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THE EFFECT OF LEMON AROMATHERAPY ON MENSTRUAL PAIN IN ADOLESCENT GIRLS AGED 12–15 YEARS IN HAMLET IV PERDAMAIAN VILLAGE BINJAI DISTRICT LANGKAT REGENCY

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ABSTRACT

Background: Menstrual pain (*dysmenorrhea*) is a gynecological condition caused by elevated levels of progesterone and increased production of prostaglandins (particularly PGF2α), which trigger intense uterine muscle contractions, resulting in lower abdominal cramps before and during menstruation. This condition has a high prevalence in Indonesia and significantly disrupts daily comfort, often causing adolescent girls to have difficulty concentrating on their studies, feel drowsy in class, and even miss school. **Objective:** This study aims to determine the effect of lemon aromatherapy on menstrual pain (dysmenorrhea) in adolescent girls aged 12–15 years in Dusun IV, Perdamaian Village, Binjai Subdistrict, Langkat Regency. **Method:** This quantitative study employed a pre-experimental design using a "one-group pre-test post-test" approach without a control group. The study sample consisted of 37 adolescent girls selected using simple random sampling from a total population of 60. Pain scale measurements were taken before (pre-test) and after (post-test) the intervention inhalation of lemon aromatherapy and the data were statistically analyzed using the Wilcoxon Signed-Rank Test. **Results:** The pre-test results showed that the majority of respondents, namely 89.2%, experienced moderate menstrual pain, and 5.4% experienced severe pain. After the intervention (post-test), the respondents' pain scores decreased dramatically, with 89.2% shifting to mild pain and the percentage of those with moderate pain dropping to 5.4%. The Wilcoxon test results showed a Z-value of -5.754 and a p-value of 0.001 ($p < 0.05$). **Conclusion:** There is a significant effect of lemon aromatherapy on reducing the level of menstrual pain in adolescent girls. Lemon aromatherapy has been proven effective in relaxing muscles and is recommended as an alternative complementary therapy for treating dysmenorrhea.

Keywords: Lemon aromatherapy; Lime; Menstrual pain; Adolescent girls; dysmenorrhea

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INTRODUCTION

Adolescence is a transitional phase toward adulthood, during which various aspects of an individual including physical, intellectual, social, emotional, and biological dimensions undergo rapid, simultaneous maturation (1). A key biological development during this period is the onset of menstruation in adolescent girls, which typically occurs between the ages of 10 and 16. Menstruation is sometimes accompanied by physical discomfort, such as cramps or pain in the abdominal area which may radiate to the back or inner thighs as well as nausea, vomiting, headaches, or even

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diarrhea; this condition is known as dysmenorrhea. Dysmenorrhea most commonly occurs between the first and third days of the menstrual cycle, with the pain reaching its peak intensity during the first 24 hours (2, 3, 25).

According to the World Health Organization (WHO) in 2018, the global burden of morbidity due to dysmenorrhea is substantial. It is estimated that 50% of women of reproductive age worldwide experience dysmenorrhea; specific data indicates that 90% of women in the United States, 72% in Sweden, and 10% in the United Kingdom are affected. (21, 22) Furthermore, adolescent girls in secondary school are frequently absent for 1 to 3 days each month due to dysmenorrhea (4,5).

Data from the Association of Southeast Asian Nations (ASEAN) for 2018 shows that approximately 15% of women of reproductive age in Singapore experience dysmenorrhea, compared to 35%–40% in Malaysia, 60% in Thailand, and 60%–70% in Indonesia—a condition that is undeniably uncomfortable and disruptive (6).

The high incidence of menstrual pain among adolescent girls is attributed to dietary patterns that fail to provide adequate nutrition, insufficient or irregular sleep duration, and limited daily physical activity (7). Furthermore, menstrual pain such as that experienced during menarche can become severe if left unaddressed.

This has adverse effects on adolescent girls, including disruptions to their school activities, an inability to focus on classroom instruction, and a tendency to fall asleep during lessons. (20) Such issues negatively impact both academic and non-academic performance; some girls may even choose to stay home from school during their period. In short, the more intense the pain, the greater the disruption to the learning process (8).

Based on an initial survey conducted by the researcher in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency, in January involving 10 adolescent girls it was found that 8 of them frequently experience menstrual pain and do not know how to manage it, while 2 do not experience such pain. Given these findings, the researcher is interested in conducting a study titled "The Effect of Lemon Aromatherapy on Menstrual Pain Among Adolescent Girls Aged 12–15 Years in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency."

METHODS

In this study, the researcher employs a quantitative research method. The research design used is a pre-experimental design, specifically a "one-group pre-test-post-test" design without a control group. A pre-experimental design involves a single group or class that is administered both a pre-test and a post-test. This one-group pre-test-post-test design is conducted on one group without the inclusion of a control or comparison group. The objective of this study is to analyze the effect of lemon aromatherapy on menstrual pain in adolescents. The assessment in this study utilizes an observation referred to as a post-test (Zarfani,

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2020).

R	Pretest	X	Posttest
R	O1	X	O2

Note :

R : Responden

O1 : Pre-test or initial test before being given treatment

X : Treatment of the intervention group

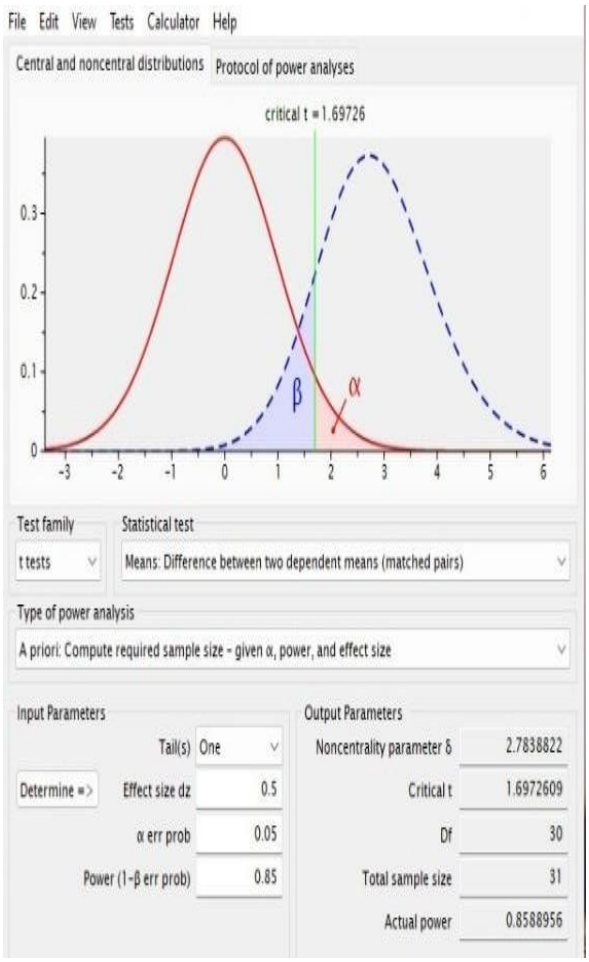
O2 : A post-test is conducted after the intervention has been administered.

This research will be conducted in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency, as many adolescent girls in this area experience menstrual pain and lack knowledge on how to manage it. The study will take place from February to July 2025.

A population is the entire group consisting of objects or subjects that possess specific characteristics and qualities, as determined by a researcher for the purpose of study and the subsequent drawing of conclusions (16). A population represents the complete set of research subjects or the objects being studied (17). The population for this study consists of all adolescent girls aged 12–15 years residing in Hamlet IV (Dusun IV), Perdamaian Village, Binjai District, Langkat Regency. The population for this study comprises 60 adolescent girls in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency.

According to (18), a sample is a portion of a population that serves as a data source in research, representing a subset of the characteristics possessed by that population. Sampling techniques, are the methods used to select the sample for a study.

Sample size determination was conducted using G*Power, with an effect size of 0.5, an alpha error probability of 0.05, and a power of 0.85, resulting in a minimum sample size of 31 individuals. The researcher selected a sample of 37 individuals; this figure includes an additional 20% above the minimum sample size to account for potential dropouts (Edgar, Franz, & Alex, 2016).



Based on the calculations above, the sample of respondents for this study has been adjusted to 37 individuals, representing approximately 41% of the total number of adolescent girls in Hamlet IV, Perdamaian Village,

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Binjai District, Langkat Regency. The sampling technique employed in this study is simple random sampling—a type of non-probability sampling in which the sample is selected from the population according to the researcher's criteria.

RESULTS

Hamlet IV of Perdamaian Village (also spelled 'Perdamean'), located in Binjai District, Langkat Regency, North Sumatra Province, covers an area of approximately 4.62 km². It shares a border with the Stabat District (specifically, it is adjacent to Banyumas Village to the west). In terms of its general characteristics, Perdamaian Village is home to a multi-ethnic population. The Javanese and Banjar ethnic groups constitute the majority, followed by the Malay, Karo, Simalungun, and Tapanuli communities. Social ties among the residents of Hamlet IV are notably strong, as evidenced by high levels of community participation in *gotong royong* (collective mutual assistance) and religious activities.

The univariate analysis in this study aims to describe the results obtained from the respondents. The analysis focuses on the initial and final states of the variables under investigation. The data collected for this study concerns menstrual pain experienced by adolescent girls in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency.

a. Demographic Data

Table 1 Demographic Data of Adolescent Female Respondents

No	Age	Frequency	Percentage (%)
1	12 year	9	**24.3 %**
	13 year	17	**45.9%**
	14 year	11	**29.7%**
	Total	**37**	100.0

Based on the demographic data above, it is known that 9 respondents are 12 years old, 17 respondents are 13 years old, and 11 respondents are 14 years old. This analysis was conducted to determine the frequency distribution of the independent variables in relation to the dependent variable (menstrual pain). Menstrual pain is classified into four categories: mild, moderate, severe, and very severe. The data represent the frequency of menstrual pain among respondents during the pretest and posttest—that is, before and after the administration of the lemon aromatherapy intervention.

Table 2 Frequency Distribution of Respondents' Pain Before and After the Administration of Lemon Aromatherapy Intervention

No	Menstrual Pain	Frequency	Percentage
Pre Test			
1	Severe Pain	2	5.4%
2	Moderate Pain	33	89.2%
3	Mild Pain	2	5.4%
4	Very Severe	0	0
	Total	**37**	100.0
Post test			
	Moderate Pain	2	**5.4%**
	Mild Pain	35	**89.2%**
	Total	**37**	100.0

Table 2 above shows that, among adolescent girls in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency, 2 respondents (5.4%) experienced severe pain, 33 respondents (89.2%) experienced moderate pain, and 2 respondents (5.4%) experienced mild menstrual pain.

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The bivariate analysis in this study aims to determine the influence of the independent variable on the dependent variable specifically, the effect of lemon aromatherapy on menstrual pain among adolescent girls in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency.

Table 3, the Wilcoxon Signed-Rank Test of lemon aromatherapy for menstrual pain

	N	Mean	Std. Deviation	Minimum	Maimum
Pre-Test	37	3.00	0.333	2	**4**
Post- Test	37	3.95	0.229	3	**4**

Ranks

		N	Mean Rank	Sum of Ranks
POST TEST - PRE TEST	Negative Ranks	0[a]	.00	.00
	Positive Ranks	34[b]	17.50	595.00
	Ties	3[c]		
	Total	37		

Based on Table 3, the Wilcoxon Signed-Rank Test indicates a change in scores before and after the administration of lemon aromatherapy for menstrual pain. There are 34 "positive ranks," meaning that for these samples, the scores improved from the pretest to the posttest. The mean rank of this improvement is 17.50, with a sum of positive ranks of 595.00, and there are 3 "ties." The Wilcoxon Signed-Rank Test yielded a Z-score of -5.754.

In this test, the negative or positive sign indicates the direction of the observed change or difference, while the magnitude of the Z-score reflects how far the data deviates from the mean expected under the null hypothesis. The negative sign in the Z-score of -5.754 indicates a reduction in menstrual pain among adolescent girls following the administration of lemon aromatherapy (posttest) compared to the state before the intervention (pretest).

This signifies a decrease in menstrual pain among the adolescent girls after the lemon aromatherapy intervention. Furthermore, the p-value of 0.001 is less than 0.05, which statistically demonstrates that the administration of lemon aromatherapy has an effect on menstrual pain among adolescent girls in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency.

DISCUSSIONS

Based on the research findings, the average level of menstrual pain among adolescent girls before the administration of lemon aromatherapy was 89.2%, which decreased to 5.4% after the application of lemon aromatherapy. There was a significant reduction in the level of menstrual pain among adolescent girls in Hamlet IV,

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Perdamaian Village, Binjai District, Langkat Regency.

This is supported by a theory suggesting that the use of lemon aromatherapy reduces the severity of menstrual pain. Lemon contains limonene, a primary component that inhibits the action of prostaglandin hormones, thereby alleviating menstrual pain. (10,11) Furthermore, limonene regulates cyclooxygenase-1 and -2, which prevents prostaglandin activity and reduces pain. Inhaling lemon aromatherapy also increases alpha waves in the brain waves that promote a state of relaxation (8,9).

Lemon aromatherapy is used as a complementary therapy in nursing practice, utilizing essential oils derived from aromatic plants to alleviate health issues and improve overall quality of life (24). When the scent of lemon aromatherapy is inhaled, olfactory receptor cells are stimulated, and impulses are transmitted to a center in the brain known as the limbic system. Aromatherapy can induce a relaxing and calming effect, while also enhancing blood circulation (12-15, 23).

The research results show that the average pain score decreased from 89.2% to 5.4%. The administration of lemon aromatherapy is effective in reducing menstrual pain in adolescent girls and can be used as an alternative therapy for menstrual pain.

CONCLUSIONS

Based on the results of the study on the effect of lemon aromatherapy on menstrual pain among adolescent girls aged 12–15 years in Hamlet IV, Perdamaian Village, Binjai District, Langkat Regency, the following conclusions can be drawn:

1. Menstrual pain among female students at SMP Negeri 13 Binjai City showed a significant change following the application of lemon aromatherapy. This is evidenced by post-test results, which reached 89.2%.
2. The Wilcoxon test results show a p-value of 0.001. Since this p-value is less than 0.05, it can be concluded that the administration of lemon aromatherapy has a significant effect on menstrual pain in adolescent female students. This is evidenced by the pretest and posttest values.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

None of the authors have any conflicts of interest regarding this article. This research was conducted independently and did not receive any specific funding

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from external parties, to the best of our knowledge.

RESEARCH AND PUBLICATION ETHICS

The authors state that this research has received ethical approval from the Research Ethics Committee of the Flora College of Health Sciences (Sekolah Tinggi Ilmu Kesehatan Flora), under reference number 005/II/STIKes-FL/KE/2025. All respondents were provided with an explanation in accordance with research ethics procedures prior to data collection.

AUTHOR CONTRIBUTIONS

The author is responsible for selecting the topic, conducting the literature search, drafting the manuscript, analyzing and interpreting the data, as well as editing and finalizing this scientific paper. The author also bears responsibility for the accuracy of the data and the integrity of the manuscript's content.

DECLARATION ON THE USE OF ARTIFICIAL INTELLIGENCE (AI)

In the preparation of this scientific paper, the author utilized artificial intelligence (AI) as a tool to improve grammar, refine sentence structure for better clarity, and assist in developing and organizing the overall composition. The use of AI is not intended to replace the author's own judgment or responsibilities in drafting the work. The author remains responsible for verifying the accuracy of the information, ensuring the reliability of the references, and upholding academic integrity and the originality of the work. All use of AI has been carried out in accordance with the competition organizers' guidelines.

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