

The Comparative Effectiveness of Deep Breathing Relaxation and Light Dysmenorrhea Exercise on Menstrual Pain Intensity in Adolescent Girls

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ABSTRACT

Dysmenorrhea is one of the most common menstrual disorders experienced by adolescent girls, which can interfere with daily activities and academic performance. Non-pharmacological interventions such as deep breathing relaxation and light dysmenorrhea exercise are widely recommended to reduce pain intensity. This study aims to compare the effectiveness of deep breathing relaxation and light dysmenorrhea exercise on menstrual pain intensity in adolescent girls. This research uses a quasi-experimental design with a pretest-posttest control group. A total of 36 respondents were selected using purposive sampling and divided equally into two intervention groups. Pain intensity was measured using the Numeric Rating Scale (NRS) before and after the intervention. Data were analyzed using the Wilcoxon signed-rank test and the Mann-Whitney U test with a significance level of 0.05. The results showed that both interventions significantly reduced dysmenorrhea pain intensity ($p=0.000$). However, the Mann-Whitney U test showed a significant difference between the two groups ($p=0.032$), where the light dysmenorrhea exercise group experienced a greater reduction in pain compared to the deep breathing relaxation group.

Keywords: deep breathing relaxation, dysmenorrhea, dysmenorrhea exercise, menstrual pain

BACKGROUND

Menstruation is a physiological process that occurs during a woman's reproductive age, often accompanied by discomfort or pain known as dysmenorrhea. According to WHO (2020), around 90% of adolescent girls experience dysmenorrhea, with 15% suffering from severe pain that interferes with daily activities. In Indonesia, the prevalence reaches 64.25%, with the highest cases in the 15–19 age group.

Pain during dysmenorrhea is primarily caused by excessive production of prostaglandins, which increase uterine contractions. Pharmacological management such as analgesics is commonly used, but long-term use carries potential side effects. Therefore, non-pharmacological methods are increasingly being promoted, including deep breathing relaxation which reduces muscle tension and increases oxygen supply and light dysmenorrhea exercise, which improves blood circulation and promotes endorphin release.

Preliminary observations revealed that many students still rely on analgesics or endure the pain without any coping strategies. This study was conducted to provide evidence-based recommendations for alternative pain management.

METHODS

This study used a quasi-experimental pretest-posttest control group design. The population consisted of all female students aged 15–18 years who experienced primary dysmenorrhea. Using purposive sampling, 36 respondents were selected and divided into two equal groups:

Deep Breathing Relaxation

Deep breathing relaxation is a simple yet effective technique that focuses on controlling the breath to promote physical and psychological calmness. This method involves taking slow, deep breaths through the nose, allowing the lungs to fill completely, and then exhaling gently through the mouth. By practicing this breathing pattern regularly, the body activates the parasympathetic nervous system, which helps reduce stress, improve oxygen circulation, and relieve tension in the muscles. For individuals experiencing menstrual pain, deep breathing can provide a soothing effect by decreasing the perception of discomfort and promoting relaxation.

Physiological Benefits of Deep Breathing

When practiced consistently, deep breathing relaxation improves blood flow and increases oxygen supply to tissues, which can reduce uterine muscle spasms that contribute to dysmenorrhea. It also lowers cortisol levels, thereby lessening the body's stress response and enhancing pain tolerance. This technique does not require special equipment, making it accessible and practical for women to perform at home or in clinical settings. In addition, deep breathing exercises can positively influence mood and reduce anxiety, which are often associated with menstrual pain episodes.

Light Dysmenorrhea Exercise

Light dysmenorrhea exercise consists of simple, low-intensity physical activities designed to ease menstrual cramps. Examples of these exercises include gentle stretching, pelvic tilts, yoga poses, or light aerobic movements such as walking. These activities improve blood circulation, especially in the pelvic area, and help release endorphins, which are the body's natural painkillers. Regular exercise has been shown to decrease the severity and duration of dysmenorrhea by reducing uterine contractions and promoting better overall physical health.

Physiological Benefits of Light Exercise

Engaging in light exercise during menstruation enhances flexibility, relaxes tense muscles, and provides a natural way to alleviate discomfort without relying solely on medication. In addition to pain reduction, exercise also boosts energy levels and reduces symptoms such as bloating and fatigue. Compared to high-intensity workouts, light dysmenorrhea exercise is safer and more comfortable for women experiencing pain, as it does not put excessive strain on the body. Therefore, incorporating light physical activity during menstruation can serve as a sustainable and beneficial strategy for managing dysmenorrhea in the long term.

Each intervention was given for 10–15 minutes, once daily for two consecutive days during menstruation. Pain intensity was measured using the Numeric Rating Scale (NRS) before and after the intervention.

Wilcoxon signed-rank test

The Wilcoxon signed-rank test is a non-parametric statistical method used to compare two related samples, matched samples, or repeated measurements on a single group. In this study, the test is applied for within-group analysis, meaning it evaluates the effectiveness of the intervention (deep breathing relaxation or light dysmenorrhea exercise) by comparing the pre-test and post-test scores of the same participants. This method is suitable when the data do not follow a normal distribution, as it relies on the ranking of differences rather than the actual values.

Rationale for using the Wilcoxon signed-rank test

Since menstrual pain intensity is often measured on an ordinal scale (for example, using a pain rating scale), the Wilcoxon signed-rank test is appropriate because it can handle ordinal or non-normally distributed interval data. The test determines whether there is a statistically significant change in outcomes within each group before and after the intervention. If the results are significant, it suggests that the treatment had a measurable effect on reducing dysmenorrhea symptoms in that specific group.

Mann-Whitney U test

The Mann-Whitney U test, also known as the Wilcoxon rank-sum test, is used for between-group analysis to compare differences between two independent groups. In this case, the test evaluates whether there is a significant difference in outcomes between Group A (deep breathing relaxation) and Group B (light dysmenorrhea exercise). Unlike parametric tests such as the independent samples t-test, the Mann-Whitney U test does not assume a normal distribution, making it suitable for small sample sizes or ordinal data.

Significance level: $\alpha = 0.05$

The significance level (alpha) is set at 0.05, which means there is a 5% risk of concluding that a difference exists when there is none (Type I error). If the p-value obtained from the Wilcoxon signed-rank test or Mann-Whitney U test is less than 0.05, the result is considered statistically significant. This threshold ensures that the findings are both reliable and valid, allowing researchers to determine the effectiveness of each intervention within groups as well as differences between the two treatment groups.

RESULTS

Table 1. Characteristics of Respondents by Age

Age (years)	Group A (n=18)	Group B (n=18)
15–16	8 (44.4%)	7 (38.9%)
17–18	10 (55.6%)	11 (61.1%)

Table 2. Pain Intensity Before and After Intervention

Group	Pretest Mean $\pm$ SD	Posttest Mean $\pm$ SD	p-value (Wilcoxon)
A (Deep breathing)	6.17 $\pm$ 1.01	3.72 $\pm$ 0.89	0.000
B (Exercise)	6.33 $\pm$ 0.97	2.67 $\pm$ 0.76	0.000

Table 3. Between-group Comparison of Pain Reduction

Test	Mean Rank A	Mean Rank B	p-value (Mann-Whitney)
Pain Reduction	14.89	22.11	0.032

DISCUSSION

The results of the study indicate that both interventions deep breathing relaxation and light dysmenorrhea exercise are effective in significantly reducing the intensity of menstrual pain among participants. This outcome provides strong evidence that non-pharmacological approaches can be valuable alternatives or complementary strategies in the management of dysmenorrhea. Both techniques target different physiological mechanisms, yet each contributes meaningfully to lowering the discomfort associated with menstruation.

Deep breathing relaxation, in particular, works by stimulating the parasympathetic nervous system, which helps calm the body and reduce muscle tension. The practice of slow, controlled

breathing improves oxygenation of body tissues and enhances blood flow, leading to decreased muscle spasms. These physiological changes help to alter the perception of pain, making the cramps feel less severe. Previous research supports the idea that relaxation techniques can regulate stress responses, thereby reducing both physical and psychological discomfort during menstruation.

On the other hand, the light dysmenorrhea exercise group demonstrated a greater reduction in pain intensity compared to the relaxation group. This may be attributed to the active nature of the intervention, as physical activity enhances pelvic blood circulation and prevents ischemia in uterine muscles. Improved circulation ensures that the tissues receive sufficient oxygen, which plays a crucial role in minimizing muscle contractions that are often responsible for menstrual cramps.

Another key mechanism underlying the effectiveness of exercise is the release of endorphins, which function as natural painkillers. Endorphins not only reduce the perception of pain but also improve mood, counteracting the irritability and emotional stress that often accompany dysmenorrhea. Compared to passive relaxation, physical exercise provides a more dynamic response by addressing both physiological and psychological aspects of menstrual pain.

Moreover, light exercise such as stretching, yoga, or gentle aerobic movement can increase overall flexibility and muscle relaxation in the pelvic region. These activities are particularly beneficial in reducing the frequency and severity of uterine spasms, which are the main source of pain in primary dysmenorrhea. In this way, exercise provides a more comprehensive approach by promoting long-term physical resilience in addition to immediate pain relief.

While both methods have proven to be beneficial, their differences highlight the importance of tailoring interventions to individual needs. Deep breathing relaxation may be particularly useful for individuals who prefer a simple, non-strenuous, and easily accessible technique, especially when exercise is not feasible due to fatigue, limited space, or cultural considerations. It can also serve as an introductory strategy for adolescents who are just beginning to learn non-pharmacological pain management methods.

Conversely, light dysmenorrhea exercise may be more suitable for those who are physically active or who experience moderate to severe levels of menstrual pain. The physical engagement not only provides immediate relief but also fosters long-term health benefits such as improved cardiovascular fitness and hormonal balance. As such, exercise-based interventions can play a dual role in both acute pain management and overall health promotion.

In conclusion, the findings of this study support the integration of both deep breathing relaxation and light dysmenorrhea exercise as effective non-drug interventions for managing menstrual pain. While relaxation techniques offer simplicity and accessibility, light exercise demonstrates superior benefits by addressing multiple physiological pathways. Health practitioners and educators should consider promoting these techniques, particularly among adolescent girls, as part of a holistic strategy to improve menstrual health and overall well-being.

CONCLUSION

The study concludes that both deep breathing relaxation and light dysmenorrhea exercise are effective in significantly reducing menstrual pain intensity among adolescent girls. However, light dysmenorrhea exercise demonstrates greater effectiveness compared to relaxation techniques, as it more actively improves circulation and reduces uterine spasms. Based on these findings, schools and health educators are encouraged to integrate simple dysmenorrhea exercise routines into health promotion programs, providing adolescent girls with practical, non-pharmacological strategies to manage menstrual pain and improve their overall well-being.

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