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The effect of peer education program on knowledge about menarche among students in elementary school: A quasi-experimental study

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Abstract

Background: Adolescents often lack information about menarche due to general unawareness. The Indonesian Ministry of Health (2018) reports that the average age of menarche in Indonesia is 12.4 years, with a 60% prevalence rate. Many feel anxious and embarrassed about the physical changes, mainly due to a lack of knowledge.
Purpose: This research aimed to assess the impact of a Peer Education Program on menarche knowledge among students at SD Negeri 09 Belakang Balok Bukittinggi in 2022.
Methods: The study employed a quasi-experimental design with a nonequivalent control group from July to August 2022. The participant population included students from SD Negeri 09 Belakang Balok, who made up the experimental group, while students from SD Negeri 07 Belakang Balok served as the control group. Fifty respondents were selected using a purposive sampling technique, ensuring an equal distribution between the experimental and control groups. For data analysis, paired sample t-tests and independent sample t-tests were used to assess the impact of the intervention.
Results: Results from the paired t-test revealed a p-value of 0.000 ($p < 0.05$), indicating a significant difference in the mean knowledge between the pre-test and post-test scores for both groups. Furthermore, the independent t-test results also yielded a p-value of 0.000 ($p < 0.05$), leading to the acceptance of the alternative hypothesis (Ha) and the rejection of the null hypothesis (Ho). This confirms that the Peer Education Program significantly affected students' knowledge of menarche.
Conclusion and recommendation: In conclusion, the Peer Education Program improved menarche knowledge among SD Negeri 09 Belakang Balok Bukittinggi students. It is recommended that schools incorporate this initiative into health education.

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1. Introduction

Adolescence is a crucial stage in life, significantly affecting the physical and psychological development of individuals aged 10 to 19, according to the World Health Organisation (WHO). However, definitions of adolescence vary: for example, Indonesia's Ministry of Health defines adolescents as individuals aged 10 to 18. At the same time, the National Population and Family Planning Agency considers unmarried individuals up to 24 as

adolescents. This lack of consensus highlights the transitional nature of adolescence from childhood to adulthood.

Globally, there are approximately 1.2 billion adolescents, making up 18% of the total population. In Indonesia, over 22 million adolescents aged 10 to 14 were reported in 2021, and West Sumatra alone has around 5.6 million adolescents, including 121,588 in Bukittinggi.

Adolescence is characterised by curiosity and a tendency toward risky behaviour, which can lead to serious health issues if conflicts are not managed properly. This underscores the need for adolescent-friendly health services, particularly concerning reproductive health. Menstruation, a natural process that involves cyclic bleeding due to the shedding of the uterine lining, marks the onset of genital maturity in girls, typically occurring between the ages of 10 and 16. This event is known as menarche.

While menarche is a natural process, many teenagers experience fear, discomfort, and anxiety during this milestone. Feelings of shame and a lack of information often lead adolescent girls to perceive menarche as traumatic (Mardona, 2013). This confusion can result in adverse outcomes, including inadequate personal hygiene, which increases the risk of urinary tract infections (UTIs). The Ministry of Health of the Republic of Indonesia reported significant annual cases of UTIs, particularly among adolescent girls (2014).

Knowledge is essential for preparing for menarche; however, many girls lack adequate information, leading to embarrassment and confusion (Darvil & Powell, 2003). Girls with insufficient understanding may face physical and emotional challenges, including guilt and anxiety about their bodily changes (Meizela, 2020). Promoting proper hygiene, such as changing sanitary napkins at least twice daily, is crucial for reducing health risks (Proverawati & Misaroh, 2016).

Education about menarche can encourage healthy behaviours. Innovative methods, especially peer education, effectively engage adolescents and enhance communication (Shanbhag et al., 2012; Putu & Pratana, 2019). However, peer education is underutilised in School Health Services (UKS) in Indonesia, often losing momentum after events like the Healthy School Competition, which leads to a decline in ongoing support and program implementation (Hukormas, 2012).

Peer education programs provide essential information that helps adolescents understand menarche and its related challenges. These programs promote peer-to-peer communication, allowing young people to share their experiences comfortably. This approach is practical because adolescents often prefer seeking guidance from peers when making decisions about reproductive health. Research indicates that peer education significantly increases knowledge among adolescents. For instance, the Indonesian Demographic and Health Survey (2012) revealed that 53.6% of women discussed menstruation with friends before experiencing it for the first time, compared to only 13.5% who spoke to teachers about the topic.

A study by Ratnasari & Na'mah (2019) emphasises this point, demonstrating that 70% of girls aged 10 to 12 had poor knowledge of menarche before a peer education intervention, whereas 100% showed good knowledge afterwards. A preliminary examination at SDN 09 Belakang Blok Bukittinggi found that students lacked information about menstruation, leading to anxiety for those who began to experience it. This situation highlights the necessity for a peer education program to improve knowledge about menarche at Bukittinggi Elementary School.

2. Methods

2.1 Research design

This research is classified as experimental research. The design used in this study is a quasi-experiment, specifically a nonequivalent control group design (Sugiyono, 2018). This research design involves observation to determine whether there are any changes following the experiment.

2.2 Setting and sampling technique

The participants in this study were all fifth and sixth-grade students from SD Negeri 09 Belakang Balok Bukittinggi. The experimental group consisted of fifth and sixth-grade students from SD Negeri 07 Belakang Balok Bukittinggi, which served as the control group. The sampling method used in this study was purposive sampling, resulting in 50 participants. This sample was divided into 25 respondents in the intervention group and 25 in the control group.

2.3 Measurement and data collection;

This research instrument employs a questionnaire to assess the knowledge level regarding menarche. The questionnaire was adapted from Leliana's 2010 study titled "The Relationship Between Female Adolescents' Knowledge and Readiness to Face Menarche," conducted at SD AL-Azhar Medan.

2.4 Data collection procedure

Data were collected at SDN 09 Belakang Balok Bukit Tinggi, West Sumatera, Indonesia, with trained enumerators administering the questionnaires in face-to-face interviews. Ethical approval was obtained before data collection, and participants provided written informed consent. Confidentiality and anonymity were strictly maintained throughout the process.

2.5 Data analysis;

Given the small sample size, a normality test for data distribution is conducted using the Shapiro-Wilk test. The results of the Shapiro-Wilk test indicate that the data follow a normal distribution.

This analysis aims to evaluate the impact of peer education programs on female students' knowledge of menarche. Statistical analysis is performed using the paired sample t-test for related groups and the independent sample t-test for unrelated groups.

a. The research hypothesis is accepted if the p-value is less than 0.05.

b. The research hypothesis is rejected if the p-value is greater than 0.05.

2.6 Ethical considerations.

Prior to the start of the research, qualified participants were given a thorough overview of the study's goals and objectives, the advantages of taking part, and guarantees about the privacy of their answers. Alternatively, participants can examine the explanation document provided by the researcher. If they decide to participate, they must sign the informed consent form.

3. Results

Univariate analysis

Table 1. Demographic characteristics

Variables	Experimental group		Control Group	
	n	%	n	%
Age (Years)				
10	7	28	9	36
11	12	48	9	36
12	6	24	7	28
Total	25	100	25	100
Class				
V	11	44	11	44
VI	14	56	14	56
Total	25	100		100

According to Table 1, which presents data from 50 participants, over half of the respondents are 11 years old. In the experimental group, 12 individuals (48%) are 11 years old, while the control group comprises an equal number of respondents aged 10 and 11, totalling nine individuals (36%). Regarding class characteristics, more than half of the respondents are in class VI, with 14 participants (56%) from the experimental and control groups.

Table 2. Students' average knowledge levels in the experimental and control groups were measured before and after the tests.

Knowledge	Experiment group		Control group	
	M	SD	M	SD
Pre-tetst	10,76	1,535	10,68	1,520
Post-test	13,44	1.193	11,48	1,558

According to the results presented in Table 2, the average pre-test knowledge score in the experimental group was 10.76, with a standard deviation of 1.535. In comparison, the control group had an average pre-test knowledge score of 10.68, with a standard deviation of 1.520. Furthermore, the analysis revealed that the average post-test knowledge score in the experimental group was 13.44, with a standard deviation of 1.193. In contrast, the control group had an average post-test knowledge score of 11.48, with a standard deviation of 1.558.

Bivariate analysis

Table 3. Comparison of the average knowledge of menarche before and after the test in the experimental group

Knowledge	Experiment group		Control group	
	M	SD	T	P
Pre-tetst	10,76	1,535	-6,791	0,000
Post-test	13,44	1.193		

The comparison of the average pre-test and post-test knowledge of the experimental group of students at SD Negeri 09 Belakang Balok Bukittinggi in 2022 is presented in Table 3. The difference in the average knowledge of menarche between the pre-test and post-test in the experimental group was 2.68, with a pre-test standard deviation of 1.535 and a post-test standard deviation of 1.193. The paired sample t-test analysis results showed a t-value of -6.791 ($p < 0.05$). A p-value of 0.000, which is less than 0.05, indicates a significant difference between the experimental group's average pre-test and post-test knowledge.

Table 4. Comparison of the average knowledge of menarche before and after the test in the control group

Knowledge	Experiment group		Control group	
	M	SD	T	P
Pre-tetst	10,68	1,520	-8,000	0,000
Post-test	11,48	1.558		

Table 4 compares the average pre-test and post-test knowledge regarding menarche among female students in the experimental group at SD Negeri 09 Belakang Balok, Bukittinggi, in 2022. The difference in the average scores between the pre-test and post-test for menarche knowledge in the experimental group was 2.68. The standard deviation for the pre-test was 1.535, while the post-test's was 1.193.

The paired sample t-test analysis results indicated a t-value of -6.791 with a p-value of 0.000, which is less than the significance level of 0.05. This result suggests a statistically significant difference in the experimental group's average pre-test and post-test knowledge.

Table 5. Post-test comparison of experimental and control groups

Knowledge	Experiment group		Control group	
	M	SD	T	P
Post-test experiment	13,44	1,193	4.995	0,000
Post-test control	11,48	1.558		

The table above illustrates the results of an independent samples t-test performed on the statistical data analysis. The calculated t value is 4.995. With a sample size (N) of 50, the degrees of freedom (df) are determined as follows: df = (N - 2) = (50 - 2) = 48. The confidence level for this analysis is set at 95%, corresponding to a significance level (α) of 0.05.

In a two-tailed test, the critical t value is derived from α / 2, resulting in 0.05 / 2 = 0.025. Accordingly, the critical t table value for df = 48 at α / α/2 = 0.025 is 2.011. Since the calculated t value (4.995) exceeds the critical t table value (2.011), we can conclude that the peer education program significantly affects menarche knowledge among students in elementary school.

Furthermore, the obtained p-value is 0.000. Given that this p-value is less than 0.05, we accept the alternative hypothesis (Ha) and reject the null hypothesis (Ho). This indicates a significant impact of peer education programs on menarche knowledge among elementary students at SDN 09 Belakang Balok Bukittinggi.

4. Discussion

4.1. Univariate Analysis

Peer education refers to the delivery of education and information by peers, typically friends, who are similar in age and social class (Santrock, 2005). In this study, the experimental group consisted of 25 participants, with seven individuals (28%) aged 10, 12 individuals (48%) aged 11, and 6 individuals (24%) aged 12. In comparison, the control group included 25 participants as well, with nine individuals (36%) aged 10, 9 individuals (36%) aged 11, and 7 individuals (28%) aged 12.

Age is crucial in a person's ability to understand and develop a mindset. Generally, as individuals get older, their ability to grasp new concepts and their mindset improve, leading to better knowledge acquisition (Notoatmodjo, 2007). Despite this, the study found no notable differences between age groups, as they were considered homogeneous. The findings indicated that the comprehension and mindset of older female students were not significantly different from those of younger female students.

Supporting this, research conducted by Akbarini (2018) showed that the average knowledge increase score for participants aged 15 to 17 was 6.79, with a standard deviation of 5.63. In contrast, the average score for participants aged 18 to 20 was 7.74, with a standard deviation of 4.82. The statistical analysis revealed a p-value of -0.44, indicating no significant difference in the average knowledge increase scores between the two age groups.

This study's experimental group consists of Class V with 11 students (44%) and Class VI with 14 students (56%). The control group mirrors this composition, with Class V having 11 students (44%) and Class VI having 14 students (56%). The experimental group was divided into Group 1 for Class V and Group 2 for Class VI.

The findings indicate a difference in knowledge between the two groups. Class VI students demonstrated better knowledge about menarche compared to Class V students. This is attributed to two students in Class VI who had experienced menarche, allowing them to share valuable insights with their peers. As a result, the study confirms that Class VI possesses a higher level of knowledge than Class V.

The grade level of students is a significant factor influencing their knowledge acquisition. Research by Sue (2011) suggests that as a person's grade level increases, so does their knowledge. This aligns with a study by Arifudin (2017), which revealed that among 22 students in Grade IV at SD Negeri Sambiroto 2, 70% exhibited knowledge of the subject. In contrast, 25 students in Grade V showed a knowledge level of 84%, indicating that Grade V students had a higher level of understanding than those in Grade IV.

According to theory, knowledge results from cognitive processing after individuals perceive a particular object through their senses. This perceptual process involves the five human senses: sight, hearing, smell, taste, and touch. Most human knowledge is acquired through visual and auditory channels (Notoadmodjo, 2012).

Various methods and concepts can enhance understanding, including those derived from formal education and personal experience. A strong understanding of menarche among female students can lead to more conscious efforts in maintaining personal hygiene during this developmental stage and encourage healthier lifestyle choices.

Based on the research results, the average knowledge measurement before the peer education program was 10.76 in the experimental group and 10.68 in the control group. The

highest average scores were 14 in the experimental group and 13 in the control group, while the lowest were 8 in both groups.

After the peer education program, the average knowledge in the experimental group increased to 15, while the control group's average increased to 14. The lowest scores after the program were 11 in the experimental group and 9 in the control group.

These findings align with research conducted by Legiati et al. (2019), which reported that respondents' average knowledge level about puberty before peer education had a score ranging from a minimum of 60 to a maximum of 88, with an overall average of 76. After the peer education intervention, the knowledge scores improved to a minimum of 74 and a maximum of 96, resulting in an average of 82.

A similar study by Sari et al. (2021) on the reproductive health knowledge of early adolescent girls at MTsN 3 Lhoknga, Aceh Regency, found that prior to peer education, the experimental group's knowledge score averaged 67.09 with a standard deviation of 9.78, while the control group averaged 69.23 with a standard deviation of 9.28. After peer education, the experimental group's average knowledge score rose to 87.68 with a standard deviation of 8.19, and the control group reached an average of 85.51 with a standard deviation of 7.58.

The researcher concluded that there was a significant increase in students' knowledge about menarche in the experimental group following the peer education program. The peer education method proved more effective, as the students delivered the material, making it easier to understand and absorb. Students felt more comfortable asking questions and discussing topics with their peers, resulting in numerous inquiries and sharing personal experiences. Additionally, the information could be provided repeatedly in small groups, allowing the young women to exchange their experiences with one another freely.

4.2. Bivariate Analysis

Based on the measurement of average knowledge in the experimental group, the pre-test had an average score of 10.76. After implementing a peer education program, the average knowledge score increased to 13.44, improving by 2.68 points. In contrast, the control group had a pre-test average score of 10.68, which increased to 11.48 in the post-test, showing a difference of 0.8 points.

Statistical analysis indicated that the p-value was 0.000 for the experimental and control groups. Since both p-values are less than 0.05, this suggests a statistically significant increase in average knowledge for both groups. Additional statistical data showed a t-value of 4.995, greater than 2.011, further indicating that the peer education program significantly impacted menarche knowledge among female students at SD Negeri 09 Belakang Balok Bukittinggi in 2022.

The study demonstrates a distinct difference between peer education and conventional teaching methods in enhancing knowledge. The average increase in the experimental group was notably higher than in the control group, indicating that the peer education method is more effective for knowledge acquisition. This effectiveness can be attributed to peer educators being selected from among female students and having undergone training, equipping them with specific knowledge about menarche.

These findings align with research by Yuli Setyoningsih (2012), which also reported an increase in early adolescents' knowledge about menarche through peer education. In her study, adolescents who received health education using the peer education method showed increased

knowledge from 10.2 to 10.8. Therefore, peer education has proven effective in enhancing adolescent knowledge, particularly in health.

Research conducted by Syarifatul et al. (2017) investigated the effects of peer education methods on early adolescents' knowledge regarding vaginal discharge at the Ta'mirul Islam Surakarta Islamic Boarding School. The study involved a sample of 69 female students, revealing an average pretest score of 63.92 and a posttest score of 81.93 in their understanding of vaginal discharge.

Similarly, Sari et al. (2021) highlighted a significant improvement in reproductive health knowledge among early adolescents before and after the intervention, particularly between the peer education and counselling groups ($p = 0.003$). Notably, early adolescents who participated in peer education were 1.5 times more effective in enhancing their reproductive health knowledge than those who received counselling.

The findings suggested that female adolescents had a limited understanding of menarche. Nearly all participants in the peer education group raised questions about menarche and associated issues. The researchers noted that many adolescent girls possess low knowledge about menarche, often because they have not yet experienced menstruation, which in turn leads to a lack of information-seeking behaviour. Furthermore, some girls reported that their parents do not discuss menarche with them.

The age of early adolescent girls presents challenges in effectively conveying this information. They frequently perceive discussions on topics related to adulthood, such as sexuality, as unsuitable for their age. Additionally, peer educators, who are also in their early teenage years, may feel embarrassed to elaborate on specific subjects, resulting in some content being inadequately explained.

The peer education method creates a more open and less rigid discussion atmosphere. Topics that might be considered taboo when discussed by teachers become more approachable when addressed by peers. This shift encourages students to engage more, listen actively, ask questions, and enhance their knowledge about menarche.

Research indicates that peer education significantly influences knowledge levels before and after the intervention. It is often deemed more effective than other health education methods. Supporting this notion, a study by Murti in 2006 highlighted the need for a new approach to health education, suggesting that the traditional lecture method was less effective in enhancing comprehension. The peer education method is considered superior due to its efficiency in terms of time, cost, workforce, facilities, and its ability to facilitate more interactive communication, as opposed to the one-way nature of lectures.

Further supporting the effectiveness of peer education, Purnomo's 2013 study compared the influence of peer education and lecture methods on students' knowledge at the Faculty of Sports and Health at Ganesha University of Education. It was found that the peer education method significantly improved students' knowledge compared to the lecture method.

The impact of peer education has been well-documented. For instance, Yuli Setyoningsih's 2012 research demonstrated that peer education counselling significantly affected knowledge about menarche among fifth and sixth-grade female students at SD Negeri Tamansari II Yogyakarta, with a statistical analysis yielding a t-value of 3.813 and a significance level of 0.001, indicating a strong effect ($0.001 < 0.05$).

Similarly, Skelly's 2018 study on peer education for college females regarding sexual health found that among 91 respondents, most had poor knowledge about reproductive health before the intervention. However, their knowledge significantly increased after participating in

a peer education program. This trend was echoed in a study conducted in Nigeria, which revealed substantial differences between the group receiving peer education and the control group, with the peer education group demonstrating superior results (Nwachukwu, 2015).

Peer education is recognised as an effective health promotion strategy for adolescents. Adolescents constitute 20% of the global population, with 85% residing in developing communities. Peer education has the potential to influence health behaviours and attitudes. Numerous studies indicate that peer education on sensitive topics, such as reproduction and sexuality, is often more effective than traditional methods, such as teacher-led explanations (Abdi & Simbar, 2013).

Research has shown a significant difference in the level of knowledge about menarche between a group that received peer education (the experimental group) and a group that did not (the control group), with a difference of 1.96 points. The experimental group demonstrated higher knowledge levels because they received health education from peers, facilitating a better understanding. In contrast, the control group, which lacked supplemental education about menarche and only received minimal information from classroom lessons, showed less knowledge.

The improvement in the experimental group can be attributed to the active participation of female students in discussions led by their peers. Participants in this study were those who had not yet experienced menarche, making the information they received particularly valuable as they engaged in peer education.

According to the researchers, the peer education program positively impacted the knowledge of menarche among students at SD Negeri 09 Belakang Balok Bukittinggi in 2022. The purpose of the program was to deliver crucial information to peers, leading to an increase in their knowledge levels. The study's results indicate that after the peer education program, there was a notable rise in the average knowledge about menarche among the students.

Peer educators, having undergone training, effectively conveyed information on menarche. According to Erikson's development theory, adolescents often look up to their peers as role models. Therefore, when their role models provide reliable information, these adolescents are more likely to be influenced positively.

5. Implication and limitations

Peer education programs in Bukit Tinggi and similar contexts have shown promise in improving knowledge and attitudes regarding menarche among elementary school girls. These initiatives can contribute to better preparedness and hygiene practices. However, their effectiveness is influenced by various factors, including cultural norms, the quality of program implementation, and the capacity to foster lasting behavioural change. To fully realise the benefits of peer education on menstrual health, it is crucial to address these limitations through culturally sensitive strategies, comprehensive training, and thorough evaluation methods.

6. Conclusion

A notable influence among peers was identified in an educational initiative to enhance female students' understanding of menarche at SD Negeri 09 Behind Balok in Bukittinggi. The study's findings demonstrated a strong correlation, with a p-value of 0.000, significantly below the 0.05 threshold. This outcome underscores the effectiveness of peer-led initiatives in cultivating a supportive environment where female students feel at ease discussing and learning

about menarche. Consequently, they gain a deeper insight into the bodily changes during adolescence.

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Author contribution

[KMM]: Conceptualized the study, designed the methodology, led data analysis and interpretation, contributed to data collection, literature review, and manuscript drafting.

[JSR]: Reviewed the manuscript critically for intellectual content and provided final approval for publication.
All authors have read and agreed to the published version of the manuscript.

Conflict of interest

There is no conflict of interest to declare

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