

REVIEW

Aromatherapeutic Remedies to Ease the Work-Related Stress

Dudu Altintas Gunduz^{1,2*} , Ufuk Koca Caliskan^{1,2} 

¹Department of Pharmacognosy, Faculty of Pharmacy, University Duzce, Duzce, Turkiye

²Department of Pharmacognosy, Faculty of Pharmacy, University Gazi, Ankara, Turkiye

*Corresponding Author: Dudu Altıntaş Gündüz, e-mail: duduaaltintas@gmail.com/dudualtintas@duzce.edu.tr

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Abstract

Stress is defined as a state of worry or mental tension caused by a difficult situation by WHO (World Health Organization). Stress is a natural human response to address challenges and threats in life. Although everyone experiences stress at some level, the way we respond to stress makes a big difference to our well-being. Since individuals spend most of their time at work, managing work-related stress is important for their quality of life. There are numerous approaches for stress management, including synthetic drugs, aromatherapy, and massage applications. Since aromatherapy is notable for its straightforward applicability and reliability, the efficacy of aromatherapeutic applications in managing work-related stress was evaluated.

Keywords: Aromatherapy, Work Stress, Essential Oil, Volatile Oil, Anxiety

INTRODUCTION

There is no doubt that volatile (essential) oils have been one of the most effective healing materials for centuries. The fact that it attracts attention with its pleasant smell has also created the idea that it is the essence of the plant.¹ Aromatherapy is a field that emerged with the use of essential oils for therapeutic purposes. Thanks to their healing power, which is not limited to physical states but also affects mental states, they can be used for various reasons.² Aromatherapy can be administered through inhalation of essential oils, topical application with fixed oil, or oral ingestion.³ Aromatherapy is used to treat multiple conditions, including anxiety, skin, hair, and digestive issues, as well as pain management, wound care, breathing, and sleeping difficulties.⁴

Stress at work is one of the mental illnesses that aromatherapy is frequently used to treat. Employee stress levels rise for various reasons, including role conflicts, workloads, and working environment. Higher stress levels directly impact work productivity.⁵ It is evident that stress directly and indirectly negatively affects one's health. The release of neurotransmitters, such as adrenaline and noradrenaline, is a physiological stress response. This results in physiological alterations, including an accelerated heartbeat and respiration. Furthermore, stress stimulates the production of cortisol, a steroid hormone.⁶ Cortisol regulates carbohydrate, fat, and

protein metabolism and regulates blood pressure and blood sugar. However, higher than normal cortisol levels have also negatively affected cognitive function.⁷ In addition, chronic stress can cause many diseases, such as diabetes, obesity, abnormal cholesterol levels, and cardiovascular diseases. For this reason, it is essential to minimize stress levels in working environments where people spend most of their time.

Individuals have employed various approaches to cope with the stress factor. Aromatherapy has also been one solution. *Citrus sinensis* (L.) Osbeck, *Lavandula angustifolia* Mill., *Matricaria recutita* L., *Rosa damascena* Mill. essential oils are frequently used for stress and anxiety states.^{8,9} For example, in a study with children, children undergoing dental treatment were treated with sweet orange oil inhalation, resulting in lower cortisol levels than the non-essential oil group.¹⁰ In another study of 150 children, although the level of anxiety related to dental treatment decreased in both gender groups, only the decrease in anxiety level of girls was found to be statistically significant.¹¹ The reduction in cortisol levels shows sweet orange oil's effect on stress. Although there are many clinical studies on stress, the number of clinical studies based on work stress is limited. In this context, aromatherapy applications, which have a place in the literature for work stress, are shown in Table 1. The chemical structures of the effective compounds of the essential oils used are shown in Figure 1.

Table 1. Clinical studies on work stress

Essential oil	Application method	Working group	Results	Reference
<i>Citrus bergamia</i>	Inhalation	Nurses	The work stress score was 46.00 ± 13.93 before the application and 42.08 ± 14.83 after the application ($p < 0.05$).	34
<i>Rosa damascena</i>	Inhalation	Nurses	The stress score, which was 140.40 ± 32.66 before the application, was measured as 129.93 ± 17.91 after the application ($p < 0.05$).	35
<i>Lavandula angustifolia</i>	Inhalation	Nurses	It was observed that work stress scores decreased from 88.97 ± 14.95 to 83.44 ± 14.53 in lavender oil application ($p < 0.05$).	36
<i>L. angustifolia</i>	Inhalation	Nurses	Before the application, the stress value was 2.97 ± 0.99 . After applying the change, this value decreased to 2.70 ± 0.92 ($p < 0.05$).	37
<i>L. angustifolia</i>	Inhalation	Nurses	The stress value, which was 6.1 before the application, was measured as 2.8 after the application ($p < 0.05$).	38
<i>L. angustifolia</i>	Inhalation	Health personnel working on night shifts	Hemodynamic findings were evaluated after the application. Blood adrenaline value of 0.022 ± 0.02 ng/mL before aromatherapy	39

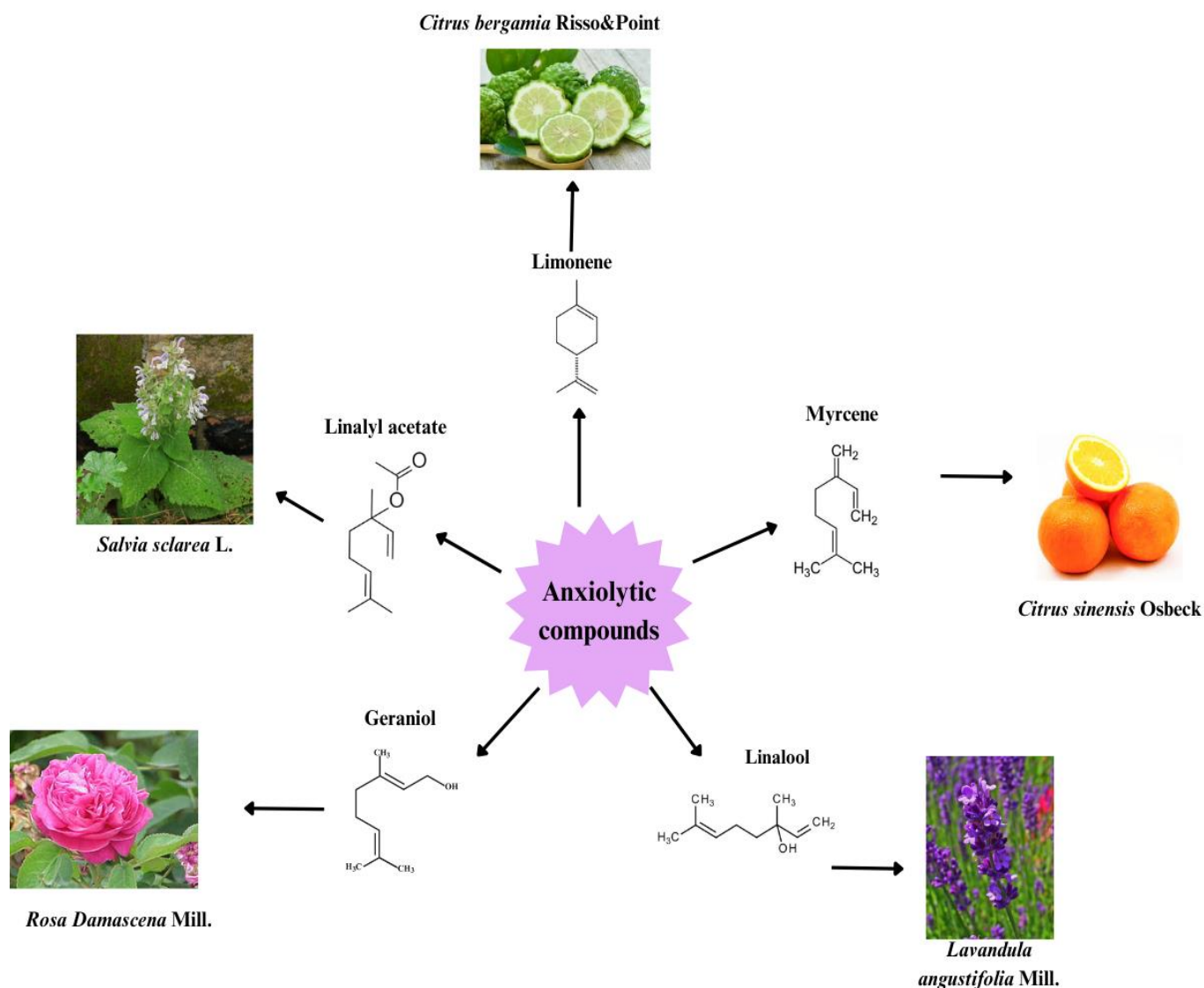


Figure 1. Major chemical compounds of essential oils used in work stress (Illustrated by the author)

1. Essential oils used in work stress

Numerous studies have examined the effects of essential oils on anxiolytic or antidepressant activity. Clinical studies on work stress, a type of stress, have been conducted on certain occupational groups. These studies frequently used essential oils of plants such as *Citrus* species, *Lavandula angustifolia*, *Rosa damascena*, and *Salvia sclarea*.

***Citrus bergamia* Risso&Poit.**

It has been classified within the Rutaceae family. The bergamot essential oil is extracted from the fruit peels mechanically.¹² The main composition of the essential oil is terpenic compounds such as limonene, linalool, β -pinene, linalyl acetate, and γ -terpinene.¹³ Especially limonene, linalool, and linalyl acetate compounds are known to have anxiolytic effects due to their impact on the GABAergic system.¹⁴ In an *in vivo* study, the anxiolytic effect of limonene inhalation was investigated using an elevated plus maze model. At the end of the 30 min inhalation time, it was observed that the duration of stay in the open arm increased.¹⁵ This activity of limonene is related to its activity as an adenosine A2A receptor agonist. By this mechanism, it shows anxiolytic activity through GABAergic modulation.¹⁶ This activity of limonene is related to its activity as an adenosine A2A receptor agonist.¹⁷

***Citrus limon* (L.) Osbeck**

Citrus limon (L.) Osbeck belongs to the Rutaceae family. The essential oil is extracted from the peels using the cold pressing method.¹⁸ The main compounds in the essential oil are limonene, β -pinene, and γ -terpinene.¹⁹ A study has demonstrated that the antidepressant mechanism of action of lemon essential oil is through the GABAergic system, which shows a benzodiazepine-like effect.²⁰

***Citrus sinensis* Osbeck**

Citrus sinensis Osbeck has been classified within the Rutaceae family. The sweet orange essential oil is extracted from the fruit peels mechanically.¹⁸ The main composition of the essential oil is terpenic compounds such as limonene, myrcene, γ -terpinene, and α -farnesene. This study shows that the anxiolytic effect of sweet orange oil is due to limonene. In an *in vivo* study, the effect of the myrcene compound was investigated in the open-arm test. It was concluded that myrcene had an anxiolytic effect even at a dose of 50 mg/kg, and this effect increased at increasing doses.²¹

Our group conducted a preliminary study to investigate the sweet orange (*Citrus sinensis* by Florame ®) oil effect on 20 female participants,

aged between 26 and 51 years, who were full-time employed in a private company. The male participants were excluded from the study due to an inability to demonstrate regular engagement with the prescribed application. The aim was to examine the potential benefits of aromatherapy in reducing work-related stress in employees. The work experience of the participants ranges from 1 to 29 years. 30% of the participants are married, and 70% are single. Additionally, 70% of the participants have obtained a university degree, while 30% have completed high school. The participants were instructed to inhale sweet orange oil twice daily (before noon and afternoon) with a personal diffuser provided by the Florame® for four weeks. Furthermore, sweet almond oil was selected as the placebo as a consequence of the literature review. Stress scores were 13.5 in the placebo group and 12.4 in the sweet orange oil group in the pre-application. At the end of 4 weeks of applications, analyses demonstrated that the stress scores decreased to 9.2 in the placebo group and 4.4 in the sweet orange oil application group. The results of the statistical analysis indicated that the change in the orange oil was statistically ($p < 0.01$) significant (Unpublished results by Altıntaş-Gunduz D. & Koca-Çalışkan U.).

***Lavandula angustifolia* Mill.**

The Lamiaceae family is the taxonomic classification of this species. The lavender essential oil is extracted from the flowers of the plant through steam distillation.¹⁸ The main compounds of the essential oil are terpenic compounds such as linalool, camphor, linalyl acetate, 1,8-cineole, and borneol.²² In an *in vivo* study, linalool was administered to mice by inhalation for 30 min with an elevated plus maze model. It was observed that the time spent in the open arm and the number of open-arm entries increased.²³ The findings of this study indicate that the anxiolytic effect is attributable to linalool.

***Rosa damascena* Mill.**

The plant belongs to the Rosaceae family. The rosa essential oil is extracted from the petals through steam distillation. The main compounds of the essential oil are terpenic and hydrocarbon compounds, including β -citronellol (48.2%), geraniol (17%), β -phenyl ethyl benzoate (5.4%), phenyl ethyl alcohol (5.1%), and nonadecane (4.3%).²⁴ It is observed that the geraniol compound may be responsible for the anxiolytic effect. In a study conducted with mice, a forced swimming test was employed. In geraniol applications at different

doses, no significant activity was observed at a dose of 20 mg/kg, while a significant decrease in immobility time was observed at a dose of 40 mg/kg.²⁵

Salvia sclarea L.

The plant is classified in the Lamiaceae family. The essential oil is extracted from the leaves through steam distillation.¹⁸ The main compounds of the essential oil are terpenic compounds such as linalyl acetate (49.1%), linalool (20.6%), (*E*)-caryophyllene (5.1%), *p*-cymene (4.9%), α -terpineol (4.9%).²⁶ The compounds linalyl acetate and linalool are thought to be responsible for the anxiolytic effect. Linalyl acetate compound was administered orally to mice at different doses and tested in the elevated plus maze test. According to the number of entries into the open arms, an effect close to the standard alprazolam compound was observed in the group

administered 200 mg/kg linalyl acetate.²⁷

2. Effect mechanisms of essential oils in anxiety **GABAergic mechanism**

GABA is one of the neurotransmitters that have an inhibitory effect on the central nervous system. GABA reduces the overall activity of the nervous system by slowing down the connection between neurons. When GABA binds to GABA-A receptors, chloride (Cl^-) channels open, and chloride ions enter the cell, resulting in a hyperpolarisation of the neuron. When GABA binds to GABA-B receptors, potassium (K^+) channels open, and calcium (Ca^{2+}) channels close, leading to a hyperpolarisation of the neuron. In both cases, synaptic transmission is inhibited. Consequently, low GABA levels are associated with increased depression and anxiety.²⁸ The mechanism is shown in Figure 2.

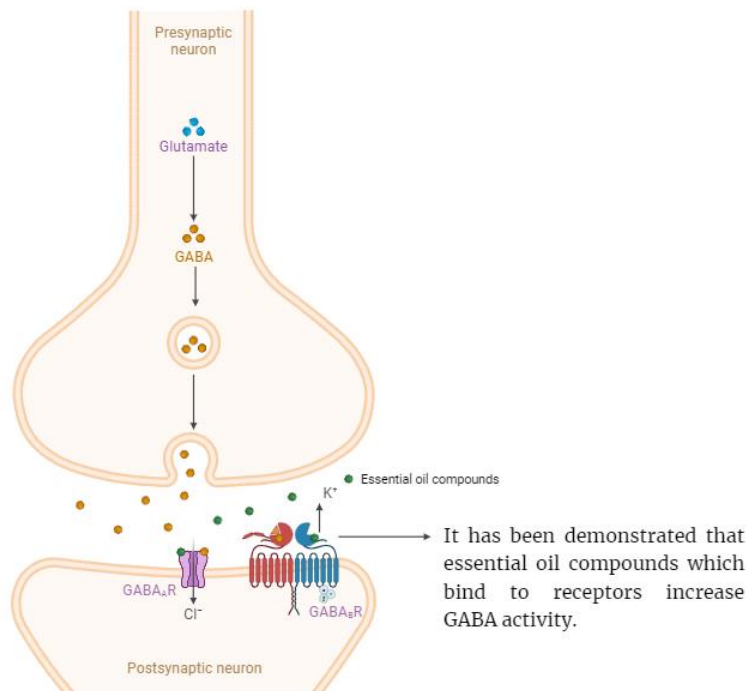


Figure 2. Mechanism of sedative action of GABA (Illustrated by the author)

The anxiolytic effect mechanism of bergamot essential oil was investigated in a study involving rats. The results demonstrated that the mechanism of action of bergamot essential oil is related to GABA receptors.²⁹ Bergamot essential oil is composed of two primary constituents: limonene and β -pinene.³⁰

Serotonin reuptake inhibition

Serotonin is a neurotransmitter that can control many processes, including mood, cognitive activity, and autonomic function. It is derived from the amino acid tryptophan. Serotonin has an

antidepressant effect by increasing the amount of serotonin in the synaptic cleft. For this reason, serotonin reuptake inhibiting (SRI) compounds have antidepressant activity. There are seven main subtypes of receptors (5-HT1, 5-HT2, 5-HT3, 5-HT4, 5-HT5, 5-HT6, 5-HT7). The 5-HT1 receptor is responsible for the antidepressant effect.³¹ It is important to inhibit the selective serotonin reuptake to achieve an antidepressant effect, as different serotonin receptors have different effects. The mechanism is shown in Figure 3.

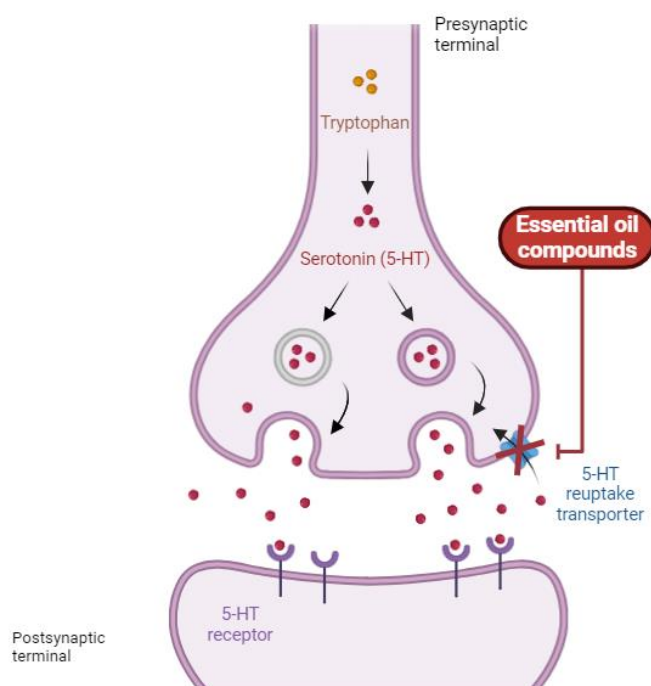


Figure 3. Mechanism of 5-HT reuptake inhibition (Illustrated by the author)

A study has examined the mechanism of action of ylang-ylang essential oil obtained from the *Cananga odorata* plant. It was observed that the antidepressant effect of this oil was related to serotonin receptor inhibition.³² The essential oil of ylang-ylang contains linalool, linalool acetate, and α -pinene as the majority of the compounds.³³

CONCLUSION

Clinical studies have scientifically proven the positive contribution of essential oils to stress levels. Considering that work stress is also evaluated in this context, it shows that aromatherapy applications

have a reducing effect on work stress. *In vivo* studies also show that this effect is due to the chemical substances that make up the composition of essential oils. In this context, it can be concluded that the widespread use of aromatherapy applications in workplaces can have a positive effect on work efficiency and human health.

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