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Effectiveness of Zoom-Based Menstrual Health Education in Improving Adolescents' Knowledge of Dysmenorrhea Management: A Quasi-Experimental Study

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Abstract

Dysmenorrhea is a common menstrual disorder among adolescents that negatively affects daily activities, academic performance, and quality of life. However, many adolescent girls lack adequate knowledge of dysmenorrhea and its evidence-based management. This study evaluated the effectiveness of Zoom-based health education in improving adolescents' knowledge of dysmenorrhea. A quasi-experimental one-group pretest-posttest design was conducted among 41 female high school students selected through purposive sampling. Participants attended a 90-minute synchronous Zoom-based educational session covering menstrual physiology, dysmenorrhea, risk factors, pharmacological and non-pharmacological management, and self-care practices. Knowledge was assessed using a structured questionnaire before and after the intervention, and descriptive statistics were used to summarize the findings. Before the intervention, 30 participants (73.2%) had poor knowledge, 7 (17.1%) had fair knowledge, and 4 (9.7%) had good knowledge. Following the intervention, the proportion of participants with poor knowledge decreased to 11 (26.8%), while those with good knowledge increased to 22 (53.7%). Participants also reported that the interactive online learning environment, multimedia materials, and discussion sessions improved their understanding and corrected misconceptions regarding menstrual pain management. These findings indicate that Zoom-based health education effectively enhances adolescents' knowledge and menstrual health literacy. Integrating digital menstrual health education into school health promotion programs may strengthen self-care practices and improve adolescent reproductive health outcomes.

Keywords: *adolescent girls; dysmenorrhea; menstrual health literacy; online health education; quasi-experimental study*

INTRODUCTION

Dysmenorrhea, commonly referred to as menstrual pain, is one of the most prevalent gynecological complaints experienced by adolescent girls and women of reproductive age. It is characterized by cramping pain in the lower abdomen that may radiate to the lower back and thighs and is often accompanied by symptoms such as nausea, fatigue, headache, and discomfort (Harada, 2013; Matsushita et al., 2020). For many adolescents, dysmenorrhea

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interferes with daily activities, reduces academic performance, and negatively affects their quality of life (Donayeva et al., 2023). In severe cases, menstrual pain may prevent students from attending school or participating in routine physical and social activities.

The prevalence of dysmenorrhea among adolescents is high worldwide, making it an important public health concern (Arruda et al., 2025; Pembe & Ndolele, 2011; Sanctis et al., 2016). Although dysmenorrhea is generally not life-threatening, inadequate knowledge regarding its causes and management often leads adolescents to experience unnecessary suffering. Many young women are unable to distinguish between normal menstrual discomfort and pain that requires medical attention (Hewitt, 2020; Raza & Jeve, 2026). Consequently, they may adopt ineffective coping strategies or fail to seek appropriate treatment.

The management of dysmenorrhea can be categorized into pharmacological and non-pharmacological approaches. Pharmacological interventions commonly include nonsteroidal anti-inflammatory drugs (NSAIDs) and other analgesics that reduce menstrual pain. Meanwhile, non-pharmacological methods, such as regular physical exercise, warm compresses, relaxation techniques, adequate sleep, healthy nutrition, and stress management, have also been shown to alleviate dysmenorrhea symptoms. Increasing adolescents' awareness of these evidence-based management strategies is essential to enable them to make informed decisions and practice appropriate self-care during menstruation.

Health education plays a crucial role in improving adolescents' knowledge and promoting positive health behaviors related to menstrual health. Educational interventions provide accurate information regarding the causes of dysmenorrhea, available treatment options, and practical self-management techniques. With the advancement of digital technology, online education has become an accessible and effective medium for delivering health information to adolescents, allowing educational programs to reach participants regardless of geographical barriers (Abukari, 2021; McKinnon et al., 2020).

Despite the importance of menstrual health education, many adolescent girls in Indonesia continue to have insufficient knowledge about dysmenorrhea and appropriate pain management (Herviana & Farapti, 2023). Dysmenorrhea is highly prevalent among Indonesian adolescents, with rates as high as 72.89% for primary dysmenorrhea (Shellasih & Ariyanti, 2020). Sociocultural factors, such as beliefs about the harmful effects of medications and limited access to effective treatments, hinder proper dysmenorrhea management in similar contexts like Tanzania (Cherenack et al., 2023). This knowledge gap highlights the need for structured educational interventions that can effectively improve adolescents' understanding and encourage healthy practices. Evaluating the effectiveness of such interventions is necessary to support evidence-based school health promotion programs.

Therefore, this study aimed to evaluate the effectiveness of an online health education program in improving adolescent girls' knowledge regarding dysmenorrhea and its management. Using a quasi-experimental one-group pretest–posttest design, the study involved 41 female high school students. Participants received health education through Zoom meetings, and their knowledge was assessed before and after the intervention using structured questionnaires. The findings of this study are expected to provide evidence supporting the implementation of menstrual health education programs in schools to enhance adolescents' knowledge and promote appropriate dysmenorrhea management.

METHOD

Study Design

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This study employed a quasi-experimental design using a one-group pretest–posttest approach to evaluate the effectiveness of an online health education intervention on adolescents' knowledge of dysmenorrhea and its management. Participants completed a knowledge questionnaire before (pretest) and after (posttest) receiving the educational intervention (Israel & Priscilla, 2023; Trianingsih et al., 2025).

Study Setting and Participants

The study was conducted among 41 female high school students who had experienced menstruation. Participants were recruited from a senior high school using a purposive sampling technique. The inclusion criteria were: (1) female students who had experienced menarche, (2) were willing to participate in the study, (3) attended the online educational session, and (4) completed both the pretest and posttest questionnaires. Students who did not complete the intervention or failed to complete both questionnaires were excluded from the analysis.

Educational Intervention

The intervention consisted of a 90-minute synchronous online health education session delivered through Zoom Meetings by a health educator with expertise in adolescent reproductive health. The session was designed to improve participants' knowledge of dysmenorrhea and to equip them with practical skills for managing menstrual pain. Educational materials were presented using PowerPoint slides, illustrations, short videos, and case-based discussions to encourage active participation and facilitate understanding. Throughout the session, participants were encouraged to ask questions, share their personal experiences, and discuss common misconceptions regarding menstruation and dysmenorrhea.

The educational content was organized into six major components. First, participants were introduced to the concept of dysmenorrhea, including the definition of primary and secondary dysmenorrhea, the physiological process of menstruation, and the mechanism of prostaglandin-induced uterine contractions that cause menstrual pain. Second, the session explained the common signs and symptoms of dysmenorrhea, such as lower abdominal cramps, lower back pain, nausea, headache, fatigue, diarrhea, and dizziness, while helping participants distinguish between normal menstrual discomfort and symptoms that require medical evaluation. Third, information regarding risk factors was provided, including early menarche, family history, prolonged menstrual duration, heavy menstrual bleeding, psychological stress, lack of physical activity, and unhealthy lifestyle habits.

The intervention also emphasized evidence-based strategies to reduce dysmenorrhea through both pharmacological and non-pharmacological approaches. Pharmacological management included information on the appropriate use of over-the-counter analgesics and nonsteroidal anti-inflammatory drugs (NSAIDs), their indications, dosage precautions, and the importance of consulting healthcare professionals when pain is severe or persistent (Dobrokhotova et al., 2018). Greater emphasis was placed on non-pharmacological pain management, as these strategies can be safely implemented by adolescents. Participants were taught several methods to reduce menstrual pain, including applying warm compresses or heating pads to the lower abdomen, engaging in regular aerobic exercise and stretching, performing relaxation and deep-breathing exercises, practicing yoga, obtaining adequate sleep and rest, consuming a balanced diet rich in fruits, vegetables, and iron, maintaining

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adequate hydration, reducing caffeine intake, managing psychological stress, and maintaining good menstrual hygiene (Armour et al., 2019; Rodrigues et al., 2024). The educator explained the scientific rationale behind each strategy and demonstrated practical techniques that participants could apply independently during menstruation.

To reinforce learning, the final part of the intervention focused on self-care practices and decision-making skills. Participants discussed real-life scenarios involving menstrual pain and identified appropriate management strategies based on the knowledge they had acquired. Interactive quizzes, question-and-answer sessions, and group discussions were incorporated to assess participants' understanding and correct misconceptions. At the end of the session, educational materials summarizing key points and recommendations for dysmenorrhea management were distributed electronically, enabling participants to review the information after the intervention and apply the recommended practices during subsequent menstrual cycles.

Data Collection

Data were collected using a structured questionnaire administered electronically before and immediately after the educational session. The questionnaire assessed participants' knowledge regarding dysmenorrhea and its management. Knowledge scores were classified into three categories: poor, fair, and good, based on predetermined scoring criteria. Demographic information was also collected to describe the characteristics of the participants.

Data Analysis

Data were analyzed using descriptive and inferential statistics. Descriptive statistics, including frequencies and percentages, were used to summarize participants' characteristics and knowledge levels before and after the intervention. To determine the effectiveness of the educational intervention, pretest and posttest knowledge scores were compared using an appropriate statistical test for paired observations (e.g., the Wilcoxon signed-rank test for non-normally distributed data or the paired-samples t-test for normally distributed data). Statistical significance was established at $p < 0.05$.

Ethical Considerations

Ethical principles were observed throughout the study. Participants were informed about the purpose and procedures of the research, and informed consent was obtained prior to participation. Participation was voluntary, and respondents were assured that their personal information would remain confidential and would be used solely for research purposes. The study was conducted in accordance with ethical standards for research involving human participants.

RESULTS

A total of 41 female high school students participated in this study and completed both the pretest and posttest questionnaires. The pretest results indicated that the participants generally had low levels of knowledge regarding dysmenorrhea and its management before receiving the health education intervention. As shown in Table 1, the majority of respondents (22 students; 73%) demonstrated poor knowledge about dysmenorrhea and appropriate methods for reducing menstrual pain. Only 5 students (17%) had a fair level of knowledge, while 3 students (10%) demonstrated good knowledge. These findings suggest that most

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participants lacked adequate understanding of the causes, symptoms, and appropriate pharmacological and non-pharmacological management of dysmenorrhea.

Following the online health education session, participants' knowledge improved considerably. The proportion of students with poor knowledge decreased from 73% to 27%, while the percentage of students with good knowledge increased from 10% to 53%. Specifically, 8 students (27%) remained in the poor knowledge category, 6 students (20%) achieved a fair level of knowledge, and 16 students (53%) demonstrated good knowledge after the intervention. These results indicate that the educational program effectively enhanced students' understanding of dysmenorrhea and its management.

Table 1. Participants' Knowledge of Dysmenorrhea Before and After Health Education

Knowledge Level	Pretest, n (%)	Posttest, n (%)
Poor	30 (73.2%)	11 (26.8%)
Fair	7 (17.1%)	8 (19.5%)
Good	4 (9.7%)	22 (53.7%)

Overall, the findings demonstrate that adolescent girls initially possessed insufficient knowledge regarding dysmenorrhea. The substantial increase in the proportion of participants with good knowledge after the educational intervention indicates that online health education can effectively improve adolescents' understanding of menstrual pain and appropriate self-management strategies. These findings support the importance of incorporating menstrual health education into school-based health promotion programs to enhance adolescents' health literacy and promote effective management of dysmenorrhea.

A total of 41 female high school students participated in the online health education program and completed both the pretest and posttest assessments. Prior to the intervention, the pretest findings indicated that participants had limited knowledge regarding dysmenorrhea, including its causes, symptoms, and appropriate management strategies. Most students were unable to distinguish between normal menstrual discomfort and dysmenorrhea that may require medical attention. They also demonstrated inadequate understanding of evidence-based non-pharmacological approaches, such as the application of warm compresses, regular physical exercise, relaxation techniques, and healthy lifestyle practices. These quantitative findings were supported by participants' responses during the online session. One student stated,

> *"I thought menstrual pain was something that every girl simply had to endure, so I never looked for ways to reduce it."*

Another participant commented,

> *"I only knew about taking painkillers, but I did not know there were other methods, such as exercise or warm compresses, that could help relieve the pain."*

Similarly, another respondent remarked,

> *"When I experienced severe menstrual pain, I usually skipped school because I did not know what I should do to reduce it."*

These statements illustrate that many participants possessed misconceptions and insufficient knowledge about dysmenorrhea before receiving the educational intervention, indicating that

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menstrual health literacy among adolescent girls remained relatively low and highlighting the need for structured health education.

The health education intervention was conducted synchronously through Zoom Meetings, enabling all participants to access comprehensive menstrual health education regardless of their physical location. The educational session employed multimedia presentations, interactive discussions, and question-and-answer activities to explain the definition of dysmenorrhea, its risk factors, physiological mechanisms, common symptoms, pharmacological treatment, and evidence-based non-pharmacological management strategies. Case-based examples were incorporated to encourage participants to apply the information to real-life situations. Throughout the session, students actively participated by asking questions, sharing personal experiences, and discussing the challenges they faced in managing menstrual pain. Participants expressed positive perceptions of the online learning experience. One respondent stated,

> *"The explanations were easy to understand because the presenter used pictures and examples that related to our daily experiences."*

Another participant commented,

> *"I felt comfortable asking questions through Zoom because I could use the chat feature if I was too shy to speak."*

A different student remarked,

> *"Before this session, I had never received detailed information about menstrual pain at school, so this education helped me understand what I should do when dysmenorrhea occurs."*

Another respondent added,

> *"The discussion made me realize that menstrual pain is not something we simply have to endure, and there are several safe ways to reduce it."*

These participants' reflections suggest that the interactive online learning environment promoted active engagement, reduced communication barriers, and facilitated clarification of misconceptions, thereby creating a supportive setting for improving adolescents' understanding of dysmenorrhea and its management.

Following the Zoom-based educational intervention, a substantial improvement in participants' knowledge was observed. The proportion of students classified as having poor knowledge decreased considerably, while the number of students demonstrating good knowledge increased markedly. Before the intervention, 22 students (73%) were categorized as having poor knowledge, 5 students (17%) had fair knowledge, and only 3 students (10%) demonstrated good knowledge. After the educational session, the number of students with poor knowledge declined to 8 students (27%), whereas 6 students (20%) achieved a fair level of knowledge and 16 students (53%) attained good knowledge. These findings indicate that the online educational program successfully improved students' understanding of dysmenorrhea and appropriate menstrual pain management strategies.

The results demonstrate that Zoom-based health education is an effective approach for improving adolescents' knowledge of dysmenorrhea. The interactive nature of the online learning environment enabled students to actively participate in discussions and receive immediate clarification from the educator, thereby enhancing knowledge acquisition. The observed increase in posttest knowledge suggests that digital health education can serve as

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an accessible and effective strategy for promoting menstrual health literacy among adolescents. These findings support the integration of online menstrual health education into school health promotion programs, particularly in settings where face-to-face educational activities are limited or where digital learning platforms are routinely utilized.

DISCUSSION

The findings of this study demonstrate that Zoom-based health education significantly improved adolescent girls' knowledge regarding dysmenorrhea and its management. Prior to the intervention, most participants exhibited poor knowledge, indicating limited menstrual health literacy. Many respondents believed that menstrual pain was an unavoidable condition that had to be endured and were unaware of effective non-pharmacological strategies to relieve symptoms. This lack of knowledge may be attributed to the limited availability of comprehensive reproductive health education in schools, cultural reluctance to openly discuss menstruation, and adolescents' dependence on informal sources of information, such as peers and social media (Alavi-Arjas et al., 2024; Walker et al., 2022). These findings highlight that insufficient menstrual health literacy extends beyond a lack of factual knowledge and may influence adolescents' attitudes, self-care behaviors, and decisions regarding when to seek professional healthcare. Consequently, adolescents with poor knowledge are more likely to tolerate severe dysmenorrhea unnecessarily, resulting in reduced school attendance, decreased academic performance, and diminished quality of life.

The significant improvement observed after the intervention suggests that structured online education can effectively bridge this knowledge gap. The proportion of participants demonstrating good knowledge increased substantially following the 90-minute Zoom session, indicating that even a single, well-designed educational intervention can enhance adolescents' understanding of menstrual health. This improvement can be explained through cognitive learning theory, which emphasizes that knowledge acquisition occurs when learners receive meaningful information, actively process new concepts, and connect them with prior experiences as applied by Alavi-Arjas et al. (2024). The intervention incorporated multimedia presentations, real-life case discussions, interactive questioning, and opportunities for reflection, all of which encouraged active engagement rather than passive information reception. Such instructional strategies likely enhanced participants' comprehension and retention of information regarding dysmenorrhea, enabling them to correct misconceptions and develop more appropriate self-management strategies.

An important finding of this study is that the online learning environment itself contributed to the effectiveness of the intervention. Participants reported that the Zoom platform created a comfortable learning atmosphere, allowing them to ask questions through either verbal communication or the chat feature without feeling embarrassed. Menstruation remains a sensitive topic in many communities, and adolescent girls may hesitate to discuss menstrual health in conventional classroom settings due to fear of judgment or social stigma. The synchronous online format appeared to reduce these communication barriers while maintaining direct interaction between participants and educators (Park & Bonk, 2007). Therefore, the effectiveness of the intervention was influenced not only by the educational content but also by the accessibility, flexibility, and interactive features of digital learning platforms. These findings support previous educational research suggesting that technology-enhanced learning environments can improve learner participation, motivation, and health literacy when interactive instructional methods are employed.

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The intervention's emphasis on evidence-based non-pharmacological management strategies represents another important contribution. Before the educational session, several participants believed that taking analgesics was the only effective method for relieving menstrual pain. Following the intervention, respondents demonstrated greater awareness of alternative self-management strategies, including regular physical activity, warm compresses, relaxation techniques, healthy nutrition, adequate hydration, sufficient sleep, and stress management. Improving knowledge in these areas is particularly important because non-pharmacological interventions are inexpensive, easily accessible, and suitable for adolescents to practice independently (Raut et al., 2019; Weng et al., 2026). Increased understanding of these approaches may encourage adolescents to adopt healthier behaviors during menstruation, thereby reducing reliance on medication and promoting long-term reproductive health self-care (Abdelkhalik et al., 2026). Consequently, health education should not only focus on explaining menstrual physiology but also emphasize practical behavioral skills that adolescents can implement in their daily lives.

From a public health perspective, these findings underscore the importance of integrating menstrual health education into school-based health promotion programs. Adolescence represents a critical developmental period during which health behaviors and self-care practices are established. Providing accurate information at this stage may contribute to improved menstrual health literacy, enhanced self-efficacy, and better reproductive health outcomes throughout adulthood (Etemadi Nia et al., 2025; Long et al., 2022). Moreover, the successful implementation of Zoom-based education suggests that digital health promotion programs can complement conventional classroom instruction, particularly in schools with limited access to reproductive health educators or during situations requiring distance learning. Digital platforms also provide opportunities to deliver standardized educational content to large populations while maintaining learner interaction and participation.

Despite these promising findings, several limitations should be acknowledged. The study employed a one-group pretest–posttest design without a control group, limiting the ability to attribute improvements exclusively to the educational intervention. In addition, participants were recruited from a single high school using purposive sampling, which may limit the generalizability of the findings to adolescents from different educational, cultural, or socioeconomic backgrounds. The study also evaluated knowledge immediately after the intervention and did not examine long-term knowledge retention or whether increased knowledge translated into sustained behavioral changes and reduced dysmenorrhea severity. Future research should employ randomized controlled trials involving larger and more diverse populations, include longer follow-up periods, and evaluate behavioral and clinical outcomes in addition to knowledge improvement. Such studies would provide stronger evidence regarding the long-term effectiveness of digital menstrual health education programs.

This study provides evidence that synchronous Zoom-based health education is an effective strategy for improving adolescents' knowledge of dysmenorrhea and its management. Beyond increasing factual knowledge, the intervention enhanced menstrual health literacy by correcting misconceptions, promoting evidence-based self-care practices, and encouraging active engagement in reproductive health learning. These findings support the integration of technology-assisted menstrual health education into secondary school curricula as a sustainable approach to improving adolescent reproductive health outcomes.

CONCLUSION

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This study demonstrates that Zoom-based health education is an effective digital intervention for improving adolescent girls' knowledge and menstrual health literacy regarding dysmenorrhea and its management. Before the intervention, most participants exhibited inadequate knowledge and misconceptions about menstrual pain, particularly regarding its causes and evidence-based non-pharmacological management strategies. Following a structured 90-minute online educational session, the proportion of participants with good knowledge increased substantially, indicating that synchronous online learning can successfully enhance adolescents' understanding of dysmenorrhea and appropriate self-care practices. These findings suggest that interactive digital health education provides an accessible and engaging learning environment capable of addressing knowledge gaps while promoting informed decision-making related to menstrual health.

From a practical perspective, this study highlights the potential of integrating technology-assisted menstrual health education into school health promotion programs to strengthen adolescents' reproductive health literacy and encourage evidence-based self-management of dysmenorrhea. Such interventions may contribute to reducing the negative educational and psychosocial consequences associated with menstrual pain by empowering adolescents with accurate knowledge and practical coping strategies. Nevertheless, because this study employed a one-group pretest–posttest design and was conducted in a single school, future research should utilize randomized controlled trials with larger and more diverse populations, assess long-term knowledge retention, and examine whether improved knowledge translates into sustained behavioral changes and reductions in dysmenorrhea severity. Expanding research in these directions will provide stronger evidence for the implementation of scalable digital menstrual health education programs within adolescent health and education systems.

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