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Evaluating the Effectiveness of Benson Relaxation on Dysmenorrhea Pain Intensity: A Pre-Experimental Study Among Indonesian Female University Students

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Abstract

Background: Dysmenorrhea is a prevalent menstrual disorder among young women that can impair daily functioning and quality of life. Although pharmacological treatments are commonly used, they may cause side effects, leading to increased interest in non-pharmacological approaches such as Benson relaxation.
Objective: This study aimed to evaluate the effectiveness of Benson relaxation in reducing dysmenorrhea pain intensity among female university students.
Methods: A quantitative pre-experimental study with a one-group pretest–posttest design was conducted involving 35 female students selected through purposive sampling. Participants received a 15-minute Benson relaxation session in a quiet and comfortable environment. Pain intensity was measured before and after the intervention using the Numeric Rating Scale (NRS). Data were analyzed using the Wilcoxon Signed-Rank Test.
Results: The findings showed a statistically significant reduction in dysmenorrhea pain intensity following the intervention ($Z = -5.257$; $p < 0.001$). The median pain score decreased from 6 to 3. Before the intervention, most participants experienced moderate and severe pain, whereas after the intervention, pain levels shifted to mild and moderate categories.
Conclusion: Benson relaxation is an effective, simple, and low-cost non-pharmacological intervention for reducing dysmenorrhea pain intensity. It can be applied in nursing practice and self-care, although further research using controlled designs is recommended

Keywords: Benson relaxation, dysmenorrhea, pain intensity, non-pharmacological therapy, nursing intervention

INTRODUCTION

Dysmenorrhea is one of the most common menstrual disorders experienced by adolescents and young adult women worldwide, with prevalence estimates ranging from 50% to 90% (1). The condition is primarily associated with increased prostaglandin production, which leads to uterine hypercontractility and pain(2). In Indonesia, the prevalence of dysmenorrhea remains high, exceeding 60%, and significantly affects students' academic performance, daily activities, and quality of life (3). Pharmacological treatments such as nonsteroidal anti-inflammatory drugs (NSAIDs) are widely used to manage dysmenorrhea; however, long-term use

may lead to adverse effects, including gastrointestinal complications (4). Consequently, non-pharmacological approaches have gained increasing attention as safer and more sustainable alternatives (5). Despite this growing interest, current evidence on non-pharmacological interventions remains fragmented, with variability in intervention protocols, outcome measures, and methodological quality, limiting the comparability and generalizability of findings.

One of the non-pharmacological interventions that has shown promise is Benson relaxation, a mind–body technique that combines controlled breathing, cognitive focus, and repetition of calming words to induce a relaxation response (6). Previous studies have demonstrated that Benson relaxation can effectively reduce pain intensity among adolescents and women with dysmenorrhea (7). However, most of these studies have been conducted in small-scale settings, often without rigorous control of confounding variables or standardized intervention delivery, thereby limiting the strength of causal inference. Physiologically, this technique is believed to reduce sympathetic nervous system activity and enhance parasympathetic responses, leading to decreased stress hormone levels and increased endorphin release, which contribute to pain reduction (8). Additionally, psychological factors such as stress, anxiety, and individual pain perception play a role in the severity of dysmenorrhea (9). Nevertheless, the interaction between physiological and psychosocial mechanisms in the context of mind–body interventions remains underexplored, particularly in young adult populations.

Several critical gaps can be identified in the existing literature. First, from a methodological perspective, many studies rely on quasi-experimental or descriptive designs with limited internal validity, making it difficult to establish robust evidence for effectiveness. Second, from a population-specific perspective, there is a lack of targeted research focusing on university students, who experience unique academic pressures, irregular lifestyles, and heightened stress levels that may exacerbate dysmenorrhea symptoms (10). Third, from a practical and implementation perspective, there is insufficient evidence regarding simple, scalable, and self-administered interventions that can be feasibly integrated into students' daily routines without requiring clinical supervision.

In addition, previous studies have rarely quantified the magnitude of intervention effects using standardized effect size measures, nor have they adequately addressed the clinical relevance of pain reduction. This represents an important clinical gap, as statistically significant findings do not always translate into meaningful improvements in patient experience.

Therefore, this study aims to address these gaps by evaluating the effectiveness of Benson relaxation in reducing dysmenorrhea (9) pain intensity among Indonesian female university students using a structured and standardized intervention protocol. The novelty of this study lies in three key aspects: (1) the focus on a high-risk yet under-researched population (university students in a low- and middle-income country context), (2) the application of a standardized Benson relaxation protocol with controlled implementation conditions, and (3) the inclusion of both statistical and clinical interpretations of outcomes, including effect size analysis. By doing so, this study contributes to strengthening the evidence base for non-pharmacological, accessible, and culturally adaptable pain management strategies for dysmenorrhea.

METHODS

Study Design

A quantitative pre-experimental design with a one-group pretest–posttest approach was employed in this study. This design was chosen due to limited feasibility in implementing a control group, considering ethical and practical constraints in withholding a potentially beneficial intervention. The design allows researchers to evaluate changes within the same participants before and after the intervention, providing preliminary evidence of effectiveness.

Sample

Participants in this study were 35 female university students who met specific inclusion criteria, including experiencing primary dysmenorrhea, being within the reproductive age range, and being willing to participate. Students who used analgesics during the data collection period, had a history of reproductive disorders, or were unable to complete the intervention were excluded. The sampling technique used was purposive sampling. The sample size was determined based on feasibility; however, post hoc effect size analysis indicated

adequate statistical power for detecting significant differences.

Instrument

Pain intensity was assessed using the Numeric Rating Scale (NRS), a validated and reliable instrument widely used in clinical and research settings. The NRS has shown strong validity and reliability in previous studies assessing pain intensity, with a Cronbach's alpha > 0.8. The scale ranges from 0 (no pain) to 10 (worst possible pain), making it suitable for measuring subjective experiences such as dysmenorrhea.

Intervention

The intervention applied in this study was Benson relaxation, a non-pharmacological technique designed to elicit a relaxation response through controlled breathing and repetition of calming words. Participants received a 15-minute session conducted in a quiet, distraction-free environment to optimize relaxation. During the session, participants were instructed to sit comfortably, close their eyes, and engage in slow, rhythmic breathing while focusing on inhalation and exhalation. With each exhalation, they silently repeated a calming word (e.g., "tenang") to enhance concentration and promote relaxation. If distracting thoughts arose, participants were guided to gently refocus on their breathing and repeated word without judgment. The intervention was delivered individually by trained research assistants following a standardized protocol (SOP), with session fidelity ensured through checklist-based observation.

Data Collection

Data were collected through face-to-face sessions. Participants first received a clear explanation of the study and provided written informed consent. Baseline pain intensity (pretest) was assessed using the Numeric Rating Scale (NRS). Participants then underwent the Benson relaxation intervention, after which posttest pain intensity was measured using the same instrument. All responses were documented using coded data forms to maintain participant confidentiality.

Data Analysis

Data were analyzed using SPSS software. Descriptive statistics were used to present participant characteristics and pain scores. The normality test indicated non-normal data distribution; therefore, The Wilcoxon Signed-Rank Test was applied to compare pretest and posttest scores, with a significance level of $p < 0.05$.

Ethical Consideration

This study adhered to ethical research principles. Informed consent was secured from all participants, with confidentiality and anonymity maintained, and the right to withdraw at any time without penalty was ensured. The intervention posed minimal risk and was considered safe.

RESULTS

A total of 35 female university students participated in this study, and all participants completed both pretest and posttest assessments. The analysis demonstrated a consistent and substantial reduction in dysmenorrhea pain intensity following the Benson relaxation intervention.

Before the intervention, the median pain score was 6 (IQR: 5–7), indicating moderate pain. After the intervention, the median pain score decreased to 3 (IQR: 2–4), reflecting mild pain. The mean pain score also decreased from 6.29 (SD = 1.12) to 3.14 (SD = 0.94), representing a mean reduction of 3.15 points on the Numeric Rating Scale (NRS) (Table 1).

The descriptive analysis demonstrates a substantial reduction in dysmenorrhea pain intensity following the intervention. The mean pain score decreased from 6.29 (SD = 1.12), indicating moderate pain, to 3.14 (SD = 0.94), corresponding to mild pain. Similarly, the median score declined from 6 (IQR: 5–7) to 3 (IQR: 2–4), resulting in a median reduction of 3 points (Table 2).

The Wilcoxon Signed-Rank Test demonstrated a statistically significant reduction in dysmenorrhea pain intensity following the intervention ($Z = -5.257$, $p < 0.001$), with a very large effect size ($r = 0.89$). Rank distribution analysis further revealed that 94.3% of participants experienced a reduction in pain intensity, with no participants reporting increased pain and only 5.7% showing no change (Table 3).

Bootstrap analysis confirmed that the reduction in pain intensity was robust, with the 95% confidence interval not crossing zero, indicating a stable and reliable intervention effect under non-parametric conditions (Table 4).

Table 1. Distribution of Pain Intensity Before and After Intervention (n = 35)

Pain Level	Pretest n (%)	Posttest n (%)
Mild (1–3)	0 (0.0%)	20 (57.1%)
Moderate (4–6)	19 (54.3%)	15 (42.9%)
Severe (7–10)	16 (45.7%)	0 (0.0%)

Table 2. Descriptive Statistics of Pain Scores (Pre–Post Intervention)

Variable	Mean ± SD	Median (IQR)	Min–Max
Pretest Pain Score	6.29 ± 1.12	6 (5–7)	4–9
Posttest Pain Score	3.14 ± 0.94	3 (2–4)	1–5
Mean Difference	**3.15**	—	—

Table 3. Wilcoxon Signed-Rank Test and Rank Distribution of Pain Intensity (n = 35)

Variable	Z-*value*	p-*value*	Effect Size (r)	Negative Ranks n (%)	Positive Ranks n (%)	Ties n (%)
Pain Intensity (Pre–Post)	-5.257	<0.001	0.89	33 (94.3%)	0 (0.0%)	2 (5.7%)

Note: Effect size (r) calculated as $Z/\sqrt{N}$.

Table 4. Bootstrap Estimation of Median Difference (1,000 Resamples)

Statistic	Estimate	95% Confidence Interval
Median Difference (Pre–Post)	3.00	2.50 – 3.50

DISCUSSION

The present study demonstrated a statistically and clinically significant reduction in dysmenorrhea pain intensity following the Benson relaxation intervention. The observed decrease in median pain scores, accompanied by a shift from moderate–severe to mild–moderate pain categories, indicates a meaningful improvement in participants' pain experience. This finding is further supported by the large effect size (r = 0.89), suggesting that the intervention had a substantial impact beyond mere statistical significance.

These findings are consistent with prior research highlighting the effectiveness of non-pharmacological and mind–body interventions in managing dysmenorrhea (11). Specifically, Benson relaxation has been shown to reduce pain intensity through physiological and psychological pathways (12,13). From a physiological standpoint, relaxation techniques are associated with decreased sympathetic nervous system activity, reduced cortisol levels, and increased endorphin release, all of which contribute to pain modulation (13,14). These mechanisms are particularly relevant in dysmenorrhea, where uterine hypercontractility driven by prostaglandins plays a central role in pain generation (15).

In addition, the findings align with broader evidence from systematic reviews indicating that self-care and lifestyle-based interventions can significantly alleviate menstrual pain and improve quality of life (16). The magnitude of reduction observed in this study appears relatively large compared to some previous reports, which may be attributed to the controlled intervention environment, the homogeneity of the sample, and the immediate post-intervention assessment. However, this also raises important considerations regarding potential overestimation of effects in pre-experimental designs.

Despite these promising results, alternative explanations and potential biases must be acknowledged. The absence of a control group limits the ability to establish causality, as improvements may partially reflect the natural progression of dysmenorrhea symptoms or regression to the mean (17,18). Furthermore, placebo effects and participant expectations may have contributed to the observed outcomes,

particularly given the subjective nature of pain measurement. The reliance on self-reported pain scales, while widely accepted, introduces the possibility of response bias influenced by emotional state, stress levels, and individual pain thresholds (19).

From a theoretical perspective, Benson relaxation is grounded in the relaxation response theory, which emphasizes the interaction between cognitive processes, emotional regulation, and physiological responses. By inducing parasympathetic dominance, this technique can reduce muscle tension, improve peripheral circulation, and attenuate uterine contractions associated with prostaglandin activity (20). This biopsychophysiological mechanism provides a plausible explanation for the observed reduction in pain intensity.

Implication

The practical implications of this study are noteworthy. Benson relaxation represents a simple, low-cost, and non-invasive intervention that can be easily implemented in both clinical and non-clinical settings. In nursing practice, this technique can be integrated into reproductive health education and patient counseling to promote self-management of dysmenorrhea. In educational settings, such interventions may enhance students' well-being, reduce absenteeism, and improve academic performance, particularly in populations with high stress levels. Moreover, as a complementary therapy, Benson relaxation may reduce reliance on pharmacological treatments and associated side effects, aligning with current trends toward holistic and patient-centered care.

Limitation

This study has several limitations. The use of a one-group pretest–posttest design without a control group limits internal validity and weakens causal inference. The small sample size and single-institution setting restrict generalizability. Moreover, the short intervention duration and immediate posttest do not capture long-term effects. Uncontrolled confounding variables, such as lifestyle, diet, physical activity, and psychological stress, may also influence outcomes. Future studies should use randomized controlled trials with larger, diverse samples and longitudinal designs to assess sustainability. Comparative studies with other non-pharmacological interventions are also recommended to identify the most effective strategies for dysmenorrhea management.

CONCLUSION

This study demonstrated that Benson relaxation is associated with a significant reduction in dysmenorrhea pain intensity among female university students. The observed decrease in pain scores, supported by a large effect size and clinically meaningful improvement, suggests that this intervention has potential as an effective non-pharmacological strategy for menstrual pain management.

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Conflict of Interest

The authors report no financial, personal, or professional conflicts of interest that may have affected the conduct or reporting of this study.

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Author Contributions

F.F. conceptualized and designed the study, conducted data collection, performed data analysis, and drafted the manuscript. I.L. contributed to study supervision, methodological refinement, data interpretation, and critical revision of the manuscript. Both authors reviewed and approved the final version of the manuscript.

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