

# The Impact of Abies Alba Essential Oil on Sleep Quality of Medical Students in Faculty of Medicine UPN Veteran Jakarta

Evita Rizky Amelia<sup>1</sup>, Arman Yurisdaldi Saleh<sup>2</sup>, Riezky Valentina Astari<sup>3</sup>, Fajriati Zulfa<sup>4</sup>

<sup>1</sup>Pembangunan Nasional Veteran Jakarta University, Medical Student, Jl. RS Fatmawati, Jakarta Selatan 12450, Indonesia  
evitarizkyamelia[at]gmail.com

<sup>2</sup>Pembangunan Nasional Veteran Jakarta University, Department of Neurology, Jl. RS Fatmawati, Jakarta Selatan 12450, Indonesia  
armanyurisdaldi[at]gmail.com

<sup>3</sup>Pembangunan Nasional Veteran Jakarta University, Department of Neurology, Jl. RS Fatmawati, Jakarta Selatan 12450, Indonesia  
riezky.valentina[at]gmail.com

<sup>4</sup>Pembangunan Nasional Veteran Jakarta University, Department of Parasitology, Jl. RS Fatmawati, Jakarta Selatan 12450, Indonesia  
zulfafajriati[at]yahoo.com

**Abstract:** *Background:* Sleep is one of the basic needs that humans need. As medical students, there were at risk for experiencing sleep disturbances due to the demands of high academic assignments. Insufficient sleep can cause fatigue, impaired attention and impaired concentration, if it occurs continuously it can result in decreased memory and cognitive abilities. One method to improve sleep quality is to use essential oils. So far there has been no research discussing the effects of using Abies alba essential oil on sleep quality. *Aim:* This study aims to determine the effect of Abies alba essential oil on the sleep quality of students at the faculty of medicine students Universitas Pembangunan Nasional Veteran Jakarta. *Methodology:* The sample for this study was medical students from Universitas Pembangunan Nasional Veteran Jakarta Faculty of Medicine class of 2018. This study used a quasi-experimental analytic design with randomized pretest and posttest control. This study used the validated Pittsburgh Sleep Quality Index questionnaire. Sampling of 36 respondents was carried out by purposive sampling method. *Result and Conclusion:* This study proves that there are differences in sleep quality in the pre-test and post-test groups in the entire group ( $p < 0.05$ ), but there is no significant difference in sleep quality between the control and experimental groups ( $p > 0.05$ ) in students of the Faculty of Medicine UPN Veteran Jakarta class of 2018.

**Keywords:** Abies alba, Essential Oil, PSQI, Sleep Quality, Medical Student

## 1. Introduction

Sleep is one of the basic needs that humans need. Everyone has different sleep needs according to their age. Sleep time needed in adults aged 18-40 is 7-8 hours per day. Insufficient sleep can cause fatigue, impaired attention, and impaired concentration. If it occurs continuously, it can result in decreased memory and cognitive abilities, mood changes, and even hallucinations. [1] The length of time you sleep can also affect sleep quality. According to the National Sleep Foundation, there are several characteristics of good sleep quality for adults, such as being able to fall asleep in 30 minutes, able to fall asleep soundly according to the required sleep time, falling asleep soundly all night without waking up, and feel energized again when you wake up in the morning. [2]

The Journal of Clinical Sleep Medicine stated that around 30% of people worldwide experience sleep disturbances. [1] Several international studies show that most students need to meet their sleep needs. [3] A survey of 17,000 college students in 24 countries found that 21% of students slept less than 7 hours. [4] Medical students risk experiencing sleep disturbances due to the demands of high academic assignments. [5] Several problem factors are encountered, such as academic factors, physical health support, social support, and economic support, which can trigger stressors and cause anxiety in starting to sleep. [6]

One method to improve sleep quality is to use essential oils. Recently, the use of essential oils in society has been quite high, especially in Bali and Yogyakarta, which are famous for their characteristics of traditional herbal medicine. Besides being easily accessible, many believe essential oils can provide calm and relaxed users. It was found that using lavender (*Lavandula sp*) as an essential oil has been proven to improve sleep quality. The results of research conducted on healthy Japanese students showed an improvement in sleep quality when using lavender aromatherapy. [7] In lavender aromatherapy, limonene and linalool are the main ingredients. [8] Silver fir essential oil (*Abies alba*) comes from silver fir and has several ingredients. One of the main ingredients is limonene [9], where this ingredient may have the same effect as lavender.

As far as researchers know to date, no research has discussed the effects of using *Abies alba* essential oil on sleep quality. Based on these facts, researchers wanted to know the description of sleep quality and the benefits of using *Abies alba* essential oil on sleep quality in students at the Faculty of Medicine.

### Objectives of the study

- 1) To look at the sleep quality of UPNVJ medical students before giving *Abies alba* essential oil.
- 2) To look at the sleep quality of UPNVJ medical students

Volume 12 Issue 1, January 2023

[www.ijsr.net](http://www.ijsr.net)

Licensed Under Creative Commons Attribution CC BY

after giving *Abies alba* essential oil.

- To know the difference in sleep quality of UPNVJ medical students before and after being given *Abies alba* essential oil.

### Hypotheses

- H1a: There was an effect of using *Abies alba* essential oil on improving the quality of sleep between before and after the intervention was given to UPNVJ medical students.
- H1b: There was an effect of using *Abies alba* essential oil on improving sleep quality between the control group and the experimental group on UPNVJ FK students.

## 2. Literature Survey

**Kawai, et.al (2018)**, carried out a descriptive research to evaluate the effects of lavender and sweet orange essential oils on the sleep quality of healthy university students. In objective measure, lavender appeared to be more beneficial than sweet orange, particularly in reducing sleep latency. In the subjective sleep study, the participants who had poor sleep quality reported that the essential oils increased their length of sleep, dreaming, and sleep maintenance. The investigator concluded that when it came to subjective sleep metrics, sweet orange appeared to be more helpful than lavender. [8]

**Samadi, et.al (2021)**, conducted a study to assess the effect of lavender essential oil aromatherapy on the sleep quality of patients with major depression. Lavender essential oil improves the quality of sleep in depressed patients. It can be used as an additional, non-invasive treatment for major depressive patients to enhance their quality of sleep. [10]

**Le, et.al (2017)**, performed a randomized controlled trial research to determine whether inhalation of aromatherapy using essential oils, might lessen anxiety and sadness while also enhancing immune function and sleep quality. Results Although the two groups did not vary in terms of ANS activation, HbA1c levels, or immune status, but significantly the aromatherapy group had considerably reduced subjective stress levels ( $p = 0.001$ ), depression ( $p = 0.049$ ), and much better sleep quality ( $p = 0.001$ ). Inhaling essential oils as part of aromatherapy decrease depression and perceived stress and improved the quality of sleep, but it had no effect on physiological variables such as immunological function or the stress index. [11]

## 3. Methodology

- Research Design:** Quasi experimental research design (Pretest-Posttest Control Group Design)
- Setting:** The study was conducted in Faculty of Medicine of UPN 'V' Jakarta, Indonesia
- Variables:** Independent variable: Essential Oil *Abies alba*. Dependent variable: Sleep quality among medical students.
- Population:** Student of the Faculty of Medicine UPN 'V' Jakarta class of 2018
- Sample:** Student who fulfilled inclusion and exclusion

criteria, were selected as sample.

- Sample size:** The total sample size of the study was 36 medical students. 18 medical students were selected in experimental group and 18 medical students in control group
- Sampling techniques:** Purposive sampling method was used to select the sample.
- Method of data collection:** The essential oil was placed as 2-3 drops on a tissue and placed 20 cm from the nose, then left overnight while sleeping in experimental group. PSQI (*Pittsburgh Sleep Quality Index*) was used to assess the sleep quality.
- Data analysis:** We utilized SPSS 25.0 statistical software program [IBM Corp., Armonk, NY, USA] for the statistical analysis. The data were processed using descriptive statistics; categorical variables were shown as frequency and percentage, while parametric variables were shown as mean and standard deviation, if normality of data test achieved. The Kolmogorov-Smirnov test and graphical representation were used to analyze the normality of the data distribution. To look into the differences between parametric variables, we employed the Wilcoxon test and independent T-test. It was decided that a probability value of  $p < 0.05$  was statistically significant.

## 4. Results and discussion

**Table 1:** Frequency and percentage distribution of sample's characteristics

	Variables	Frequency	Percentage
1	Age (in years)		
	21	10	26,3
	22	26	68,4
	23	2	5,3
2	Gender		
	Male	9	23,7
	Female	29	76,3

The majority of respondents were 22 years old, as many as 26 people (68.4%). The study's results showed that most respondents were still in the early adult age range. It can be explained by research by Dubey et al., which showed that there was mostly a decrease in sleep quality in children older than 15 years. [12] The decline in sleep quality in the age range is thought to be caused by increased lecture workload, tight class schedules, and final lecture assignments such as theses, which disrupt sleep patterns and leads to a decrease in sleep quality in individuals. [13] Medical students are more likely to experience stress because of the many professional pressures and academic burdens they face. If this stressful condition occurs and continues, it can result in more serious disturbances, such as decreased academic performance and quality of life, which can be characterized by depression and suicide. [14] The results of this study also show that this age range is included in the category of final-year students by the research of Paudel et al., which shows that final-year students are 1.1-11.5 times more at risk than first-year students in experiencing sleep disturbances. This can be explained by the amount of pressure they received both from within and outside the individual to immediately finish their studies. [14]

Furthermore, most respondents were female, with as many as 29 respondents (76.3%). These results are in line with the research of Fatima et al. in 2016 by taking as many as 3778 young adult respondents showing that women experience more decreased sleep quality than men. The researcher said that it results from hormonal roles and circadian rhythms. Estrogen and progesterone are the dominant hormones in women, and their fluctuations throughout a woman's menstrual cycle can contribute to sleep quality. Estrogen controls the menstrual cycle phases, while progesterone helps maintain pregnancy. Progesterone is known as a relaxation hormone and has a mild sedative effect. [15]

**Table 2:** Distribution of samples according to the pre-test & post-test level of knowledge, n=60

Sleep Quality	Pre-test		Post-test	
	Frequency	Percentage	Frequency	Percentage
Good	10	26,3	18	47,4
Bad	28	73,7	20	52,6

Table 2 shows that 28 people (73.7%) in the pre-test group had poor sleep quality. Whereas in the post-test group, the sleep quality of most respondents was bad, as many as 20 people (52.6%). These findings indicate that there is a difference between the sleep quality of the pre-test and post-test groups.

**Table 3:** Comparison of sleep quality between pretest, post-test in control and experimental

Sleep Quality	Control			
	Median	Min	Max	Wilcoxon
Pretest	2	1	2	0,317
Posstest	2	1	2	
Sleep Quality	Experimental			
	Median	Min	Max	Wilcoxon
Pretest	2	1	2	0,034
Posstest	1	1	2	

Table 3 shows that the median in the control group for the pre-test and post-test is 2, the minimum value is 1, and the maximum value is 2. In contrast, the Wilcoxon test results for the control group show a p-value of 0.317 ( $p > 0.05$ ) and a p-value of 0.034 ( $p < 0.05$ ) for the experimental group.

Similar results to the research conducted by Chang, Lin, and Chang (2017), where there was a decrease in the total sleep quality score of  $\pm 1$  (8.89, 7.63), which showed that there was an increase in the quality of sleep in the respondents [16] and was also in line with the research of Cheong et al. showed that aromatherapy inhalation was proven to be effective in relieving insomnia symptoms in patients.[17] The mechanism for improving the quality of sleep can occur through the role of essential oils, which evaporate into the air and enter the nasal cavity, and are received by the cilia at the ends of the olfactory receptor cells. Then this message is sent to the back of the nose. The neurons interpret the smell by sending it to the respiratory system. In addition, essential oils can also induce sleep by activating the limbic system through the production of  $\gamma$ -aminobutyric which mainly works in the amygdala and can also have a sedative effect by inhibiting the release of acetylcholine.[18]

Other effects are also found in the respiratory system in

relieving and relaxing the body's muscles[19] On the cardiovascular system, the administration of essential oils shows a vasodilatory effect, making it easier to enter the sleep phase. According to Salehi et al. (2019), The  $\beta$ -pinene content in *Abies alba* can provide an anti-anxiety effect through a binding mechanism with GABAA-Benzodiazepine-receptors (GABAA-BZD) and works as a neurotransmitter modulator at the BZD receptor site.[20]

**Table 4:** Comparison of sleep quality between control and experimental group

Sleep Quality	Mean	SD	Unpaired t-test
Control	5,8421	1,53707	0,673
Experimental	5,5789	2,24390	

Table 4 shows that the mean  $\pm$  SD in the control group is  $5.8421 \pm 1.53707$ , while in the experimental group, it is smaller, namely  $5.5789 \pm 2.24390$ . The independent T-test results showed a p-value of 0.673 ( $p > 0.05$ ). Based on the p-value indicated that the research hypothesis was rejected because there was no significant difference in sleep quality between the control and experimental groups.

This study's results align with the research of Cheraghbeigi et al. (2019), which showed no significant difference between the average PSQI score and the administration of aromatherapy massage to patients with heart disease between the two intervention groups. [21] Other research that is in line, namely research conducted by Ke, Hsieh, and Hsieh in 2022, states that there is a significant difference in quality between the groups' given massages using aromatherapy oils compared to the control group. [22]

This study still has some limitations, such as the sample size not fully represented the population. Then, the researcher needs to find out what factors underlie low sleep quality in medical faculty students in detail. Next, collecting primary data using questionnaires is subjective, so the correctness of the answers depends on how honest the respondents are in answering the questionnaires given. In overcoming this, the researcher explains the aims and objectives of this study. The researcher explains the confidentiality of the answers, the respondent's data, and the existence of informed consent.

## 5. Conclusion

The lack of research on the effect of using *Abies alba* as an essential oil on sleep quality made researchers interested in conducting this research. Based on the findings of this study suggest that. The use of *Abies alba* essential oil can help sleep quality in respondents. The implications of the data call for the need of programs promoting better sleep quality in colleges. In addition to the limitations of the study, further research is needed using a larger sample size to describe the population more clearly.

## References

[1] Lauwsen R, Dwiana A. Pengaruh aroma terapi lavender terhadap peningkatan kualitas tidur mahasiswa Fakultas Keperawatan Universitas Tarumanagara. *Tarumanagara Medical Journal*; 2.

- [2] Suni E. How To Determine Poor Sleep Quality. *Sleep Foundation*.
- [3] Sivertsen B, Vedaa Ø, Harvey AG, et al. Sleep patterns and insomnia in young adults: A national survey of Norwegian university students. *J Sleep Res*; 28. Epub ahead of print 2019. DOI: 10.1111/jsr.12790.
- [4] Vazsonyi AT, Harris C, Terveer AM, et al. Parallel Mediation Effects by Sleep on the Parental Warmth-Problem Behavior Links: Evidence from National Probability Samples of Georgian and Swiss Adolescents. *J Youth Adolesc*; 44. Epub ahead of print 2015. DOI: 10.1007/s10964-014-0167-y.
- [5] Haryati H, Yunaningsi SP, RAF J. Faktor yang Mempengaruhi Kualitas Tidur Mahasiswa Fakultas Kedokteran Universitas Halu Oleo. *Jurnal Surya Medika*; 5. Epub ahead of print 2020. DOI: 10.33084/jsm.v5i2.1288.
- [6] Gunanthidkk. Prevalensi Dan Gambaran Gangguan Tidur Berdasarkan Karakteristik Mahasiswa Semester I Program Studi Pendidikan Dokter Fakultas Kedokteran Universitas Udayana Tahun 2015. *E-Jurnal Medika Udayana*; 5.
- [7] Hirokawa K, Nishimoto T, Taniguchi T. Effects of lavender aroma on sleep quality in healthy Japanese students. *Percept Mot Skills*; 114. Epub ahead of print 2012. DOI: 10.2466/13.15.PMS.114.1.111-122.
- [8] Kawai H, Tanaka S, Nakamura C, et al. Effects of essential oil inhalation on objective and subjective sleep quality in healthy university students. *Sleep Biol Rhythms*; 16. Epub ahead of print 2018. DOI: 10.1007/s41105-017-0121-y.
- [9] Wajs A, Urbańska J, Zaleskiewicz E, et al. Composition of essential oil from seeds and cones of *Abies alba*. *Nat Prod Commun*; 5. Epub ahead of print 2010. DOI: 10.1177/1934578x1000500830.
- [10] Samadi Z, Jannati Y, Hamidia A, et al. The effect of aromatherapy with lavender essential oil on sleep quality in patients with major depression. *Journal of Nursing and Midwifery Sciences*; 8. Epub ahead of print 2021. DOI: 10.4103/JNMS.JNMS\_26\_20.
- [11] Lee M kyoungh, Lim S, Song JA, et al. The effects of aromatherapy essential oil inhalation on stress, sleep quality and immunity in healthy adults: Randomized controlled trial. *Eur J Integr Med*; 12. Epub ahead of print 2017. DOI: 10.1016/j.eujim.2017.04.009.
- [12] Dubey M, Nongkynrih B, Gupta S, et al. Sleep quality assessment of adolescents residing in an urban resettlement colony, New Delhi, India. *Indian Journal of Community Medicine*; 44. Epub ahead of print 2019. DOI: 10.4103/ijcm.IJCM\_87\_19.
- [13] Sundas N, Ghimire S, Bhusal S, et al. Sleep quality among medical students of a tertiary care hospital: A descriptive cross-sectional study. *Journal of the Nepal Medical Association*; 58. Epub ahead of print 2020. DOI: 10.31729/jnma.4813.
- [14] Paudel K, Adhikari TB, Khanal P, et al. Sleep quality and its correlates among undergraduate medical students in Nepal: A cross-sectional study. *PLOS Global Public Health*; 2. Epub ahead of print 2022. DOI: 10.1371/journal.pgph.0000012.
- [15] Mong JA, Baker FC, Mahoney MM, et al. Sleep, rhythms, and the endocrine brain: Influence of sex and gonadal hormones. *Journal of Neuroscience*; 31. Epub ahead of print 2011. DOI: 10.1523/JNEUROSCI.4175-11.2011.
- [16] Chang YY, Lin CL, Chang LY. The Effects of Aromatherapy Massage on Sleep Quality of Nurses on Monthly Rotating Night Shifts. *Evidence-based Complementary and Alternative Medicine*; 2017. Epub ahead of print 2017. DOI: 10.1155/2017/3861273.
- [17] Cheong MJ, Kim S, Kim JS, et al. A systematic literature review and meta-analysis of the clinical effects of aroma inhalation therapy on sleep problems. *Medicine*; 100. Epub ahead of print 2021. DOI: 10.1097/MD.00000000000024652.
- [18] Karadag E, Samancioglu S, Ozden D, et al. Effects of aromatherapy on sleep quality and anxiety of patients. *Nurs Crit Care*; 22. Epub ahead of print 2017. DOI: 10.1111/nicc.12198.
- [19] Yang SA, Jeon SK, Lee EJ, et al. Radical scavenging activity of the essential oil of silver fir (*Abies alba*). *J Clin Biochem Nutr*; 44. Epub ahead of print 2009. DOI: 10.3164/jcbn.08-240.
- [20] Salehi B, Upadhyay S, Orhan IE, et al. Therapeutic potential of  $\alpha$ - and  $\beta$ -pinene: A miracle gift of nature. *Biomolecules*; 9. Epub ahead of print 2019. DOI: 10.3390/biom9110738.
- [21] Cheraghbeigi N, Modarresi M, Rezaei M, et al. Comparing the effects of massage and aromatherapy massage with lavender oil on sleep quality of cardiac patients: A randomized controlled trial. *Complement Ther Clin Pract*; 35. Epub ahead of print 2019. DOI: 10.1016/j.ctcp.2019.03.005.
- [22] Ke M-H, Hsieh K-T, Hsieh W-Y. Effects of Aromatherapy on the Physical and Mental Health and Pressure of the Middle-Aged and Elderly in the Community. *Applied Sciences* 2022; 12: 4823

### Author Profile



**Evita Rizky Amelia** medical student from Faculty of Medicine from Universitas Pembangunan Nasional Veteran Jakarta.