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The Effect of Dysmenorrhea Exercises on Menstrual Pain Intensity in Adolescent Girls at SMPN 1 Tumpang

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Abstract. *The prevalence of menstrual pain, or dysmenorrhea, among adolescent girls remains quite high, and this condition often presents a significant obstacle to their learning. This study was conducted with the specific objective of examining the effectiveness of dysmenorrhea exercise interventions in reducing menstrual pain levels among female students at SMPN 1 Tumpang. Using a quasi-experimental method with a non-equivalent control group design, this study sought to examine the effect of physical activity on student comfort. The population involved included all seventh-grade female students experiencing menstrual pain, with a sample of 30 respondents determined using a simple random sampling technique. All respondents were grouped into two categories: the intervention group and the control group. Pain levels were measured using the Numeric Rating Scale (NRS) before (pre-test) and after (post-test) the intervention to ensure data accuracy. Statistical data processing was performed using the Wilcoxon Signed Rank test to assess changes within groups and the Mann-Whitney test to compare differences between groups. The test results demonstrated a significant reduction in pain intensity in respondents who received the exercise intervention, with the average pain level dropping from moderate to mild. This contrasted with the control group, which tended to remain stable and showed no significant change in pain levels. Based on these statistical tests, it can be concluded that the application of dysmenorrhea exercises has a significant effect on reducing menstrual pain. These findings also confirm that dysmenorrhea exercises can be a safe, practical, and efficient alternative non-drug self-help solution for adolescent girls to address discomfort during the menstrual cycle.*

Keywords: *Dysmenorrhea Exercise, Menstrual Pain, Adolescent Girls, Primary Dysmenorrhea, Non-pharmacological Interventions*

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INTRODUCTION

Adolescence is a crucial transitional phase in the human life cycle, marked by the maturation of reproductive organs, which in young women manifests through the onset of the menstrual cycle (Dahl et al., 2018; Waltereit et al., 2018). However, this supposedly natural biological process is often accompanied by the uncomfortable symptom of primary dysmenorrhea. As the most common gynecological problem, dysmenorrhea has a very high prevalence worldwide (Itani et al., 2022; Francavilla et al., 2023; Armour et al., 2019).

Data from the World Health Organization (WHO) indicates that the majority of women in almost every country experience menstrual pain at some point in their lives (Mesele et al., 2022). In Indonesia, the incidence of primary dysmenorrhea remains a serious health challenge, with a prevalence reaching over 60% (Hidayat et al., 2024). These high statistics strongly indicate that

menstrual pain is not simply a routine complaint but a health issue for adolescents that requires more in-depth attention.

The urgency of addressing this issue, particularly at SMPN 1 Tumpang, is closely related to efforts to maintain the quality of life of female students while at school. Untreated primary dysmenorrhea is often a major trigger for impaired concentration, limited physical mobility, and is a classic reason behind high student absenteeism rates (Maity et al., 2022; Wong, 2018). Pathophysiologically, this painful phenomenon is rooted in the excessive release of prostaglandin (PGF2α) in the endometrial tissue (Niringiyumukiza et al., 2018).

This results in intense myometrial contractions and narrowing of uterine blood vessels, triggering tissue ischemia (Jain et al., 2022; Reavey et al., 2021). If this ischemia and severe pain persist without appropriate treatment, it is certain to significantly decrease the academic productivity and psychological well-being of young women (Zhao et al., 2021). The rationale for using dysmenorrhea exercises as a problem-solving approach is based on the independence and safety of the intervention for adolescents.

While the use of analgesics or non-steroidal anti-inflammatory drugs (NSAIDs) is very common, non-pharmacological methods offer alternatives with fewer long-term side effects (Chen et al., 2022; Seifalian et al., 2022). Dysmenorrhea exercises are a form of light physical activity designed to relax pelvic muscles and improve blood circulation in the uterine area (Murtiningsih et al., 2019; Nuraeni, 2018). Based on a literature review, structured physical exercise can stimulate the production of endorphins, the body's natural opiate hormones that function as sedatives and increase pain thresholds (Sluka et al., 2018; Thorén et al., 1990; Winiarz, 2019; Matei et al., 2023).

The movements in these exercises are also effective in helping stretch muscles that experience tension during menstruation, gradually reducing pain intensity significantly (Carroquino-Garcia et al., 2019; Solon et al., 2024). The problem-solving plan in this study focused on implementing specific physical exercises that were practical and easy for female students to adopt independently (Putri, 2023). Through a quasi-experimental approach, the effectiveness of these exercises will be tested to determine their impact on reducing pain levels experienced by respondents (Ballance, 2024; de Vocht et al., 2021).

The primary objective of this research was to analyze the effect of dysmenorrhea exercise intervention on changes in menstrual pain levels in adolescent girls at SMPN 1 Tumpang (Wulanda et al., 2020). The proposed hypothesis was that dysmenorrhea exercise would significantly reduce menstrual pain intensity. This is expected to be seen from the statistically significant difference in pain scores between the treatment group and the control group (Saputri & Pasaribu, 2023; Siregar et al., 2025).

METHODS

This investigation adopted a quantitative approach using a quasi-experimental, non-equivalent control group design. To maintain strict methodological precision and prevent confusion with a randomized controlled trial (RCT), a clear distinction was made between the sampling mechanism and group allocation. Simple random sampling was exclusively utilized during the initial phase to select the 30 participants from the broader eligible student pool. However, true random assignment to the study arms was not executed due to the logistical constraints of an intact school environment. Instead, respondents were allocated into either the intervention group (n = 15) or the control group (n = 15) while systematically ensuring baseline equivalence in initial characteristics to control selection bias and preserve internal validity (de Vocht et al., 2021). This research was conducted at SMPN 1 Tumpang from January to February of the 2025/ 2026 academic year. The deployment of 30 respondents (n = 15 per cohort) was justified based on a school-based clinical pilot trial framework. Given that the study primarily aimed to evaluate the immediate behavioral and therapeutic effects of a localized physical routine, a group size of 15 satisfies the mathematical boundary conditions required for non-

parametric distribution models. Prior dysmenorrhea exercise literature indicates a large anticipated effect size (Cohen's d ≥ 0.80), meaning that a sample of 15 subjects per group offers sufficient statistical power to detect a significant reduction in menstrual pain intensity while minimizing random data fluctuations typical of small-scale field designs (Bruserud et al., 2020). The target population encompassed all seventh-grade female students enrolled at SMPN 1 Tumpang, comprising a total of 160 individuals. Recruitment followed a transparent multi-stage screening process. Initially, a universal screening using the Numeric Rating Scale (NRS) identified 45 students suffering from regular menstrual distress. Eligibility criteria were then applied to this sub-population. Inclusion required participants to have reached menarche, experience primary dysmenorrhea with a baseline NRS score ≥ 4 (moderate to severe category), and possess no history of systemic gynecological disorders, pelvic pathologies, or anatomical abnormalities (Bruserud et al., 2020). To rigorously differentiate primary from secondary dysmenorrhea and rule out pathological abnormalities, a structured Gynecological and Menstrual History Questionnaire (GMHQ) was administered alongside a review of institutional health forms. To ensure diagnostic validity, these screenings were performed by the principal investigator—a final-year midwifery student at the Institut Teknologi Sains dan Kesehatan (ITSK) RS dr. Soepraoen Malang under the direct supervision and confirmation of senior certified clinical midwifery faculty. Following this assessment, 35 students met all eligibility requirements, of whom 5 declined to participate due to personal schedule conflicts. From the remaining 30 eligible students, simple random sampling via a lottery system selected the final 30 respondents.

The research protocol underwent strict ethical review and was granted formal clearance by the Health Research Ethics Committee (KEPK) of the ITSK Dr. Soepraoen Hospital Malang. Participant protection was rigorously maintained; comprehensive explanations of all procedures were provided, and written informed consent was obtained from both the adolescent students and their legal guardians prior to data collection. Administrative authorization was also officially granted by the management of SMPN 1 Tumpang (Parmelli et al., 2021). Conducting dysmenorrhea exercises on a fixed schedule of three times per week was unfeasible due to the biological constraints of the menstrual cycle duration. Instead, the intervention was strategically scheduled exclusively during the first and second days of menstruation, aligning precisely with the respondents' peak pain phases. To ensure a uniform intervention dose and eliminate confounding duration variances, the protocol was strictly standardized to exactly 20 minutes per session, completely removing flexible timing brackets. The physical regimen was structured into four sequential, highly regulated components, beginning with three minutes of deep breathing techniques to induce initial relaxation, which was immediately followed by five minutes of the bridge pose consisting of five distinct repetitions of 45-second holds separated by 15-second passive rest intervals. Next, participants executed the knee-to-chest pose for five minutes, utilizing five alternating repetitions per leg with a 10-second hold for each extension, before finally concluding the routine with seven minutes dedicated to the child's pose for comprehensive neuromuscular relaxation. Every session was fully guided and face-to-face under the direct supervision of the researcher to ensure postural accuracy, and participant compliance was meticulously logged using structured observation sheets (Carroquino-Garcia et al., 2019; Logan et al., 2018; Anguera et al., 2018). Respondents in the control cohort did not undergo the physical exercise routine but continued active monitoring of their pain intensity. To mitigate potential biases stemming from the non-randomized assignment, confounding variables were systematically managed. Baseline pain intensity variations were controlled using statistical homogeneity and baseline equivalence testing.

Confounding from pharmaceutical analgesics and co-existing medical conditions was minimized through the strict application of the inclusion/exclusion filters. Furthermore, control participants were explicitly instructed to abstain from chemical pain relievers and other non-pharmacological modalities (such as warm compresses or excessive bed rest) throughout the active measurement cycle. Conversely, lifestyle and biological confounders including psychological stress levels, sleep quality, nutritional status, and individual menstrual cycle dynamics were not directly monitored due to field constraints and are acknowledged as inherent

study limitations (Rahnenführer et al., 2023; Zhang et al., 2026; Marabita et al., 2022; Baber et al., 2026). Menstrual pain intensity was quantified using the Numeric Rating Scale (NRS) across a 0–10 spectrum, an instrument extensively validated for evaluating adolescent pain severity. Baseline comparability was evaluated via the Mann-Whitney U or Chi-Square test to confirm that both cohorts displayed statistically equivalent conditions prior to any treatment. Data distribution normality was verified using the Shapiro-Wilk test. Given the non-normal distribution of the data, the Wilcoxon Signed Rank Test was applied as the bivariate analytical method to assess intra-group shifts before and after treatment. Concurrently, the Mann-Whitney U test was deployed to evaluate differences in pain reduction efficacy between the intervention and control groups, operating at a 95% confidence level ($\alpha = 0.05$) (Murphy et al., 2020).

RESULTS AND DISCUSSION

Gathered from a cohort of 30 female students at SMPN 1 Tumpang, the primary data from this quasi-experimental investigation offers a detailed assessment regarding how structured physical routines affect menstrual discomfort. To ensure a transparent statistical representation of the shifts in pain intensity, a descriptive summary of both cohorts is outlined in Table 1.

Table 1. Descriptive Assessment of Pain Intensity Pre- and Post-Observation

Group	N	Timeline	Mean	Standard Deviation (SD)	Intra-group p-value
Intervention	15	Pre-test	5.87	0.915	0.001
		Post-test	2.40	0.828	
Control	15	Pre-test	5.60	0.737	0.157
		Post-test	5.53	0.834	

Source: Processed Primary Data (2026)

To fortify the quantitative reporting and validate the methodological integrity required by a non-equivalent control group framework, baseline equivalence tests and between-group comparative analyses were executed utilizing the non-parametric Mann-Whitney U method. These analytical outcomes are synthesized in Table 2:

Table 2. Between-Group Comparative Analysis (Intervention vs. Control)

Observation Phase	Mean Difference	Asymptotic Significance *(p-value)*	Interpretation
Pre-test *(Baseline)*	0.27	0.422	Homogeneous / Equivalent
Post-test *(Endpoint)*	3.13	< 0.001	Significantly Divergent

Source: Processed Primary Data (2026)

As documented in Table 1, intra-group evaluation via the Wilcoxon Signed Rank test verifies a highly notable reduction in pain metrics within the experimental cohort, plunging from an initial baseline of 5.87 to an endpoint score of 2.40 ($p = 0.001$). Conversely, the control group exhibited relatively stagnant pain indices, moving marginally from 5.60 to 5.53 by the end of the observation window ($p = 0.157$). Furthermore, data from Table 2 demonstrates that both cohorts maintained statistically equivalent or homogeneous baselines prior to the introduction of any physical routine ($p = 0.422$). At the final assessment phase, however, a highly pronounced and statistically significant divergence emerged between the intervention and control cohorts ($p < 0.001$).

Observations gathered from the control cohort indicate that participants who did not engage in the targeted dysmenorrhea exercises maintained highly uniform pain scales throughout the monitoring timeframe. The minor shift in average pain indices from 5.60 to 5.53, yielding a non-significant value of $p = 0.157$ ($p > 0.05$), underscores an absence of meaningful clinical or statistical variance. This empirical pattern suggests that during the initial forty-eight

hours of menstruation, primary dysmenorrhea symptoms tend to remain persistent if no active therapies are introduced.

Existing literature frequently links this continuous discomfort to the endometrial shedding process, during which sedentary rest devoid of targeted physical stimuli allows uterine contractions to perpetuate at peak intensity (Ensari et al., 2022). Although theoretical frameworks posit that such prolonged pain correlates with elevated prostaglandin concentrations within adolescent bodies (Jain et al., 2022; Niringiyumukiza et al., 2018), the present investigation did not quantify these specific biochemical variables directly. Consequently, the control group's metrics serve strictly as empirical evidence that natural, unassisted recovery mechanisms during the peak menstrual phase lack the necessary capacity to alleviate pain intensity without active therapeutic movement.

An initial screening of the participants' baseline profiles revealed that both the intervention and control cohorts commenced the study suffering from moderate dysmenorrhea, with pain scores hovering around the 5-point threshold (Hidayat et al., 2024). This clinical baseline emphasizes that primary dysmenorrhea poses a substantial physical burden for the students at SMPN 1 Tumpang, carrying the risk of undermining their daily academic focus and productivity (Maity et al., 2022; Wong, 2018). Generally, such elevated initial pain scores are understood to stem from uterine ischemia, a physiological state brought on by severe contraction pressures that constrain local oxygen delivery (Reavey et al., 2021).

Within a quasi-experimental research architecture, establishing early parity between cohorts is of paramount importance. The statistical computations here indicated that the initial variation between groups was entirely negligible ($p = 0.422$), validating that the cohorts were statistically equivalent prior to any intervention. This initial homogeneity effectively mitigates potential confounding risks associated with selection bias, thereby rendering a highly robust and dependable baseline from which to measure the true therapeutic impact of dysmenorrhea exercises (Fallah & Mirfeizi, 2018).

Following the implementation of the supervised dysmenorrhea exercise regimen, the treatment cohort exhibited a marked decline in pain metrics down to an average of 2.40, a score aligned with the mild pain classification (Clara Wulanda et al., 2024). This 59.11% reduction highlights the practical and clinical utility of this specific physical protocol. A variety of scholarly sources suggest that the deliberate movements involved in dysmenorrhea-specific exercises possess the capacity to enhance vascular efficiency throughout the pelvic region (Abdelnaby et al., 2022; Hotta & Muller-Delp, 2022). This heightened circulatory flow is theoretically thought to optimize tissue metabolism within the myometrium, thereby accelerating the clearance of localized chemical irritants that prompt nociceptive responses (Das et al., 2018).

This transition from moderate to mild pain scales likely mirrors an underlying state of neuromuscular relaxation, which works to decrease intrauterine pressures and provide subsequent physical comfort to the students (Barcikowska et al., 2022). Because localized physical markers such as pelvic vascular velocity and uterine muscular tension were not monitored via direct clinical diagnostic apparatuses in this study, these physiological phenomena are framed as probable recovery pathways validated by prior empirical literature.

In a final synthesis, comparing the post-test endpoints between the intervention and control cohorts brought to light an exceptionally stark contrast, yielding a high significance level of $p < 0.001$. This statistical proof strongly reinforces the assertion that targeted dysmenorrhea exercises outperform passive monitoring in successfully reducing pain severity. From a neurological standpoint, this therapeutic success is commonly interpreted through the lens of the Gate Control Theory. Engaging in systematic physical activities is widely believed to prompt the systemic release of endorphins endogenous opioids that impede the transmission of pain impulses along neural pathways to the cerebral cortex (Sluka et al., 2018; Vaegter et al., 2019). This mechanism ultimately accounts for the elevated pain tolerance thresholds observed among the students following the exercise regimen (Carroquino-Garcia et al., 2019).

Notwithstanding the robust statistical significance reported, the modest sample size of 15 subjects per cohort requires a measured approach when extrapolating these conclusions broadly without broader, multi-site replications. Collectively, however, the empirical insights gathered from this study solidify the theoretical position that dysmenorrhea exercises represent a highly encouraging, safe, and easily adoptable non-pharmacological strategy. It equips adolescents with the means to manage their reproductive wellness autonomously, minimizing reliance on conventional chemical analgesics (Armour et al., 2019).

CONCLUSION

Based on a series of data analysis and discussion in this study, the main conclusion is that dysmenorrhea exercise intervention has been empirically proven to have a very significant effect on reducing the degree of menstrual pain in adolescent girls at SMPN 1 Tumpang. This finding automatically answers the problem formulation and validates the research hypothesis through evidence of statistically contrasting differences in pain intensity between the experimental and control groups post-intervention (Siregar et al., 2025; Solon et al., 2024). The transition of pain scores from the moderate to mild category in the treatment group confirms that structured physical activity can stimulate uterine muscle relaxation and trigger the release of endorphins as the body's natural analgesics, making this non-pharmacological strategy crucial in improving adolescents' physical comfort during the monthly cycle (Armour et al., 2019; Sluka et al., 2018; Vaegter et al., 2019).

SUGGESTION

As a suggestion for application and scientific development, researchers recommend that dysmenorrhea exercises be integrated into school health education programs and become a standard operating procedure (SOP) in health centers (UKS) and primary health facilities as a safe and economical treatment solution (Hidayat et al., 2024). For future researchers, it is recommended to expand the scope of research by exploring confounding variables such as nutritional status, sleep patterns, and stress levels, and implement longitudinal monitoring over several future cycles to obtain a more comprehensive picture of long-term effectiveness (Dixon et al., 2023; Rogan & Black, 2023; Zhao et al., 2021).

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