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Lavender aromatherapy reduces menstrual pain intensity in adolescents: a double-blind randomized clinical trial



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ABSTRACT

Introduction: Before, during, or after a period, dysmenorrhea may occur. Menstrual discomfort may persist for one to several days throughout the menstrual cycle. The uterine muscles contracting to release endometrial tissue is believed to be the cause of colic or chronic discomfort. Some predisposing factors that play a role in the pathophysiology of primary dysmenorrhea have not been explained to date, it is suspected that prostaglandin factors are the main cause of perceived pain. There are two methods for treating menstruation pain: pharmaceutical and non-pharmacological. A non-pharmacological treatment that can give good results is the use of lavender aromatherapy because the content of essential substances in it is suspected to reduce anxiety and pain sensations to reduce the intensity of dysmenorrhea.

Method: This study employs a double-blind, randomized pre- and post-test control design, thereby constituting a true experiment. This research was conducted in Susut Village, Bangli from January 2024 to March 2024. This study used a consecutive sampling technique followed by randomizing the grouping of treatment subjects who received the aroma of lavender therapy and the control subjects received a placebo for 15 minutes for 2 consecutive days. Pain intensity was measured using the NRS scale before and after the intervention.

Results: This study involved 60 subjects consisting of 30 cases and 30 controls. The administration of lavender aroma therapy significantly reduced the intensity of dysmenorrhea pain compared to placebo.

Conclusion: The administration of lavender aromatherapy lowers the intensity of dysmenorrhea pain.

Keywords: dysmenorrhea, adolescent, lavender aromatherapy, pain intensity, NRS.

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INTRODUCTION

Normal women after entering adolescence will experience menstruation cyclically every month. Menstruation often starts in teenagers between the ages of 12 and 13, while some may begin as early as age 8 or later as age 18.¹

When menstruation occurs, it can be followed by mild to very severe pain called dysmenorrhea.² Dysmenorrhea is a disorder that causes discomfort in the lower abdomen, specifically in the Michaelis square area. It can occasionally spread to the thighs, lower back, and waist.^{3,4}

Before, during, or after a period, dysmenorrhea may occur. One to several days throughout the menstrual cycle, menstrual discomfort may persist. The uterine muscles contracting to release endometrial tissue is believed to be the

cause of colic or chronic discomfort.⁵ Dysmenorrhea can lead to inability to perform daily activities, anxiety, depression, anxiety, and stress.⁶

A study states that as many as 25% of adolescents are absent from school due to menstrual pain. Although 90% of Indonesian women are said to have had dysmenorrhea, the majority view it as normal.⁷ The prevalence of dysmenorrhea in Indonesia is suspected to be 64.25% of which 54.89% experience primary dysmenorrhea.⁸ However, some researchers say that the prevalence of adolescents experiencing primary dysmenorrhea is 60%-75%, of which about 7%-15% do not.⁹⁻¹¹ In contrast, between 45% and 95% of Indonesian working women experience dysmenorrhea.¹²

There are two methods for treating menstruation pain: pharmaceutical and non-pharmacological.^{13,14} Treatment

through pharmacological approaches can be done using analgesic and anti-inflammatory regimens of nonsteroidal anti-inflammatory drugs (NSAIDs), but often long-term use of these drugs can cause complaints and unpleasant side effects such as headaches and allergies.

Non-pharmacological treatment that can give good results is the use of aromatherapy because the content of essential substances in it is suspected to reduce anxiety and pain sensations.¹⁵ A study showed that lavender aromatherapy reduced the intensity of dysmenorrhea pain. It is thought that the volatile chemicals in aromatherapy lavender are transported to the nose's receptor cells when breathed. Volatile molecules adhere to the hair of the nose. Through the olfactory tract, electrochemical signals are sent to the limbic system and brain. This electrochemical transmission will

stimulate the hypothalamus to release the hormones serotonin and endorphins which are believed to produce a feeling of relaxation and calm.¹⁶

There have been many reports of menstrual pain among adolescent girls in Susut Bangli Village. This study was conducted to investigate the effects of lavender aromatherapy on the intensity of dysmenorrhea pain in adolescents, as the current treatment for dysmenorrhea involves the administration of pain relievers such as paracetamol, mefenamic acid, and NSAID analgesic regimens, which can cause side effects such as nausea, vomiting, and stomach pain.

MATERIALS AND METHODS

This study is purely experimental research with a double-blind randomized pre and post-test control design. The research was conducted in Susut Bangli Village for 3 months from January 2024 to March 2024. The inclusion criteria used were adolescents who had primary dysmenorrhea. Exclusion is carried out if the respondent has an abnormality that causes menstrual disorders. Meanwhile, the drop-out criteria for respondents who experienced complaints during treatment or refused to continue their participation. In this study, there were 63 respondents aged 15 – 21 years who were eligible to undergo random allocation dengan cara blok permutation which was divided into 2 groups, namely 32 treatment groups, given lavender aromatherapy, and 31 control groups, given placebo. Each was given a treatment for 15 minutes. Three respondents were declared dropouts, 1 person from the control group because they were not present during the next day's study and 2 people from the treatment group where 1 person refused to continue and 1 person had nasal inflammation. Intervention is carried out by enumerators so that the blinding process is achieved. Pain was measured using the NIRS scale before and after treatment. To prevent bias, the researcher who took the measurement was unaware of the treatment received by the respondent.

To analyze the difference in pain intensity decrease between groups after the intervention, a statistical analysis of the lavene T homogeneity test, and a

Table 1. Characteristics of respondents

Variables	Treatment		Control		Total
	f	%	f	%	
Age Group					
15 - < 18 years old	25	83.3	28	93.3	53
18 -21 years old	5	16.7	2	6.7	7
Total	30	100	30	100	60
Education					
Junior High School	6	27.3	16	72.7	22
Senior High School	24	63.2	14	36.8	38
Total	30	100	30	100	60

Table 2. Estimation of the intensity of the pain of the respondent

Variables	Treatment		Control		Total
	f	%	f	%	
Pain Intensity Before Treatment					
Moderate pain	6	20	4	13.3	10
Severe Pain	24	80	26	86.7	50
Total	30	100	30	100	60
Pain Intensity After Treatment					
No Pain	3	10	0	0	3
Mild Pain	18	60	0	0	18
Moderate pain	9	30	10	33.3	19
Severe Pain	0	0	20	66.7	20
Total	30	100	30	100	60

Table 3. Homogeneity test (Levene Test) of research variables

Variables	Statistics	P value
Pre-Test Pain Intensity	1,914	0.172
Post-Test Pain Intensity	0.238	0,628

Table 4. Pre and Post-Test Pain Intensity Comparability Test

Variables	P value
Pre-Test Pain Intensity and Post Pain Intensity	<0.001

comparability test were performed using IBM SPSS Statistics for Windows, version 29.0 (Armonk, NY: IBM Corp) at $\alpha=0.05$ and was declared meaningful if the value of $p<0.05$

RESULTS

The demographic information for the two groups of study participants is displayed in Table 1. Age, educational attainment, and the severity of pre-test discomfort did not significantly differ between the two groups.

For dysmenorrhea pain intensity measured using the NRS scale before the intervention, there was no significant difference in the two groups where the pain was dominant with severe intensity.

There was a change in pain intensity after the intervention which was better in the treatment group compared to the control group (Table 2).

Homogeneity or Variance Test

In the homogeneity test, the pre-test and post-test pain intensity variables had a homogeneous distribution ($p > 0.05$) (Table 3).

Comparability Test

To compare the decrease in pain intensity in the treatment group and the control group, a comparability test was performed using the Wilcoxon Test. From this analysis, it was found that the decrease in pain intensity was significantly different between the group given lavender

aromatherapy and the group given placebo where the value of $p = 0.000$ ($p < 0.05$) (Table 4).

DISCUSSION

The purpose of this study is to demonstrate how lavender aromatherapy affects the severity of teenage dysmenorrhea discomfort. The prevalence of primary dysmenorrhea is influenced by several factors. This study showed that primary dysmenorrhea was more commonly experienced by adolescents in the age group of 15 years to less than 18 years, followed by the age group of 18-21 years, and not found in the group of early adolescents aged 13-15 years. Several studies are in line with this study and one of them found dysmenorrhea occurs on average in adolescents aged 19 years.^{17,18}

Pain Intensity Before Lavender Aromatherapy

The assessment of pain intensity in this study used the Numeric Rating Scale (NRS) instrument before treatment and 30 minutes after the second day of treatment. In order to select a number between 0 and 10 that best reflected the degree of their pain, respondents were asked to rate the intensity of their pain. "No pain at all" is represented by the number 0, and "the worst pain ever felt" by the number 10. There are only 11 viable replies in the range of 0-10 points, which is different from VAS/GRS in that only the numbers themselves are valuable answers.¹⁹

Before treatment, severe pain intensity occurred in 80% of the intervention group and 86.7% of the control group. From the statistical test, it was found that this difference was not significant ($p > 0.05$). Adolescents who experience severe pain during menstruation are normal or normal because during menstruation, especially on the first and second days, they will experience unusual pain in the lower abdomen.²⁰⁻²² The results of the identification of primary dysmenorrhea pain in adolescent girls in the study were caused by stress factors related to emotional tension and menarche age.²³

Menstrual pain is a sharp pain that is felt in the thighs and lower abdomen. Almost all women, including young women, must experience some form of menstrual pain

during their periods. This pain can range in intensity from minor pelvic aches and pains to severe pain. The first and second days of menstruation are painful. There will be less discomfort after a significant amount of bleeding. Women's activities, particularly those of teens, may be affected by menstrual discomfort. Women who have menstrual discomfort are unable to function properly and need to be prescribed medication. Women's quality of life suffers as a result of this circumstance; for instance, female students who suffer from primary menstruation pain find it difficult to focus in class and become less motivated to learn.²⁴

Pain Intensity After Lavender Aromatherapy

After receiving lavender aromatherapy, the treatment group's level of discomfort decreased. When compared to the control group, the treatment group saw a greater reduction in pain intensity. Some studies have also reported a decrease in pain intensity after lavender aromatherapy stating that lavender can reduce pain and is recommended to be used as an alternative therapy or adjuvant.²⁵ Other studies have shown that the administration of lavender aromatherapy, in addition to reducing the intensity of pain, also has a stimulating and relaxing effect on the mind and body.^{3,26,27} The presence of the aromatherapy effect of lavender due to the content of linolol acetate which can affect reducing menstrual pain.^{20,27}

In research on pain due to childbirth, it was also found that the effect of lavender aromatherapy on reducing pain intensity. Aromatherapy reduces the anxiety and pain experienced by mothers during the delivery process. This effect is caused by the content of linolol acetate contained in lavender oil which has a relaxing effect on the mother in childbirth. During the research process, the mother who previously experienced severe pain after being given aromatherapy experienced moderate pain. This shows that after being given lavender aromatherapy most of the pain changes.²⁸

Essential oils and other fragrant molecules from plants are used in aromatherapy, a general term for an alternative medicine practice that aims

to improve a person's health or mood. Aromatherapy is an alternative treatment that uses smells or fragrances derived from aromatic compounds. The smell response resulting from aromatherapy stimulates the work of brain neurochemical cells. Therefore, a pleasant smell will stimulate the thalamus to secrete enkefalin which serves as a natural pain reliever and generates a feeling of calm.^{29,30}

Lavender aromatherapy has its main ingredient, namely linalool. The effects of linalool include an increase in alpha waves in the brain, which promote relaxation and block the prostanooid pathway that produces PGE2. Smell affects the brain to distinguish more than 100,000 different smells. These smells affect parts of the brain related to mood (mood), emotions, memory, and learning.^{29,30}

Using essential oils from the fragrant scent of plants, aromatherapy is a supplementary therapy that lowers health issues and enhances quality of life. The idea is that, like analgesic medications, scent directly affects the brain. For instance, the aroma of lavender will help you relax by increasing alpha waves in your brain.³¹

Previous research on the benefits of lavender aromatherapy has stated that a pleasant smell will induce a feeling of calm and happiness that can reduce anxiety. Aromatherapy is thought to work on the limbic region by stimulating the secretion of enkephalin or endorphins in the hypothalamus, Periaqueductal Grey (PAG), and ventromedial rostral medulla. A brain region called the raphe nucleus is stimulated to release serotonin so that it causes relaxing, calming effects and reduces anxiety. When essential oil molecules enter the hypothalamus, the body processes and transforms them into an action by releasing neurochemical substances like endorphins and serotonin. This reaction causes physiological changes in the body, soul, and mind and has a calming effect. This is why aromatherapy that enters the nasal cavity through inhalation works faster. Hormones called endorphins can reduce pain and promote comfort.^{31,32}

This study can prove the positive effect of lavender aromatherapy in reducing the intensity of dysmenorrhea pain, but a larger sample count is needed to prove the consistency of this positive effect.

CONCLUSION

The findings showed a positive effect of lavender aromatherapy inhalation in reducing the intensity of pain during menstruation. Since there were no side effects reported by the subject, aromatherapy can be considered a safe and effective treatment for menstrual pain. In the future, research can be carried out by comparing the effectiveness of lavender aromatherapy with other therapeutic modalities such as endorphin massage, acupressure, and others so that more knowledge and therapeutic modalities can be chosen in the treatment of dysmenorrhea pain.

DISCLOSURES

None.

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Nile.

CONFLICT OF INTEREST

There is no conflict of interest.

ETHICAL STATEMENT

This research was authorized by the ethics committee with an ethical clearance number: 530/EA/KEPK-BUB-2023.

AUTHOR CONTRIBUTION

All authors contributed equally to this study.

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