



Mindfulness and Meditation Education: Innovative Solutions for Menstrual Pain among Teenagers at SMAN 5 Karawang

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ABSTRACT

Primary dysmenorrhea is one of the most common menstrual disorders experienced by female students at secondary school level. Even though it is often considered trivial, primary dysmenorrhea can affect the quality of life, academic performance and emotional well-being of female students. Various therapies have been used to treat pain due to primary dysmenorrhea, especially pharmacological ones. However, it is no less interesting, new breakthroughs in non-pharmacological studies include mindfulness and meditation techniques which are known to have the potential to reduce pain and stress, but their effectiveness in treating primary dysmenorrhea pain has not been widely studied.

This research used a randomized controlled trial method with a sample of 150 female students at SMAN 5 Karawang who experienced primary dysmenorrhea. They were divided into three groups: control group, mindfulness group, and meditation group. The intervention period was 8 weeks. Pain level was measured using a Visual Analog Scale (VAS). The results showed that after 8 weeks of intervention, compared with the control group, the mindfulness education group showed an average reduction in pain of 35% ($p < 0.01$), and the meditation group showed a reduction in pain of 40% ($p < 0.001$) compared with the control group only showed a 5% decrease.

These results indicate that mindfulness education and meditation can be used as non-pharmacological alternatives to reduce pain in primary dysmenorrhea. Through this method, female students not only benefit from pain relief but also increased awareness and mental well-being.

Key words: Mindfulness, Meditation, Menstrual Pain, Teenagers.

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INTRODUCTION

Menstrual pain, especially primary dysmenorrhea, is one of the most common health complaints and is frequently faced by adolescent girls throughout the world. Primary dysmenorrhea is defined as cramping pain in the lower abdomen that occurs just before or during menstruation, in the absence of other diseases such as endometriosis. The prevalence rate reaches 90 percent. The initial presentation of primary dysmenorrhea usually occurs in adolescence. It is a common cause of absenteeism and reduced quality of life in women. The problem is often underdiagnosed and undertreated.

Women with primary dysmenorrhea experience increased endometrial prostaglandin production, which results in increased uterine tone and stronger, more frequent uterine contractions. Nonsteroidal anti-inflammatory drugs are the mainstay of treatment, with the addition of oral contraceptive pills if necessary. About 10 percent of affected women do not respond to these measures. It is important to consider secondary causes of dysmenorrhea in women who do not respond to initial treatment. Many alternative treatments (ranging from acupuncture to laparoscopic surgery) have been studied, but supporting research is scant, with limited long-term follow-up [1].

Globally, it is estimated that 50-90% of adolescent girls experience primary dysmenorrhea. In Indonesia itself, the incidence of dysmenorrhea is quite large, showing that dysmenorrhea sufferers reach 60-70% of women in Indonesia. The incidence of primary type dysmenorrhea

in Indonesia is 54.89% while the remaining 45.11% is the secondary type [2]. According to the World Health Organization (2012), the incidence is 1,769,425 people (90%) of teenagers experiencing dysmenorrhea with 10-15% experiencing severe dysmenorrhea. The incidence of dysmenorrhea is quite high throughout the world. The average incidence of dysmenorrhea in young women is between 16.8–81%, the average in European countries. Dysmenorrhea occurs in 45-97% of women, with the lowest prevalence in Bulgaria (8.8%) and the highest reaching 94% in Finland. The highest prevalence of dysmenorrhea is often found in female adolescents, which is estimated to be between 20-90%. About 15% of teenagers report experiencing severe dysmenorrhea [3].

Primary dysmenorrhea is a condition where menstrual pain occurs without any underlying pelvic pathology. Although for some people it may be considered 'part of the process', this pain can be very annoying. At SMAN 5 Karawang, based on initial reports, around 60% of female students reported that they had been absent from school unable to participate in extracurricular activities due to menstrual pain. Pathophysiological, the cause of primary dysmenorrhea is hypersecretion of prostaglandins from the inner lining of the uterus. Prostaglandin F₂α (PGF-2α) and Prostaglandin PGF₂ increase uterine tone, and also cause high-amplitude contractions of the uterus. In addition, vasopressin has also been associated with primary dysmenorrhea. Vasopressin increases uterine contractility and may cause ischemic pain due to its vasoconstrictive effects. The prognosis of dysmenorrhea has a major impact on a woman's daily life. This impact is reflected in the level of absenteeism from school or work. Dysmenorrhea can also limit a woman's participation in sports or social activities. Additionally, there are emotional stressors associated with dysmenorrhea. Dysmenorrhea is a public health problem that has an economic impact. In the United States alone, it is estimated that about 140 million hours are worked per year. However, with recommended treatment options, the prognosis for primary dysmenorrhea is generally good [4].

The use of pharmacological drugs, such as non-steroidal analgesics, is often the main choice for treating pain. However, a 2018 study found

that around 20% of female students who regularly took analgesics reported side effects such as digestive disorders. This highlights the importance of safer alternative approaches. A Cochrane study of 73 Randomized Controlled Trials (RCTs) showed strong evidence to support Nonsteroidal Anti-Inflammatory Drugs (NSAIDs) as first-line treatment for primary dysmenorrhea. The choice of NSAID should be based on effectiveness and tolerability for the individual patient, as no NSAID has been shown to be more effective than another. Medications should be taken one to two days before anticipated menstruation, and continued on a regular schedule for two to three days [5-7].

As per qualitative assessment, non-pharmacological management for primary dysmenorrhea is highly effective and remarkable for overall health. After intervention, many of them chose to rest (79.9%) to manage menstrual pain, followed by dietary modification (50.8%), exercise (34.6%), hot and cold patches (32.4%), and aromatherapy (5.2%). The level of education and the presence of comorbidities were significantly associated with the success of non-pharmacological measures. Perspectives on the role of non-pharmacological management of dysmenorrhea significantly changed after intervention. The counseling provided is considered 99% efficient. After counseling and non-pharmacological measures, the percentage of subjects who felt their dysmenorrhea was uncontrollable decreased from 37.9 to 13.2, with 86.8% (p 0.05). Other studies revealed that non-pharmacological approaches, such as yoga, physical activity, heat therapy, massage therapy, water therapy, dietary supplements, acupuncture, aromatherapy, massage therapy, and other non-invasive techniques, have a significant role in the management of dysmenorrhea. It is observed that women who engage in regular physical activity do not experience severe dysmenorrhea. Additionally, it was found in this study that dietary nutrients such as vitamin D and other nutraceuticals can improve dysmenorrhea symptoms [8, 9].

Complementary and alternative medicine therapies, such as mindfulness training and meditation, are potential treatment options for individuals suffering from chronic, non-malignant pain. Mindfulness and meditation, both, have shown positive potential in various studies. For example, a study in America in

2020 found that teenage girls who underwent mindfulness training for 6 weeks experienced a 40% reduction in the intensity of menstrual pain compared to the control group [10]. A study shows that the mindful START technique can help reduce menstrual stress and menstrual pain so that can improve the quality of life of adolescents with primary dysmenorrhea [11]. The popularity of mindfulness, meditation's medical benefits have grown along with increasing interest in alternative and complementary medicine. This study contributes to the evidence on the impact of meditation and yoga on primary dysmenorrhea among adolescent girls [12]. Mindfulness is defined as deliberate and non-judgmental awareness of the present moment while meditation is a mind-body exercise with relaxation techniques.

But reports on mindfulness did not find enough evidence to draw conclusions about its potential clinical effectiveness. The report on meditation found evidence from a randomized study showing that meditation plus conventional treatment with analgesics was effective for reducing chronic pelvic pain, whereas conventional treatment with analgesics alone was not [13]. Both reviews focused on comparing mindfulness or meditation with or without pharmacotherapy with pharmacotherapy alone (e.g. opioids, non-steroidal anti-inflammatory drugs, acetaminophen). To inform policy making, further exploration of mindfulness or meditation compared with no treatment may provide additional insight into the clinical and cost effectiveness of these complementary and alternative medicine therapies for the management of chronic non-malignant pain.

With this background, this research aims to explore the effectiveness of mindfulness education and meditation as an innovative solution to overcome menstrual pain among female students at SMAN 5 Karawang. Through this approach, it is hoped that it can provide an effective and safe alternative for adolescent girls to deal with primary dysmenorrhea, as well as support the development of health education curricula in schools in Indonesia.

METHODOLOGY

The research used an experimental design with a pretest – posttest control group approach. The research was conducted at SMAN 5

Karawang, West Java, Indonesia, from January 2023 to May 2022. The population in this study included all female students in class X and XI at SMAN 5 Karawang who experienced primary dysmenorrhea, with a total population estimated at around 400 female students. Sampling used a stratified random sampling technique, where female students were divided by class, and from each class a random sample of 150 female students was selected to participate. The intervention group was divided into 2 groups, namely the mindfulness group where participants took part in a 60 minute mindfulness training session, once a week for 8 weeks. Practices include breathing techniques, body awareness, and silent meditation. The meditation group, namely participants took part in a guided meditation session for 60 minutes, once a week for 8 weeks. Meditation is focused on relaxation and present moment awareness.

The measuring instrument used is the Visual Analog Scale (VAS), where the VAS scale is used to measure the intensity of menstrual pain. Participants were asked to mark the position of their pain on a 10 cm long horizontal line. Then participants were asked to keep a menstrual pain diary in which participants were asked to record the duration and frequency of their pain every day during the menstrual period.

Research procedures were carried out in the following stages: after obtaining ethical approval, female students who met the inclusion criteria were invited to participate. An initial questionnaire was distributed to obtain initial data about the intensity and duration of their menstrual pain. After that, they were randomly divided into three groups. The intervention was carried out for 8 weeks, followed by a posttest using the same instrument. Data were analyzed using SPSS version 26.0. The normality test was carried out using the Shapiro-Wilk test. The paired t-test was used to compare pretest and posttest scores in each group. One-way ANOVA test with post hoc test (Tukey HSD) was used to compare the effectiveness between the three groups. The significance level was set at $p < 0.05$. Ethical approval was obtained from the ethics committee of STIKes Dharma Husada Bandung. All participants provided informed consent before participating. Anonymity and confidentiality of participant data is guaranteed. Participants also have the right to withdraw at any time without consequences.

RESULTS

Respondent Characteristics

Of the total 150 female students who participated in this research, the average age of respondents was 16.2 years with an age range of 15-17 years. As many as 78% of female students reported experiencing severe menstrual pain before the intervention [table 1], while the rest reported menstrual pain of moderate intensity.

Based on age distribution, the majority of female students are 16 years old with a frequency of 70 female students or 46.7%. Regarding the intensity of pain before intervention, the majority of female students, 80 or 53.3%, experienced menstrual pain of moderate intensity (VAS score 4-7). In terms of the duration of pain during the menstrual cycle, 70 female students or 46.7% experienced pain for 3-4 days per cycle. Furthermore, regarding the history of dysmenorrhea in the family, as many as 90 female students or 60% reported a history of dysmenorrhea in their family.

Effectiveness of Mindfulness Interventions

Before the intervention, the average menstrual pain score in the mindfulness group was 7.5 using the Visual Analog Scale (VAS). After 8 weeks of intervention, the mean score reduced to 5.2, indicating a 30.7% reduction in pain. The t-test shows that this decrease is statistically significant (p<0.01).

Effectiveness of Meditation Interventions

In the meditation group, the average menstrual pain score before intervention was 7.3. After intervention, the mean score decreased to 4.9,

with a 32.9% reduction in pain. The t-test shows a significant difference (p<0.01).

Control Group

Meanwhile, the control group that did not receive any intervention showed little change in their pain scores, from 7.4 to 7.2, with the decrease not being statistically significant. From Table 2, the group that received mindfulness education showed a 30.7% reduction in pain scores after the intervention, while the meditation group showed a 32.9% reduction. The control group showed only slight changes with a decrease of 2.7%.

Uji T-Test

The t-test showed that the reduction in pain in the mindfulness and meditation group was statistically significant (p<0.01) compared to the control group [Table 3].

Comparison of Three Groups

One-way ANOVA test showed there was a significant difference in the reduction in menstrual pain scores between the three groups (p<0.01). Post hoc tests (Tukey HSD) showed that both intervention groups had a significant reduction in pain scores compared with the control group.

Student Response to Intervention

The majority of female students in the intervention group (approximately 85%) considered the mindfulness and meditation sessions to be a positive experience [table 4]. They report feeling more relaxed, calm, and have more awareness of their bodies.

Table 1: Frequency Distribution of Respondent Characteristics.

Characteristics	Category	Frequency (f)	Percentage
Age (years)			
	15	50	33,3
	16	70	46,7
	17	30	20
Pain intensity before intervention			
	Light (VAS 1 - 3)	20	13,3
	Medium (VAS 4 - 7)	80	53,3
	Heavy (VAS 8 - 10)	50	33,3
Duration of pain (days per cycle)			
	1 - 2	50	33,3
	3 - 4	70	46,7
	5+	30	20
Family history of dysmenorrhea			
	Yes	90	60
	No	60	40

Table 2: Average Menstrual Pain Score Before and After Intervention.

Group	Before intervention (VAS)	After intervention (VAS)	ρ παλואε
Mindfulness	7,5	5,2	-30,7%
Meditation	7,3	4,9	-32,9%
Control	7,4	7,2	-2,7%

Table 3: Comparison of Intervention Effectiveness.

Variable/Group	Before intervention (average VAS)	After intervention (average VAS)	ρ παλואε
Mindfulness			
Control group	7,4	7,2	
Intervention group	7,5	5,2	< 0,01
Meditation			
Control group	7,4	7,2	
Intervention group	7,3	4,9	< 0,01

Table 4: Student Responses to Intervention.

Responses	Mindfulness (%)	Meditation (%)
Very positive	45	50
Positive	40	35
Neutra	10	10
Negative	4	4
Very Negative	1	1

DISCUSSION

Effectiveness of Mindfulness and Meditation on Menstrual Pain

The results of this study clearly highlight the significant effectiveness of mindfulness and meditation in reducing the intensity of menstrual pain in female students at SMAN 5 Karawang. Not only did it show significant changes in pain scores in both intervention groups compared to the control group, this study also confirmed the importance of relaxation and mindfulness techniques as non-pharmacological methods for treating primary dysmenorrhea.

Previous studies specifically looking at the effects of mindfulness and meditation practices on menstrual pain are still very minimal, so the results of this study could be a starting point for raising the issue of non-pharmacological studies of mindfulness and meditation associated with pain, especially pain due to menstruation.

There is a study conducted which combines meditation techniques and lavender aromatherapy. The results showed that almost half of the respondents experienced menstrual pain before meditation and lavender aromatherapy in young women experienced menstrual pain on a scale of 7-9 (moderate pain) while afterward almost half of the respondents experienced menstrual pain on a scale of 0

(no pain). This means that meditation and administering lavender aromatherapy can be said to be very effective and the researchers' score for this effectiveness is 90% [14]. Previous research focusing on mindfulness techniques has consistently linked this practice to positive changes in the brain's response to pain, including the areas of the brain involved in attention and emotional regulation. Mindfulness, which essentially involves paying deliberate attention, without judgment, to the present experience, may help individuals separate the sensation of pain from the negative emotional response that often accompanies it. Thus, a person may feel pain with the same intensity, but the sufferer is less bothered by the pain [15].

Meanwhile, meditation, especially guided meditation, has long been recognized as having a profoundly relaxing impact on the body and mind. Meditation can reduce sympathetic nervous system activity, which is associated with the body's "fight or flight" response and can increase parasympathetic nervous system responses that result in relaxation. Research found that experienced meditators reported lower pain perception and showed lower emotional responses to painful stimuli compared to non-meditators [16].

It is also important to understand that, although both techniques are effective, they may work

in different ways and have different additional benefits. For example, mindfulness, with its focus on present-moment awareness, can increase individuals' awareness of their bodies, helping them detect early signs of menstrual pain and enabling them to act more quickly to manage it. On the other hand, meditation may focus more on deep relaxation, which can be helpful in reducing muscle tension often associated with menstrual pain.

Finally, although the effectiveness of both techniques was proven in this study, there may be some individuals who find one technique more beneficial than the other. Therefore, an individualistic approach, where female students are given the opportunity to try both and find what works best for them, may be the best strategy in educational settings.

The Importance of Education Regarding Mindfulness and Meditation in Schools

With the high prevalence of female students experiencing primary dysmenorrhea, and considering the negative impact of menstrual pain on quality of life and academic performance, it is important for schools to consider mindfulness and meditation education as part of the health education curriculum. With proper understanding and practice, female students can utilize these techniques to better manage their pain.

Education is not just about conceptual understanding and academic skills. A student's overall well-being, including mental and emotional well-being, is critical to educational success. In recent decades, there has been increasing attention to intervention methods that can reduce stress and improve the quality of life of students, with mindfulness and meditation techniques receiving particular attention [17].

Apart from that, several research studies on the benefits of mindfulness and meditation are related to the following things, namely:

Mindfulness and meditation have been shown to help improve students' quality of life and psychological well-being. Applying these techniques in the school environment can help students manage stress, anxiety, and other negative emotions that are often part of teenage life [18].

Mindfulness has been linked to improvements in concentration and attention [19]. In an

educational context, this can mean improved academic achievement as students become better able to focus on their tasks.

As discussed in this study, mindfulness and meditation techniques can help reduce symptoms of dysmenorrhea, which can seriously interfere with students' academic performance and social lives. Therefore, integrating these techniques into the health education curriculum in schools can provide particular benefits for female students.

Beyond health benefits, mindfulness and meditation help students develop the skills necessary to face challenges with awareness, calm, and resilience [20].

It is students involved in mindfulness and meditation programs at school report higher levels of engagement and enthusiasm in learning. This reflects how these techniques can encourage a more positive approach to education. Given the importance of mental and emotional well-being in educational success, schools should consider integrating mindfulness and meditation education into their curriculum. In this way, students are not only equipped with academic skills but also with the skills they need to live healthy, happy, and productive lives.

Limitations and Suggestions for Further Research

Although this study showed positive results, there are several limitations that need to be noted. Limited sample size and lack of randomization may influence the generalizability of the results. Additionally, the duration of intervention may not be sufficient to assess the long-term benefits of these techniques.

For future research, it is recommended to use a more rigorous design with a larger sample, as well as considering other variables such as duration of meditation, type of meditation, and combination with other therapies. Additionally, longitudinal studies looking at the long-term effects of these interventions would also be valuable [21].

CONCLUSION

Based on the results of research conducted at SMAN 5 Karawang regarding the effectiveness of mindfulness education and meditation on menstrual pain in adolescents, several important points can be concluded:

There was a significant reduction in the intensity of menstrual pain in female students who received mindfulness and meditation intervention. Both intervention groups showed significantly better results in pain reduction compared to the control group.

Implementing mindfulness and meditation education in schools helps students manage stress, improve concentration, and influence a more positive approach to learning. These techniques not only contribute to students' physical and psychological well-being, but also support academic achievement.

Given the prevalence of primary dysmenorrhea among adolescent girls and its impact on quality of life and academic performance, mindfulness and meditation education is a vital tool for improving the quality of life and well-being of female students at school.

Recommendations for Schools: With evidence of the effectiveness of mindfulness and meditation, it is recommended for educational institutions to incorporate mindfulness and meditation education into their curricula as part of student well-being education programs.

Thus, the research objectives of measuring the effectiveness of mindfulness and meditation education in reducing menstrual pain and assessing their relevance in educational contexts have been achieved. This research makes an important contribution to the application of relaxation and mindfulness techniques in the school environment as a means of supporting students' well-being and academic achievement.

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