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The impact of aromatherapy on glossophobia among medical students: A study on cortisol levels and stress reduction

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Abstract

Glossophobia (fear of public speaking, presentation anxiety) is an anxiety disorder characterized by extreme fear and anxiety about public speaking. Glossophobia is a very common phobia worldwide, reportedly affecting 75% of the population. This study aims to examine the effects of different aroma inhalations (Thyme and Juniper) on public speaking anxiety, and salivary cortisol hormone levels in university students. The sample of the research consisted of a total of 104 university students, male and female, between the ages of 18-20. In the first step, cortisol hormone levels were determined using the ELISA technique in the saliva samples taken from the university students included in the study. The average salivary cortisol hormone level and public speaking anxiety levels of the university students participating in the study showed a positive and statistically significant relationship (p=0.001). There is a significant negative correlation between the participants' public speaking anxiety and post-thyme oil status at a 99% confidence level and a 1% significance level, r=-.318. When public speaking anxiety and juniper oil were analyzed, a significant negative relationship was found at r=-.290, a 99% confidence level, and a 1% significance level. It was also concluded that inhalation of 2% thyme essential oil in individuals with high glossophobia is both safe and beneficial in reducing anxiety levels.

Keywords: Aromatherapy, glossophobia, cortisol, hormone, university medicine students

Introduction

Speech is the main purpose of communication and a part of social life, and it is also the most effective tool that enables an individual to communicate within social life. Effective speaking skill is the ability to express our thoughts, feelings and information in a clear and impressive way. Being effective in communication helps us connect better with the people around us, convey our thoughts clearly and create positive effects on our environment. Speaking in front of the public causes tension and excitement, and when used correctly, this excitement increases the concentration of individuals and helps them be more successful during the speech. Glossophobia, also known as "speech anxiety", is the feeling of fear when speaking in front of the public and is generally defined as fear of public speaking or nervousness in communication (Hancock et al., 2010). Public speaking anxiety is the most common type of social anxiety, occurring at 75% and occurring frequently and at different levels [1].

Cortisol, known as the stress hormone, is a corticosteroid hormone produced in the shell region of the adrenal gland and is associated with the body's response to stress. Due to the release of cortisol in individuals with public speaking anxiety, healthy thinking is prevented, and the immune system is weakened. People simultaneously begin to lose their positive emotions, resulting in unnecessary and excessive excitement. Additionally,

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increased heart and respiratory rate, excessively rapid reactions, muscle tremors, shoulder and neck. It is a feeling of panic associated with different physiological changes such as stiffness in the body part [2]. People with a fear of public speaking face problems achieving career goals and advancement, which can lead to frustration, distress, and depression [3]. It has been reported that the cortisol concentration in saliva reflects the free cortisol in the blood [4]. Salivary cortisol is a simple, non-invasive and stress-free procedure and is an important parameter used in psychoneuroendocrinological monitoring [5].

Glossophobia occurs due to environmental, genetic and sociocultural factors, and strategies to reduce glossophobia are important because it significantly affects both the social life and professional life of the individual. One of the important strategies for reducing glossophobia is aromatherapy. Aromatherapy use essential oils to mitigate psychological symptoms such as stress, anxiety, and sadness, primarily by inhalation. These oils stimulate the brain through the olfactory sense, causing the release of serotonin and dopamine, which can alleviate anxiety and mood disorders [6]. When essential oil molecules are inhaled, they are carried to the lungs and bloodstream, where they stimulate brain activity and have an impact on the limbic system, which regulates emotions and hormones [7]. One of the products widely used in traditional complementary medicine and aromatherapy are thyme and juniper. Junipers (Juniperus L.) are dioecious, rarely monoecious, woody and evergreen plants in the form of trees or shrubs. Juniper berry has an immune system strengthening, vitalizing and relaxing effect thanks to antioxidant components such as catechin, organic acid, terpenic acid, flavonoids, tannins, coumarin, limonene, camphor and beta pinene. Thyme (Thymus vulgaris) is a genus of plant belonging to the Lamiaceae family. Thyme is grown for its aromatic leaves, which are rich in essential oils and used in cooking. Thyme essential oil, thymol and carvacrol phenolic compounds, which provide antioxidant properties, have antibacterial, antispasmodic, diuretic, hypertensive, calming properties on stress, anxiety, depression, irritability and balancing brain activity.

In the literature research, no studies were found examining the relationship between salivary cortisol hormone levels and different aroma inhalations (thyme and juniper) to evaluate public speaking anxiety in medical faculty students. The medical profession is a vital service field that basically aims to protect and improve human health. Doctors comprehensively evaluate the physical, mental and spiritual health conditions of the human body; They are individuals who have a wide set of knowledge and skills and are in constant communication to make a diagnosis and apply effective treatment methods. In this context, it was aimed to examine the effects of different aroma inhalations (Thyme and Juniper) on public speaking anxiety, salivary cortisol hormone level and some physiological parameters in university students.

Material and Methods

Ethical Approval

Ethics committee approval (18.10.2023/Decision no: 138) and institutional approval were obtained from Ankara Medipol University non-interventional ethics committee. The participants were informed about the study in accordance with the Declaration of Helsinki and their consent was obtained for the Informed Consent Form. Volunteer participants were included in the study.

Study Design and Participant

This study's population consisted of healthy men and women who were first-year students at the Faculty of Medicine. The study was started with a study group of 158 people who voluntarily agreed to participate in the study from this population, and since 52 people did not complete the study, a study group of 104 people was taken into consideration. The convenience sampling method was used as the sampling method. This sampling method's goal is to identify the sample that is closest to the researcher and most easily accessible [8]. A total of 104 volunteer students, including 39 males and 65 females between the ages of 18 and 20, made up the experimental group of the study. Each individual served as their own control, with saliva samples collected before and after aromatherapy. The study excluded students with psychological and chronic disorders, those who used medication, including sedatives, herbal mixtures, or supplements, those with allergies or health issues related to odor, and those with communication disabilities. Information about the demographic characteristics of the individuals in the study group is presented in Table 1.

Aromatherapy Application

In the study, aromatherapy was applied by sniffing before and after the experiments. Before starting the application, the participants were informed about the study with the informed consent form, and their consent was obtained. Participants were asked to fill out the Perceived Stress Scale Pre-test form before starting the application. Essential oils of juniper (Juniperus communis/Madagascar) and thyme (Origanum vulgare/Madagascar) were used for inhalation. For aromatherapy inhalation application, 2 drops of thyme and juniper essential oils were dropped on the paper pinned to their collars. The participants experienced aromatherapy for a total of 15 minutes during the presentation. An aromatherapist and a specialist physician carried out the study process [8]

Data Collection Tools

In this study, the perceived stress scale was used to determine the stress levels of the participants, and a demographic information form was used to collect personal data from the participants.

Questionnaire

Participants were asked to complete a survey regarding sociodemographic variables, work environment, lifestyle,

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emotional well-being, and approach to respite therapy treatment. In the presentation, detailed content in the survey is given based on working environment, relaxation methods, aromatic oil use and stress information. The public speaking anxiety level of the participants was evaluated by taking relevant questions from the public speaking anxiety Scale, which is a 17-question evaluation tool.

Test Anxiety Inventory (TAI) was developed by Spielberger (1995) [9] and adapted to Turkish in 1985 [10]. The SDI consists of a 17-sentence question item, four response options [(1) almost never, (2) sometimes, (3) often, (4) almost always] and instructions. Cronbach's Alpha (α) value of the scale was found to be 0.87 and test-retest reliability coefficients were found to vary between 0.70 and 0.90 for all tests [10,11]. In the Turkish version of the inventory, seven items (two five nine 10 11 13 14) and ten items (one three four six seven eight 12 15 16 17) constitute the affective subtest [12].

Collection of Saliva Samples

Saliva samples were collected at a period of 09:00 to 10:00 in the morning using the passive salivation method in Salivette tubes (Sarstedt, GERMANY) at 5 ml. After centrifuging at 1500 g for 15 minutes in a refrigerated centrifuge (NF 1200R, NUVE, Ankara, TÜRKİYE) in the laboratory, saliva samples were kept at -80°C until the analyses for cortisol hormone levels were performed.

Measurement of Cortisol Level in Saliva

The commercial kit used in the measurement is specific to humans and was used for cortisol levels (BT LAB, Cat.No E 1 003Hu, CHINA). It was examined in accordance with the procedure specified in the manufacturer's catalog (determination 31.25-2000pg/ml, intra-assay coefficient 8.0%, inter-assay coefficient 10.0%).

Analysing the Data

The G-power method calculated the sample group to represent the population of the study to be 101 persons. Therefore, the study was conducted with 104 participants. The study employed Anova and t tests, which are independent sample tests, with the assistance of the SPSS v22 statistical program in a Windows environment. We used Cronbach's alpha coefficient, a measure of the items' internal consistency, to explain or challenge the scale's homogeneous item structure. The study also used the Elisa saliva test for hormone data. The significance level was evaluated at $p<0.05$.

Results

In the study, a positive and statistically significant relationship was found between the average salivary cortisol hormone level of university students and their public speaking anxiety levels ($p=.001$). While public speaking anxiety levels were at low levels, their averages were 3.61 Juniper (Before) Cortisol (ng/ml), 2.44 Juniper (After) Cortisol (ng/ml), 3.48 Thyme (Before) Cortisol (ng/ml), 1.03 Thyme (After) Cortisol (ng/ml) levels were observed.

While the public speaking anxiety levels were at medium levels, the averages were 3.65 Juniper (Before) Cortisol (ng/ml), 2.63 Juniper (After) Cortisol (ng/ml), 3.53 Thyme (Before) Cortisol (ng/ml), 1.14 Thyme (After) Cortisol (ng/ml) levels.

When public speaking anxiety levels are at high levels, the averages are 3.88 Juniper (Before) Cortisol (ng/ml), 2.69 Juniper (After) Cortisol (ng/ml), 3.81 Thyme (Before) Cortisol (ng/ml), 1.88 Thyme (After) Cortisol. It varies between (ng/ml).

According to Table 1, it is seen that a grading (strong, medium, weak) was made over the total of the public speaking anxiety stress scale. Accordingly, when the socio-demographic variables related to the scale were examined, no significant differentiation was observed between the rows and columns in any way. However, when the variables in the columns in the graded form of the scale are examined respectively, it is seen that juniper (before) and (after) and thyme (before) and (after) levels differ significantly. In other words, the public speaking anxiety perceived by the 1st year medical faculty students increases with cortisol levels before juniper and thyme oils are sniffed. On the other hand, it was revealed that the same participants who were made to smell juniper and thyme oil had a remarkable decrease in both cortisol levels and public speaking anxiety levels. Therefore, the anxiety levels of the participants who were made to smell juniper and thyme oils were relieved somewhat due to the effect of the scents, and as their anxiety levels decreased, their cortisol levels also decreased. Another result of this study is that the change in cortisol and anxiety levels, which were approximately at the same level in participants smelling juniper oil and thyme oil, changed in favor of thyme oil. In other words, it can be said that thyme oil has a more dominant effect on stage anxiety and cortisol than juniper oil.

According to Table 2, correlation analysis was conducted for first-year medical faculty students' stage anxiety, juniper oil (before-after) and thyme oil (before-after). Accordingly, there is a significant negative relationship between the participants' stage anxiety and their post-thyme oil conditions, $r=-.318$ at the 99% confidence level and 1% significance level. At the same time, when the participants' stage anxiety and juniper oil were examined, a significant negative relationship was found at $r=-.290$. 99% confidence level and 1% significance level. Therefore, it was determined that both types of oils negatively affected the participants' public speaking anxiety, but the conditions before the oils were not significant. In other words, public speaking anxiety decreases after aromatic scents and the scent of thyme has a stronger effect than the scent of juniper.

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Table 1. Comparison of sociodemographic characteristics of first-year students of the Faculty of Medicine with Juniper and Thyme oil smelling status, Cortisol levels and scale total score (n=104)

Variables	n (%)	Juniper (before) cortisol (ng/ml)	Juniper (after) cortisol (ng/ml)	Thyme (before) cortisol (ng/ml)	Thyme (after) cortisol (ng/ml)
Gender					
Girl	65 (62.5)	3.59±1.025	2.49±0.979	3.72±0.792	2.64±0.562
Boy	39 (37.5)	3.81±0.884	2.61±0.946	3.64±0.969	2.75±0.666
		t=-1.089	t=-.832	t=.424	t=-.890
		p=.100	p=.065	p=.275	p=.640
Father's education status					
Illiterate/literate	1 (1)	3.79±0.719	2.59±0.309	3.38±0.539	2.57±0.279
Primary education	4 (3.8)	4.11±0.921	2.76±0.525	4.12±1.128	2.70±0.597
Secondary education	21 (20.2)	3.92±0.998	2.52±0.759	3.84±0.790	2.66±0.624
University and above	78 (75.0)	3.58±0.975	3.54±0.699	3.63±0.859	2.68±0.602
		F=.946	F=.142	F=.716	F=.018
		p=.421	p=.934	p=.545	p=.997
Mother's education status					
Illiterate/literate	1 (1)	3.79±1.313	2.59±0.754	3.38±1.271	2.56±0.754
Primary education	5 (4.8)	3.48±0.845	2.28±0.751	3.40±0.887	2.57±0.751
Secondary education	28 (26.9)	4.01±0.988	2.62±0.863	4.00±0.963	2.79±0.863
University and above	70 (67.3)	3.55±0.975	2.52±0.766	3.59±0.739	2.64±0.766
		F=1.547	F=.374	F=1.687	F=.460
		p=.207	p=.772	p=.175	p=.711
Family type					
Small family	100 (96.2)	3.69±0.981	2.55±1.65	3.70±0.870	2.68±1.616
Extended family	1 (1)	3.59±0.907	2.56±0.696	3.62±0.230	2.52±0.941
Other	3 (2.9)	3.09±0.975	1.96±0.852	3.42±0.859	2.50±0.850
		F=.554	F=1.094	F=.103	F=.168
		p=.576	p=.359	p=.902	p=.846
Perception of income status (family)					
Low	4 (3.8)	4.18±0.536	2.93±0.410	3.58±0.553	2.83±0.557
Middle	36 (34.6)	3.64±0.926	2.46±1.697	3.66±0.565	2.61±0.644
High	64 (61.5)	3.66±0.679	2.55±0.713	3.71±0.173	2.71±0.402
		F=.566	F=.846	F=.071	F=.462
		p=.569	p=.432	p=.931	p=.632
Presentation Anxiety Scale total levels					
Low	24 (23.1)	3.61±1.011	2.44±0.638	3.48±0.553	1.03±0.718
Middle	60 (57.7)	3.65±0.959	2.63±0.731	3.53±0.565	1.14±0.546
High	20 (19.2)	3.88±0.865	2.69±0.602	3.81±0.173	1.88±0.519
		F=97.36	**F=110.22**	**F=20.06**	**F=64.32**
		p=.044**	**p=.029****	**p=.013****	**p=.047****

*Independent T test **One-Way ANOVA a Post Hoc=3>1, 2>1

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Table 2. The relationship between cortisol hormone levels and scale total scores of first-year medical faculty students (n=104)

Variables	1	2	3	4	5
Presentation anxiety	(0.73)				
Juniper cortisol (before)	.057	1			
Juniper cortisol (after)	**-.298****	**.491****	1		
Thyme cortisol (before)	.064	.101	.014	1	
Thyme cortisol (after)	**-.318****	**.620****	**.414****	**.315****	1

Values in parentheses are Cronbach Alpha reliability values. p<.01**; It shows that it is significant at p<.05* level

Discussion

Glossophobia (fear of public speaking, public speaking anxiety) is the fear of public speaking. It is a common social anxiety disorder with symptoms that range from mild irritability to extreme distress or panic. Aromatherapy is a complementary therapy consisting of extracts of essential oils obtained from plants for therapeutic and protective purposes for the human body, mind and spiritual health [13]. Thyme and juniper are safely and widely used in aromatherapy applications. Thyme oil is invigorating, strengthening for mental and physical exertion, helps support concentration and stimulate intelligence. In addition to helping balance the nervous system, juniper oil is effective in relieving anxiety and mental distress and reducing stress levels [14]. This study investigated the effects of Juniper and Thyme essential oils on the cortisol levels and public speaking anxiety of first-year medical students. In line with the findings of the study, it was determined that thyme and juniper aroma inhalation application reduced the salivary cortisol hormone level, which indicates the level of public speaking anxiety, and the most significant decrease was statistically effective in the group in which thyme aroma inhalation was performed ($p<0.01$). Previous research has demonstrated that the act of breathing in essential oils has the effect of diminishing stress levels [15]. For instance, a study conducted in the United States in 2016 discovered that it relieved stress among first-year students [16]. Similarly, a Turkish study conducted in 2015 revealed that lavender oil lowered anxiety among nurses working in intensive care units [17]. Additionally, a study conducted in South Korea in 2009 saw a decrease in stress levels among teenagers [18]. Aromatherapy demonstrated a reduction in heart rates among patients in the intensive care unit and an improvement in energy levels among women in the process of healing from COVID-19. However, there is a paucity of study about the impact of thyme oil on stress [19]. A study conducted by Lehrner et al. (2005) emphasized the anxiolytic properties of Lavender oil in dental patients, suggesting that aromatherapy may be a beneficial intervention in stress-inducing circumstances [20]. Our data corroborate these outcomes, as both Juniper and Thyme oils resulted in a significant reduction in anxiety and cortisol levels among the subjects. The decrease in cortisol levels observed in this study aligns with the results published by Hur et al. (2014), who found that inhaling essential oils caused a significant reduction in blood cortisol levels in persons experiencing stress [21]. Regarding public speaking anxiety, our study found that there were significant negative correlations between anxiety scores and post-exposure cortisol levels for both Juniper and Thyme oils. The correlation coefficient is -0.290 for Juniper and -0.318 for Thyme, and the p value is less than 0.01. This discovery confirms the concept that aromatherapy can relieve anxiety symptoms, as shown by Sayorwan and colleagues. (2012) saw a reduction in state anxiety through inhalation of essential oils in a controlled experiment [19]. Our research found that there was no significant change in the effectiveness of oils when different sociodemographic factors were taken into account, such as gender, parents' education level, family structure or perceived income status. These findings show that the calming properties of Juniper and Thyme oils can be applied to all individuals, regardless of demographic variables. This finding contradicts previous studies suggesting that individual differences may affect the effectiveness of aromatherapy [20]. Managing public speaking anxiety is essential to the academic and professional development of medical students. Being able to adequately demonstrate confidence and manage stress are crucial skills for future healthcare managers as healthcare practitioners. As a result of the study, it was seen that thyme and juniper aroma inhalation application reduced the salivary cortisol hormone level, which indicates the level of public speaking anxiety, and the most statistically significant decrease was found in the group in which thyme aroma inhalation was performed ($p<0.01$). Although examining the effect of thyme and juniper essential oil aroma inhalation on the salivary cortisol hormone level is limited, it is similar to the results of research reporting that the level of anxiety decreases in individuals who received aromatherapy [8,22]. The reason for observing the most significant effect of thyme essential oil aroma inhalation application in reducing salivary cortisol hormone levels in the study groups is Carvacrol, which is contained in thyme; thymol; Linalool; Cineole; It is thought to originate from phenolic compounds with antioxidant effects, such as borneol.

Study limitations

Additional research is needed to investigate the lasting effects of aromatherapy on stress and anxiety. Exploring the mechanisms by which these essential oils exert their effects may provide deeper insights. Additionally, studies can investigate the effects of different essential oils and their combinations to determine the most effective compounds for reducing anxiety. These tests can also be repeated for healthcare administrators.

Conclusion

In conclusion, this study reveals the effect of aroma inhalation of thyme and juniper essential oils on reducing the level of salivary cortisol hormone in university students with speech anxiety. The most significant effect was determined in the groups where 2% thyme essential oil aroma inhalation was applied. It has been concluded that the application of 2% thyme

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essential oil aroma inhalation will be safe and beneficial in stress management in many anxiety problems such as glossophobia, as well as in stressful periods (for students during the exam period) or in professions with intense stress. (Managers, healthcare professionals, etc.).

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
Ethics committee approval (18.10.2023/Decision no: 138) and institutional approval were obtained from Ankara Medipol University non-interventional ethics committee.

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