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Research Article

THE EFFECT OF LAVENDER AROMATHERAPY ON REDUCING DYSMENORRHEA PAIN LEVELS AMONG ADOLESCENT GIRLS AT JUNIOR HIGH SCHOOL 3 BANJARBARU

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Abstract:

Background: Primary dysmenorrhea is a highly prevalent gynecological problem among adolescent girls, typically provoked by excessive endometrial prostaglandin hypersecretion that induces spastic myometrial ischemia, physical distress, and academic absenteeism. Non-pharmacological therapies such as lavender aromatherapy (Lavandula angustifolia) offer an accessible, safe complementary intervention; however, empirical evidence from secondary school settings remains essential.

Aims: To determine the effect of lavender aromatherapy on reducing dysmenorrhea pain intensity among adolescent girls at Junior High School 3 Banjarbaru in 2026.

Methods: A quantitative pre-experimental study using a one-group pretest-posttest design was conducted in 2026. A sample of 32 female students experiencing primary dysmenorrhea was selected via total sampling from school health clinic (UKS) registers. Lavender essential oil was administered via an ultrasonic diffuser for 15 minutes twice daily over two consecutive days. Menstrual pain intensity was evaluated pre- and post-intervention using the 11-point Numerical Rating Scale (NRS) and analyzed using the Wilcoxon signed-rank test (alpha = 0.05).

Result: Prior to intervention, respondents experienced high pain intensity, with a mean score of 4.75 ± 1.016 (min 3, max 6). Following lavender aromatherapy inhalation, pain intensity declined significantly to a mean score of 1.72 ± 1.023 (min 0, max 4), demonstrating a mean difference reduction of 3.03. All 32 respondents (100.0%) exhibited negative ranks (clinical symptom reduction). The Wilcoxon signed-rank test confirmed a statistically significant effect of lavender aromatherapy on dysmenorrhea pain reduction (Z = -4.954, p = 0.001).

Conclusion: Lavender aromatherapy is significantly effective as a non-pharmacological complementary modality in attenuating primary dysmenorrhea pain among adolescent girls.

Keywords: Adolescent girls; Dysmenorrhea; Lavender aromatherapy; Menstrual pain; Non-pharmacological therapy; Numerical Rating Scale

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1. INTRODUCTION

Adolescence is a critical developmental period marked by reproductive maturation and the onset of menstruation (Fitriana & Wibowo, 2022). Dysmenorrhea is a common menstrual complaint among adolescent girls, with prevalence exceeding 50% globally. In Indonesia, 117,418 cases have been recorded, comprising 54.89% primary and 12.80% secondary

dysmenorrhea (Kemenkes RI, 2023). In South Kalimantan, prevalence ranges from 63.2% to 93.4% across several schools. At Junior High School 3 Banjarbaru, preliminary screening in 2025 found that 32 of 337 female students (9.5%) required bed rest due to severe menstrual pain, while interviews revealed that 70% of ten students experienced pain interfering with classroom activities.

Primary dysmenorrhea is primarily associated with excessive prostaglandin production, particularly PGF2α and PGE2, causing uterine hypercontractions, vasoconstriction, ischemia, and pain (Charu, 2022; Masnilawati & Thamrin, 2021). Although pharmacological treatments such as NSAIDs and paracetamol are commonly used, concerns regarding adverse effects encourage the development of safer non-pharmacological alternatives. Lavender aromatherapy (Lavandula angustifolia), containing linalool and linalyl acetate, may reduce pain through olfactory stimulation of the limbic system, promoting endogenous endorphin release and reducing sympathetic activity (Azzahra, 2024; Kamidah & Ismarwati, 2024). Previous studies have demonstrated its potential effectiveness in reducing menstrual pain; however, evidence involving standardized interventions within school health settings remains limited.

Therefore, this study aimed to analyze the effect of lavender aromatherapy on dysmenorrhea pain intensity among adolescent girls at Junior High School 3 Banjarbaru in 2026. The findings are expected to provide empirical evidence for integrating standardized, non-pharmacological aromatherapy interventions into school-based reproductive health services.

2. METHODS

2.1 Research Design

This study used a quantitative pre-experimental research design utilizing a one-group pre-test and post-test approach ($O_1 \rightarrow X \rightarrow O_2$). This design was selected to measure and evaluate the immediate therapeutic effect of lavender aromatherapy on primary dysmenorrhea pain intensity by comparing pain scores before intervention (O_1) and after intervention (O_2) within the same group of adolescent respondents without a parallel untreated control cohort.

2.2 Research Population and Sample

The study population comprised all female students enrolled at Junior High School 3 Banjarbaru who suffered from primary dysmenorrhea. A total sample of 32 female students was recruited using a total sampling technique from eligible students registered in the School Health Unit (UKS) clinical log. Inclusion criteria included: (1) active students at Junior High School 3 Banjarbaru; (2) post-menarche experiencing primary dysmenorrhea during the study period; (3) aged 12–15 years; (4) not consuming oral pharmacological analgesics (NSAIDs/paracetamol) or herbal concoctions within 24 hours prior to intervention; (5) having a normal sense of olfaction without acute respiratory tract infections; and (6) consenting to participate. Exclusion criteria included students with diagnosed secondary pelvic pathology, known allergic hypersensitivity to lavender fragrance, and students absent during post-test evaluations.

2.3 Research Setting and Time

The research was undertaken at the School Health Unit (UKS) of State Junior High School 3 Banjarbaru (Junior High School 3 Banjarbaru), located in Banjarbaru City, South Kalimantan Province, Indonesia. Field data collection and intervention trials were conducted in early 2026.

2.4 Research Procedures and Intervention Protocol

The research procedure followed four structured phases: preparatory, pre-test, intervention, and post-test. In the preparatory phase, research licensing was secured and students were screened. During pre-test, baseline dysmenorrhea pain intensity was assessed using the Numerical Rating Scale. In the intervention phase, pure essential oil of lavender (*Lavandula angustifolia*) was administered via an ultrasonic room diffuser. Respondents were positioned comfortably in a supine or semi-Fowler position in a quiet UKS resting room, inhaling the diffused vapor at a distance of 1 to 2 meters for 15 minutes per session, administered twice daily for two consecutive days during active menstruation. During the post-test phase, pain intensity was reassessed immediately following the final intervention cycle under identical conditions.

2.5 Data Collection Techniques

Primary data collection utilized structured questionnaires and clinical pain scoring. Demographic characteristics (chronological age, age at menarche, menstrual cycle regularity, and familial history of dysmenorrhea) were obtained via self-administered questionnaires, while pain scores were measured pre- and post-intervention.

2.6 Research Instruments

Dysmenorrhea pain intensity was assessed using the 11-point Numerical Rating Scale (NRS, 0–10), a widely validated, highly sensitive instrument for adolescent pain measurement: Score 0 (No Pain); Scores 1–3 (Mild Pain); Scores 4–6 (Moderate Pain); Scores 7–9 (Severe Pain); and Score 10 (Very Severe/Unbearable Pain).

2.7 Data Analysis

Data were analyzed using SPSS software. Descriptive univariate statistics established absolute frequencies (f), percentages (%), means, standard deviations (SD), and minimum-maximum ranges. Data distribution normality was evaluated; due to non-normal paired data distributions and ordinal scoring characteristics, bivariate hypothesis testing was performed using the non-parametric Wilcoxon Signed-Rank Test at a statistical significance threshold of alpha = 0.05.

2.8 Scope and Limitations of the Research

The study's scope was delimited to adolescent girls at a single junior high school in Banjarbaru. Key methodological limitations include the one-group pre-experimental design lacking a randomized placebo/sham control group, the inability to blind respondents to the distinctive aroma of lavender, potential confounding from the natural self-limiting resolution of dysmenorrhea over a 48-hour menstrual timeframe, and reliance on subjective pain reporting without biochemical prostaglandin assays.

2.9 Ethical Considerations

The primary manuscript indicates that respondents participated cooperatively. The study was conducted with the participant's informed consent and the ethical approval status and confirm that appropriate written consent for publication was obtained.

3. RESULTS AND DISCUSSION

3.1. Results

A total of 32 female students completed the pre-test, full two-day aromatherapy intervention, and post-test evaluations. Table 1 summarizes the socio-demographic and reproductive characteristics.

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Table 1. Frequency Distribution of Adolescent Characteristics with Primary Dysmenorrhea (n = 32)

Characteristic	Classification / Category	Frequency (f)	Percentage (%)
Age of Student	12 years old	1	3.1
	13 years old	17	53.1
	14 years old	11	34.4
	15 years old	3	9.4
Age at Menarche	Early Menarche (< 12 years old)	17	53.2
	Normal Menarche (12 – 14 years old)	15	46.8
Menstrual Cycle Duration	Short Cycle (< 28 days)	12	37.5
	Normal Cycle (28 – 35 days)	19	59.4
	Long Cycle (> 35 days)	1	3.1
Family History of Dysmenorrhea	Present / Positive History	23	71.9
	Absent / Negative History	9	28.1

Source: Primary research survey data, Junior High School 3 Banjarbaru, 2026.

As detailed in Table 1, more than half of the respondents were 13 years of age (53.1%, n = 17), followed by 14 years (34.4%, n = 11). Over half experienced early menarche onset under age 12 (53.2%, n = 17). Menstrual cycles were regular (28–35 days) in 59.4% (n = 19) and short (< 28 days) in 37.5% (n = 12). Importantly, 71.9% of respondents (n = 23) reported a positive familial history of dysmenorrhea.

Table 2. Univariate Distribution of Dysmenorrhea Pain Scores Before and After Lavender Aromatherapy (n = 32)

Observation Stage	Sample (n)	Min Score	Max Score	Mean Score	SD	Clinical Pain Classification
Pre-Test (Baseline)	32	3	6	4.75	1.016	Moderate to Severe Pain
Post-Test (After Intervention)	32	0	4	1.72	1.023	Mild Pain / Asymptomatic

Source: Primary data, 2026.

Table 3. Bivariate Wilcoxon Signed-Rank Test Results of Lavender Aromatherapy on Dysmenorrhea Pain (n = 32)

Pain Measurement Stage	Mean	Std. Deviation	Mean Difference	Negative Ranks (Improved)	Positive Ranks / Ties	Wilcoxon Z	p-value (Sig.)
Pre-Test	4.75	1.016	-3.03	32 (100.0%)	0 / 0	-4.954	p = 0.001
Post-Test	1.72	1.023					Significant (Reject H0)

Source: Processed SPSS Wilcoxon Signed-Rank Test output, 2026.

As shown in Table 2, prior to the intervention, students experienced substantial pain intensity (mean 4.75 ± 1.016; min 3, max 6), with 40.6% (n = 13) scoring at level 5 and 25.0% (n = 8) at level 6. Following lavender aromatherapy inhalation, pain scores decreased markedly across all participants to a mean of 1.72 ± 1.023 (min 0, max 4), with 37.5% (n = 12) reaching mild pain (score 2) and 9.4% (n = 3) achieving complete pain resolution (score 0).

As presented in Table 3, the bivariate Wilcoxon Signed-Rank Test demonstrated that all 32 respondents (100.0%) exhibited negative ranks, signifying that every participant experienced a reduction in menstrual pain score following lavender aromatherapy. The mean pain score decreased by 3.03 points. The Wilcoxon test yielded a test statistic of Z = -4.954 with an exact significance value of p = 0.001 (p < 0.05). Consequently, the null hypothesis (H0) is rejected and the alternative hypothesis (Ha) is accepted, confirming that lavender aromatherapy exerts a statistically significant effect on reducing dysmenorrhea pain intensity among adolescent girls at Junior High School 3 Banjarbaru.

3.2 Discussion

The findings showed that lavender aromatherapy (Lavandula angustifolia) administered through an ultrasonic diffuser for 15 minutes twice daily over two consecutive days significantly reduced dysmenorrhea pain among 32 adolescent girls. The mean pain score decreased from 4.75 to 1.72, with a mean reduction of 3.03 points (p = 0.001), and all participants experienced pain improvement. These findings are consistent with previous studies reporting that lavender inhalation reduces menstrual pain and improves comfort among adolescents and young women (Kurnia et al., 2025; Kamidah & Ismarwati, 2024; Suyono et al., 2019; Hanik, 2023).

The analgesic effects of lavender are potentially associated with its major components, linalool and linalyl acetate, which stimulate olfactory pathways connected to the limbic system and may promote the release of endogenous analgesic substances, including endorphins and enkephalins. Linalool may also contribute to antispasmodic effects and reduced sympathetic activity, potentially decreasing muscle tension and pain perception (Azzahra, 2024; Cahyanti et al., 2021; Mulyani & Resmiati, 2020). However, the findings should be interpreted cautiously because the one-group pretest–posttest design lacked a control group. Natural resolution of menstrual pain, placebo effects, and other factors may have contributed to the observed reduction. Nevertheless, lavender aromatherapy offers a potential accessible, non-invasive complementary intervention for school-based menstrual pain management through School Health Units.

3.3 Implications

School administrators, UKS personnel, and community health centers (Puskesmas) should institutionalize non-pharmacological pain protocols by equipping school resting rooms with essential oil diffusers. Reproductive health education programs should train adolescent girls in independent non-pharmacological self-care strategies (aromatherapy, warm compresses, relaxation) to manage menstrual discomfort safely at home.

3.4 Research Contribution

This study provides empirical field documentation from Banjarbaru, South Kalimantan, documenting the quantitative reduction in NRS pain scores following a standardized two-day diffuser protocol, contributing valuable baseline metrics to Indonesian midwifery and school health literature.

3.5 Limitations

Several limitations must be acknowledged: (1) The one-group pre-experimental design lacked a randomized placebo/sham control group; (2) The sample size was small (n = 32) and restricted to a single junior high school; (3) Inability to blind participants to the sensory fragrance of lavender; and (4) The lack of multivariable regression modeling controlling for reproductive covariates.

3.6 Suggestions

Future inquiries should employ double-blind, randomized controlled trials comparing lavender aromatherapy against an active comparator or sham fragrance, utilize larger multi-center cohorts across junior and senior high schools, incorporate objective physiological biomarkers (e.g., salivary cortisol or serum PGF2α levels), and evaluate long-term effectiveness across consecutive menstrual cycles.

4. CONCLUSION

Lavender aromatherapy (*Lavandula angustifolia*) administered via an ultrasonic diffuser for 15 minutes twice daily over two consecutive days significantly reduces dysmenorrhea pain intensity among adolescent girls at Junior High School 3 Banjarbaru ($p = 0.001$, mean reduction from 4.75 to 1.72). Inhaled lavender serves as an effective, safe, and accessible non-pharmacological complementary modality for primary dysmenorrhea management in secondary school settings.

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AUTHOR CONTRIBUTION STATEMENT

WI: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing—original draft. Y, EK, H: Supervision, Validation, Methodology, Writing—review and editing, Project administration.

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