studies, affects between 10% and 30% of students and students. Due to the importance of this issue, the aim of this research is to investigate the effect of *Lavandula angustifolia* extract on prevention of students' test anxiety in two time intervals. The findings show that there is a significant difference between the scores of the control group and the two groups of "long-term consumption" and "short-term consumption" ( $P < 0.05$ ); but between the two experimental groups (at two intervals of assumption of the extract of the *Lavandula angustifolia*) no significant difference exists in change in this index by students ( $P > 0.05$ ). The results of this research are consistent with the findings of [7]. In their research, aiming at studying the effect of aromatherapy on the test anxiety of nursing students in Alborz University of Medical Sciences, they showed that although the aromatherapy has not had a significant effect on reducing test anxiety but has reduced its amount over time; on the other hand, many studies have tested the beneficial effects of using the aromatherapy in reducing anxiety and stress [8,9]. However, there are some studies that indicate that the aromatherapy does not affect the level of anxiety [10,11].

But on the other hand, in a research, with the use of aromatherapy lamps including of the scent of *Lavandula angustifolia*, chamomile and sweet orange in nursing students before the first intravenous injection, Kim & Kwon (2010) [12] showed that the aromatherapy was effective in

reducing students' anxiety in the first offensive practice. Also, studying the effect of the inhalation aromatherapy on test anxiety, Koca Kutlu, Yilmaz (2008) [13] showed that the use of *Lavandula angustifolia* scent during exam time can reduce test anxiety. Thomas McCaffery and Kinzelman (2009) [14] also found that the *Lavandula angustifolia* and rosemary scents reduce the test anxiety. In the present research, *Lavandula angustifolia* caused to reduce test anxiety in both long-term and short-term experimental groups compared with the control group. It can be concluded that the aromatherapy can be used as one of the new and effective methods for reducing the level of anxiety. Also, in a study by Saheb Al-Zamani et al [15] with the aim of determining the "effect of inhalation aromatherapy on anxiety and depression among female students living in dormitory complex of Tehran University of Medical Sciences" in the academic year of 2009-2010, there was observed a significant decrease in the symptoms of anxiety and depression, compared with the pre-test and control group ( $P < 0.05$ ); it is consistent with our study outcomes. In this study, the aromatherapy had been done by combining 7 drops of *Lavandula angustifolia* essence with 3 drops of essence of Persian rose for four weeks and every day for half an hour at night and at a time other than the time of the exam. Also, only female students living in university dormitories, according to numerous studies, have more test anxiety than male students.

One of the findings of the present research, which is the aim of the study, is the duration of consumption of *Lavandula angustifolia* in reducing students' test anxiety. This finding has not become significant. Consistent with this finding, Wilkinson et al (2007) [16], in a research entitled "Effect of Aromatherapy on Anxiety and Depression in Cancer Patients," showed that the combination of routine supportive care with the use of aromatherapy has not been effective in reducing anxiety and depression in cancer patients within 10 weeks of intervention. Also, Graham et al (2003) [17] found that 3 weeks of inhalation aromatherapy during radiotherapy did not reduce the anxiety of cancer patients. Therefore, it can be argued that duration and time is a variable that should be considered more in this therapeutic approach. Also, a variety of researches has been done on the effects of the aromatherapy on stress response and physiological symptoms. Park & Lee (2004) [18] conducted a study in Korea to investigate the effects of inhalation aromatherapy of *Lavandula angustifolia*,

peppermint, rosemary, and salvia on the response to stress (physical symptoms, anxiety level, stress perception) of nursing students; they showed that the aromatherapy can have a beneficial effect on stress management.

One of the strengths of this research is the clinical relevance of this research, but since anxiety is a mental phenomenon, it is difficult to measure it accurately; so, based on cultural and emotional reasons, people's perceptions of anxiety may vary, which is one of the study's limitations. On the other hand, this research was conducted among high school students of the first period, which is one of the other constraints of this research. Also, referring to the results mentioned above, and also considering that the test anxiety is not a new category and is always one of the concerns of the education system, it is suggested that future researchers investigate the effect of *Lavandula angustifolia* extract to prevent test anxiety and aromatherapy as a non-medicinal, non-invasive, and sometimes economical method and as a complementary therapy, along with other psychological therapies, in the reduction of test anxiety and even depression and stress in different educational levels. In general, despite the limitations of the present research, it seems that the results of the research, consistent with previous findings, confirm the negative effects of anxiety on academic performance. Therefore, with regard to the prevalence of test anxiety and its negative effects on students and educational system, the assistance to advance the mental health of children and adolescents is needed in order to prevent physical, psychological, educational and economic damages. It is recommended that more research be done to identify effective preventive approaches and complementary therapies such as aromatherapy, music therapy, hearing the calming sounds, including the sound of the Qur'an and, in general, the use of different visual and non-visual arts in the treatment of test anxiety.

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