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Research Article

The Effect of *Aetoxylon sympetalum* Essential Oil Treatment on Focus Endurance Level of First-Year Medical Students

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ABSTRACT

First-year medical students tend to experience stress, which can affect how they maintain focus on their work. One alternative treatment that can be done is through relaxation techniques using aromatherapy in the form of essential oils. Crocodile agarwood (*Aetoxylon sympetalum*) is one of the plants that can provide anxiolytic and antidepressant effects that can be associated with these problems. This study aims to determine the effect of giving *Aetoxylon sympetalum* essential oil on the level of ability to maintain the focus of first-year students of the medical faculty. This quasi-experiment research method with a nonequivalent control group design was conducted on 34 samples which were divided into control and treatment groups with the same number to see the effect of essential oil on both groups. The research data were analyzed using Spearman's rho test and showed a significance value of 0.004 and a correlation coefficient value of 0.661, meaning that a significant correlation was obtained, the level of correlation between variables was strong and unidirectional. So it can be concluded that the more often inhaling *Aetoxylon sympetalum* essential oil, the ability to maintain focus will increase

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INTRODUCTION

Indonesia is one of the countries that has a very high potential for medicinal plants (Nugroho, 2017). One of the medicinal plants that thrive in West Kalimantan but has not been optimally utilized is crocodile agarwood (Meidianto et al., 2019). Crocodile agarwood (*Aetoxylon sympetalum*) is a species of agarwood-producing plant with the *Thymalaeaceae* family (Pratama et al., 2017). Agarwood is a medicinal plant that can provide anxiolytic and antidepressant effects (Wang et al., 2018). Therefore, medicinal plants such as crocodile agarwood (*Aetoxylon sympetalum*) can be used as aromatherapy materials such as essential oils which are often used as relaxation therapy. The use of aromatherapy is done by inhalation, this method is better than oral drugs, especially if the target is respiratory organs (Michalak, 2018).

In addition to having a high potential for medicinal plants, Indonesia is also faced with the problem of young adults who often have difficulty concentrating (Bulut, 2023). One factor that can cause difficulty concentrating or maintaining focus is the occurrence of stress or anxiety in this age group, for example, first-year medical students. A study states that the majority of first-year medical students experience moderate stress (Wahyudi et al., 2015).

The high potential of medicinal plants followed by the problem of difficulty in concentrating or maintaining focus in Indonesia is the background for researchers to conduct this study. This study aims to determine the effect of giving *Aetoxylon sympetalum* essential oil on the level of ability to maintain focus of first-year medical students. In this study, it is expected that *Aetoxylon sympetalum* essential oil aromatherapy can be a solution to the problem of first-year medical students who tend to experience stress to improve their level of ability to maintain their focus in doing something.

METHODS

This study has been reviewed for ethical feasibility by the Health Research Ethics Committee of Muhammadiyah Surabaya University under number 002/KET/II.3/AU/F/2024. This study used a quasi-experiment research design with a nonequivalent control group design approach. The treatment in this study was carried out by inhalation using a diffuser while doing the Kraepelin test. The diffuser tool was given 3 drops of essential oil and 100 cc of water then turned on until it smelled and inhaled for 10 minutes (Andriati et al., 2022). In addition, the diffuser was placed at a distance of approximately 30 cm from the research sample (Rahayu, 2021).

The population of this study included all first-year students of the Faculty of Medicine, Muhammadiyah University of Surabaya. The sample of this study includes members of the study population who have criteria such as agreeing to the informed consent letter, completing COVID-19 vaccination, being healthy and having no history of asthma or other respiratory disorders, not smoking and do not consume alcohol, are willing to not consume foods containing chili and garlic and do not exercise 1 day or shortly before the study and are willing to have breakfast 2 hours before the study.

The entire research sample was divided into 2 groups with the same number consisting of the control group and the treatment group. The control group was given water inhalation only, while the treatment group was given inhalation of a mixture of *Aetoxylon sympetalum* essential oil and water. Data collection was carried out starting from the control group first and then continued in the treatment group.

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Analysis of research data using bivariate analysis with Spearman's rho test. This analysis is used to describe the effect of essential oil aromatherapy through the level of strength, type, and whether or not the correlation between the control group and the treatment group is significant. The results of the Spearman's rho test are said to have a significant correlation if the significance value is <0.05, the type of correlation is said to be unidirectional if the correlation coefficient value is positive. Then the results of the correlation strength level can be said to be very weak if the correlation coefficient value is 0.00-0.25, sufficient if the correlation coefficient value is 0.26-0.50, strong if the correlation coefficient value is 0.51-0.75, very strong if the correlation coefficient value is 0.76-0.99, and perfect if the correlation coefficient value is 100 (Sugiyono, 2019).

RESULT

Characteristics of the study sample

Table 1. Characteristics of the study sample

Characteristics	Frequency	Percentage
a. Gender		
1) Male	11	32.4
2) Female	23	67.6
b. Age		
1) 18 years old	1	2.9
2) 19 years old	13	38.3
3) 20 years old	14	41.2
4) 21 years old	5	14.7
5) 22 years old	1	2.9

Focus Endurance Level

Table 2. Focus endurance levels of the control and treatment groups

Focus Endurance Level (*Hanker*)	Control Group		Treatment Group	
	f	%	f	%
1 (very low)	3	17.6	3	17.6
2 (low)	6	35.3	7	41.2
3 (medium)	6	35.3	7	41.2
4 (good)	2	11.8	0	-
5 (very good)	0	-	0	-
Totally	17	100	17	100

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The table above contains the overall characteristics of the research sample (n=34). The research sample was mostly female. In addition, all research samples are first-year students of the medical faculty who are classified as young adults.

The table above contains the results of the level of focus endurance of the control and treatment groups. The control group and the treatment group have the same percentage of focus endurance results as 17.6% of respondents with very low results, but there is a percentage difference of 5.9% in respondents with low results and moderate results, and a percentage difference of 11.8% in respondents with good results.

Statistical test results

Table 3. Spearman's rho test

			Control Group Focused Endurance Level	Treatment Group Focused Endurance Level
Spearman's rho	**Control Group Focused Endurance Level**	*Correlation Coefficient*	1.000	0.661
		Sig. (2-tailed)	.	0.004
		N	17	17
	Treatment Group Focused Endurance Level	*Correlation Coefficient*	0.661	1.000
		Sig. (2-tailed)	0.004	.
		N	17	17

Based on the results of Spearman's rho test in Table 3 obtained a significance value of 0.004 ($p < 0.05$), meaning that there is a significant correlation between the level of focus resistance of variables given water inhalation alone (control group) and the level of focus resistance of variables given inhalation of a mixture of water and essential oil of *Aetoxylon sympetalum* (treatment group). In addition, the correlation coefficient between focus endurance in the control group and the treatment group is 0.661, meaning that the level of correlation strength between variables is strong. The correlation coefficient number is positive so that the correlation between the two variables is unidirectional.

DISCUSSION

Essential oil aromatherapy is a therapy that has the benefit of fostering feelings of relaxation, creating a peaceful atmosphere, and keeping feelings of anxiety and anxiety away (Shaleha et al., 2016). Essential oil aromatherapy can provide these effects when the aromatherapy vapor has been inhaled. During the inhalation process, essential oil aromatherapy vapor will hit the cilia of the nasal mucosa and then affect the limbic system such as the hypothalamus which produces a sedative effect on the nervous and endocrine systems (Pratiwi & Subarnas, 2020). After that, a feeling of relaxation will

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arise if the molecules in essential oils stimulate the release of endorphin neurotransmitters, this happens because endorphins function to prevent depression and reduce anxiety (Primadina, 2021).

Therapy to reduce anxiety and stress is needed by first-year medical students. A study states that the majority of first-year medical students experience moderate stress (Wahyudi et al., 2015). This study was conducted to find new therapies that are suitable for reducing anxiety and can support focus endurance by looking at the effect of administering *Aetoxylon sympetalum* essential oil on the level of ability to maintain the focus of first-year medical students.

After conducting all research procedures and statistical tests, the results of statistical tests show that the correlation between variables is strong and unidirectional, which means that the more often inhaling *Aetoxylon sympetalum* essential oil aromatherapy, the more focus endurance will increase. This shows that the administration of *Aetoxylon sympetalum* essential oil aromatherapy can affect focus endurance. Focus endurance can be influenced by *Aetoxylon sympetalum* essential oil aromatherapy because the essential oil has compounds that are antidepressants.

Aetoxylon sympetalum essential oil aromatherapy contains dominant compounds such as *alloaromadendrene*, *alpha-selinene*, *alpha-eudesmane*, and *elemol.* These dominant compounds have antidepressant effects. *Alloaromadendrene* is a compound that acts as an oxidative stress protector and has neuroprotective effects (Yu et al., 2014). *Alpha-selinene* is a compound that can increase serotonin levels and compounds in the brain that are indicative of antidepressant activity. *Alpha-eudesmane* has also been shown to be a compound that can reduce immobility time in tail suspension tests and forced swimming tests commonly used to assess antidepressant activity. In addition, *elemol* is also part of the sesquiterpenoids found in various plants due to its bioactive properties including potential antidepressant effects (Xue et al., 2023).

A study mentioned that increasing antidepressants on human brain receptors can affect neurotransmitter activity that can support cognitive functions such as focus (Moskal et al., 2014). The results of the study are relevant to the results of this study. In this study, the mixture of dominant compounds in *Aetoxylon sympetalum* essential oil can provide antidepressant effects so that it can affect the focus endurance of first-year medical students.

This study has successfully proved that there is an effect of giving *Aetoxylon sympetalum* essential oil aromatherapy on the focus endurance of first-year medical students. The limitation of this study is that some respondents are not cooperative. Suggestions for future researchers, especially those who want to take the topic of *Aetoxylon sympetalum* essential oil aromatherapy, are to increase the number of research respondents in anticipation some respondents declare to drop out before the research is completed. In addition, use a new dependent variable so that it can provide new information that can be used as a basis for research by future researchers.

CONCLUSION

There is an effect of *Aetoxylon sympetalum* essential oil aromatherapy on the level of focus endurance of first-year medical students. The more often inhaling *Aetoxylon sympetalum* essential oil aromatherapy, the more it will increase the focus endurance of first-year medical students.

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