

Effect of aromatherapy blend essential oils (lemongrass and lemon) on sleep quality in pregnant women's third trimester



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ABSTRACT

Introduction: Many studies have provided non-pharmacological therapies to overcome health problems, including maternal and child health. One is how to overcome sleep disorders often complained about in pregnant women's third trimester. Some previous studies have analyzed aromatherapy using floral fragrances by inhaling aromatherapy oil directly or applied to cotton and using one type of aroma only, while inhalation using a diffuser and combining two or more similar scents have not been studied. The combination of both compositionally and beneficial aromas can complement each other, for example, lemongrass and lemon. This study aimed to examine the impact of essential oils diffuser and mix aromatherapy lemon grass on sleep quality and anxiety levels in pregnant women in their third trimester.

Methods: This study used quasi-experimental studies with one group pre-test and post-test. The research sample is 48 pregnant women in the third trimester of Wonokromo were selected with simple random sampling. The Independent variable is aromatherapy interventions (blended lemongrass and lemon) inhalation using diffuser, while the dependent variables are sleep quality. Data collection instrument using Pittsburg Sleep Quality Index (PSQI). Data analysis using Wilcoxon test with $\alpha=0.05$.

Results: After being given aromatherapy intervention, almost all respondents have good sleep quality, 8-point increase in average sleep quality score. The results of the Wilcoxon test obtained a value of $p = 0.01$.

Conclusion: Essential oils diffuser blend aromatherapy of lemongrass and lemon effectively improves the sleep quality of third-trimester pregnant women. Aromatherapy makes participants feel relaxed, comfortable, and feel sleepy better. For health workers, this technique can be one of the practical options for non-pharmacological therapy to decrease discomfort during pregnancy.

Keywords: aromatherapy blend essential oil, lemongrass and lemon, sleep quality.

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INTRODUCTION

There have been many studies on the provision of non-pharmacological therapies to overcome health problems, including maternal and child health, one of which is sleep disorders that often occur in third-trimester pregnant women. Various concerns experienced by the mother related to the process of childbirth include uncomfortable sleeping position, fetal movement at night, fear of illness and physical harm arising during childbirth, worry for her safety, worry about the baby being born in abnormal circumstances, giving birth during pandemic Covid-19 and hospital policy on childbirth companion during the pandemic, this can lead to the quality of mother's sleep. Unfulfilled

sleep quality impacts hypertension or preeclampsia, inhibition of intrauterine fetal growth, and even psychological changes, i.e., anxiety.¹ Excessive anxiety will trigger the body to produce more stress hormones, such as cortisol, ACTH, norepinephrine, and epinephrine. If these stress hormone levels are too high, they will cause placental hypoperfusion, which impacts the inhibition of fetal growth.² Disturbed sleep quality and anxiety can be prevented and overcome by making pregnant women relax. Relaxation can be done in a variety of ways. One of them is non-pharmacological therapy, such as aromatherapy.

Based on literature reviews by Babar Ali et al., (2015), using various aromatherapy essential oils such as eucalyptus, citrus,

zingiber/ginger, lavender, and Cananga can reduce complaints such as anxiety, vomiting, nausea, sleep disorders/insomnia and also reduce pain. Aromatherapy can be given in various ways that are applied/sprayed on objects/parts of the body, mixed in bath water, used for massage, or inhalation/evaporated. Most lemongrass essential oil can come from plants grown in tropical and Mediterranean countries.³ Some studies related to the administration of aromatherapy to improve relaxation that has been researched include the type of aromatherapy derived from the fragrance type of flowers. Research by Pei-Jung Yu (2018) explains that lavender is effective in improving sleep quality, as are chamomile and lemon. While the ingredients derived from the type of spices such as ginger

and lemongrass are more often used as aromatherapy given in the form of oils applied because it gives a warming effect.⁴ On the other hand, according to Udrika Qodri (2020), research on the analysis of the quantity of lemongrass essential oil using an organoleptic test on lemongrass essential oil of 0.878 gr/ml has a distinctive or aromatic smell.⁵ In the study Mughtaridi (2015) stated that essential oils from lemongrass could affect the locomotor activity in mice. Essential oil content, if inhaled then it can interact with the central nervous system and directly with the olfactory system to stimulate the work of the nervous system in the brain.⁶

Some previous studies have analyzed aromatherapy using wax vapor or inhaling aromatherapy oil directly or applied to cotton/cloth. In addition, researchers generally use one type of aroma only, while inhalation using a diffuser and combining two or more similar scents have not been studied. The combination of both compositionally and beneficial aromas can complement each other, for example, lemongrass and lemon. One of the most in-demand types of aromas is refreshing natural aromas such as lemongrass and lemon, which have not been studied simultaneously. Aromatherapy by inhalation is estimated to be faster in absorption than oral administration of drugs due to the rapid delivery of drugs through the wide surface of the airways and epithelium of the lungs so that when a person inhales aromatherapy, the aroma release stimulates the release of serotonin, which is a neurotransmitter that regulates the onset of sleep.⁷

This study aimed to analyze aromatherapy's effect on sleep quality and anxiety levels in third-trimester pregnant women. In this study, researchers combined both types of aromatherapy, lemongrass and lemon, and administered inhaled using a diffuser (essential oils diffuser blend aromatherapy lemongrass and lemon).

METHODS

Study Design

This study is an analytical study that describes the relationships between variables. The design of this study is cross-sectional. Participants in this study are

pregnant women in the third trimester of pregnancy from the Wonokromo area who are willing to participate and willing to undergo a seven-day intervention in the form of aromatherapy. Sampling using a simple random sampling technique. The independent variable was mixed aromatherapy (lemongrass and lemon) administration, and sleep quality was the dependent variable.

Data Collection

Mixed aromatherapy (lemongrass and lemon) is breathed twice in a row, every 2 hours before night, for seven days straight using a diffuser following standard surgical protocols. This study uses a quasi-experimental study with one group pre-test and post-test. The data collection instrument uses a sleep quality questionnaire, the Pittsburg Sleep Quality Index (PSQI), which includes subjective sleep quality, duration, latency, efficiency and sleep disturbances. The category of sleep quality based on PSQI score is good sleep quality if PSQI score = 0 – 5 and poor sleep quality if the score is >6. Measurement of sleep quality is performed before intervention and after the intervention.

Data Analysis

An editing process performs quantitative data processing techniques to study data integrity, followed by scoring and coding. Analyze the data using the Wilcoxon test with $\alpha = 0.05$. This study passed ethical review by the Ethics Committee of Nahdlatul-Ulama University, Surabaya, Indonesia.

RESULTS

Table 1 below shows that almost all respondents are 20-35 years (of reproductive age), most respondents are primigravida pregnancy (first pregnancy), most are unemployed/not working, and more than half of the respondents had a middle education.

Table 2 shows that aromatherapy effectively improves the sleep quality of pregnant women. They were evidenced by improved good sleep quality from 33.3% just before aromatherapy to 81.3% after aromatherapy. Average sleep quality score before aromatherapy = 13 (poor sleep

quality) and after aromatherapy 5 (good sleep quality), an 8-point increase in average sleep quality score. The Wilcoxon sign rank test results with SPSS for Windows with a significance level of $\alpha = 0.05$ obtained a value of $\rho = 0.01$ ($0.01 < 0.05$). That means the aromatherapy essential oil diffuser blend effectively improves sleep quality in the third trimester of pregnant women in Wonokromo Surabaya. Aromatherapy makes participants feel relaxed, comfortable, and feel sleepy better.

DISCUSSION

This study showed that aromatherapy with lemongrass and lemon mixture affected sleep quality. It means that aromatherapy effectively improves sleep quality for pregnant women in the third trimester of pregnancy, according to Wonokromo. Sleep activity is regulated by the reticular activation system, a system that regulates all levels of central nervous system activity, including wakefulness and sleep regulation. The center of the mindfulness and sleep activity arrangement is on the mesencephalon and the bridge. In addition, the reticular activation system (RAS) can provide visual stimulation, hearing, pain and palpation and cerebral cortical stimulation, including emotional stimulation and thought processes. In the conscious state, neurons of the RAS release catecholamines such as norepinephrine.² Similarly, during sleep, it is likely due to the release of serum serotonin from special cells located in the pons and brain stem, the bulbar synchronizing regional (BSR), and during awakening, the impulse received in the center of the brain. Therefore, the brainstem system that regulates sleep cycles or changes is the RAS and BSR.⁸

Lemon is a type of aromatherapy that has a calming and relaxing effect-relief of anxiety, tension and insomnia. The substance contained in lemon is linalool, which helps stabilize the nervous system, so it not only calms the inhaler but also reduces stress, anxiety, negative thoughts, and anxiety. While lemongrass aromatherapy is a non-pharmacological therapy that has the main content of asymmetric oil consisting of citrate, cytoroneral, lonalol, geraniol, a-pinen, kamfen, sabinen, mirsen, psimen, limonen,

cisosimen, terpinol, sitronelal, borneol, and farsenol, which have a calming, balancing, stimulant, antidepressant, and vasodilator effect that can provide a warm effect, and relax muscles.⁹ Lemongrass and lemon can function more optimally because they are both immunomodulators. This combination will help improve sleep quality. The natural aroma of lemongrass and the freshness of lemon produce a soothing fresh aroma. In the process, aromatherapy that serves to calm will make a person able to control emotions by affecting the limbic system in the brain. Furthermore, the application of aromatherapy by inhalation is presumed to be safer, more convenient, and more rapidly absorbed than oral administration of drugs due to the rapid delivery of the drug through the airways and large surfaces of the lung epithelium.

When a person inhales aromatherapy, the released scent stimulates the ciliary receptors of the olfactory nerves in the olfactory epithelium and transmits the scent to the olfactory bulb via the olfactory nerves. Bulbusolfactorius is assigned to the limbic system. The limbic system receives all information from the auditory,

visual and olfactory systems. The limbic system is an internal brain structure located below the cerebral cortex. The most important parts of the limbic system associated with scent are the amygdala and hippocampus. The amygdala is the center of emotion, the hippocampus is associated with memory, including scent, and since scent passes through the hypothalamus as a regulator, the scent is called the raphe nucleus, a small but important part of the brain. Increase. The effect of stimulated nuclear raphe is the release of serotonin, a neurotransmitter that regulates the sleep onset process.^{10,11}

Standardized essential oil (Sirexan) is a potent anxiolytic agent that inhibits voltage-dependent calcium channels in synapses, primary hippocampal neurons, and stably expressing cell lines, to the same extent as pregabalin. Linalool and linalyl acetate levels interact with NMDA receptors, which are neurochemically classified as ionotropic glutamate ion receptors (iGLURs). Since activation of NMDA receptors by glutamate is also implicated in neurotoxicity, essential oils can provide neuroprotection by blocking these ionotropic receptors.¹²

Based on literature reviews, aromatherapy coordinates physiological, mental and psychological improvements for new stages of life. This treatment is prophylactic and can also be used in the acute and chronic stages of the disease without causing side effects. Only eight molecules can trigger electrical impulses at nerve endings that must be stimulated before a person realizes what smell is being smelled.¹³

The results of Karadag's study (2015) showed that aromatherapy affects the quality of sleep of the elderly. Aromatherapy containing linalool and geraniol is efficacious in calming and relaxing the central nervous system by stimulating the olfactory nerve. The mechanism of aromatherapy in the human body goes through two physiological systems, namely the body's circulation and the olfactory system. Fragrances can affect a person's psychic condition, memory, and emotions. Essential oil rose is a type of aromatherapy used to help relieve depression, nervous tension, headaches, and insomnia.¹⁴ Inhaling a fresh and soothing aroma increases the alpha waves in the brain, and these waves help to create a relaxed state. Alpha waves themselves are central nervous waves (brain) that occur when a person who experiences relaxation or begins to rest with signs of eyes starting to close or start drowsiness, or a phase of the conscious state becomes unconscious (or unconscious) but remains conscious even though the eyelids are closed.¹²

Aromatherapy that has a calming or relaxing effect can also relieve insomnia, anxiety, and depression. Inhaling the scent of lemongrass and lemon containing linalool can stimulate the olfactory nerve that delivers impulses to the brain through olfactory bulbs related to the structure of the brain/limbic system that is the center of

Table 1. Distribution of respondents based on age, work, education and parity.

Characteristics	Category	Amount	%
Age	<20 years	2	4,2
	20-35 years	37	77,1
	>35 years	9	18,7
Parity	Primigravida	25	52,1
	Multigravida	21	43,7
	Grandemulti gravida	2	4,2
Work	employee	16	33,3
	unemployed	32	66,7
Education	Basic	4	8,4
	Middle	28	58,3
	High	16	33,3

Table 2. The frequency distribution of sleep quality before and after giving aromatherapy.

	Category	Frequency (n)	(%)	Minimum skor	Maximum Skor	Mean Score	p value
Before intervention	sleep quality:						0.01
	Good sleep quality	16	33,3	3	18	13	
	poor sleep quality	32	67,7				
Total		48	100,0				
After intervention	sleep quality:						
	Good sleep quality	39	81,3	1	7	5	
	poor sleep quality	9	18,7				
Total		33	100,0				

emotions and the hippocampus associated with memory (including against odors), so inhaling the aroma of lemongrass and lemon has a calming effect. When the body is relaxed, ras activation decreases, and BSR takes over, causing drowsiness and sleep will become more relaxed, comfortable, feel better, and not easily disturbed or awake.

CONCLUSION

Essential oils diffuser blend aromatherapy of lemongrass and lemon effectively improves the sleep quality of third-trimester pregnant women. Lemongrass and lemon aromatherapy makes participants feel relaxed, comfortable, and feel sleepy, and have better anxiety levels. For health workers, this technique can be one of the practical options for non-pharmacological therapy to decrease discomfort during pregnancy. Further studies are needed to assess the relationship among variables with larger sample size and a more comprehensive research design.

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CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

AUTHOR CONTRIBUTION

All authors similarly contribute to the think about from the investigation concepts, information acquisitions, information investigation, factual investigations, changing the paper, until detailing the consider comes about through publication.

ETHICAL CONSIDERATION

The investigators agreed to conduct this study fully with the principles of the Declaration of Helsinki and its subsequent related amendments. The Ethics Committee approved this study of the Surabaya Islamic Hospital. Letter of exemption Ref. No. 1212/EC.KEPK/UMS/2020.

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