

EFFECTIVENESS OF ADOLESCENT REPRODUCTIVE HEALTH TRIAD EDUCATIONAL INTERVENTIONS IN IMPROVING ADOLESCENT REPRODUCTIVE HEALTH KNOWLEDGE AND ATTITUDES AT SMA NEGERI 1 KOTARIH

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Received : 01 March 2026

Accepted : 30 March 2026

Revised : 15 March 2026

Published : 27 April 2026

Abstract

Adolescents are a vulnerable population due to limited knowledge of reproductive health, which increases the risk of unsafe sexual behavior, HIV/AIDS infection, and drug abuse. This study aimed to determine the effectiveness of the Triad Adolescent Reproductive Health (TRIAD KRR) educational intervention in improving adolescents' knowledge and attitudes toward reproductive health. This study used a quantitative approach with a quasi-experimental one-group pretest–posttest design conducted at SMA Negeri 1 Kotarih, Serdang Bedagai Regency, North Sumatra. The sample consisted of 63 tenth-grade students selected using purposive sampling. Data were collected using validated questionnaires measuring knowledge and attitudes before and after the intervention. The intervention was delivered through interactive educational sessions covering sexuality, HIV/AIDS prevention, and drug abuse. Data analysis was performed using the Wilcoxon Signed Rank Test and effect size calculation. The results showed a significant increase in knowledge scores from 28.63 to 29.29 and attitude scores from 58.49 to 59.16 after the intervention ($p < 0.05$), with a large effect size, indicating the effectiveness of the TRIAD KRR education. This study concludes that TRIAD KRR educational intervention is effective in improving adolescents' knowledge and attitudes and can be used as a promotive and preventive strategy in school-based reproductive health programs.

Keywords: adolescent reproductive health, attitude, health education, knowledge, TRIAD KRR.

INTRODUCTION

Adolescence represents a critical transitional phase characterized by rapid biological, psychological, and social changes that significantly influence individual development and future health outcomes. During this period, adolescents begin to explore identity, sexuality, and social roles, often accompanied by increased curiosity and risk-taking behaviors (BKKBN, 2024; Dewi et al., 2025; UNICEF, 2024; WHO, 2024b). However, limited access to accurate reproductive health information places adolescents at high risk for various health problems, including risky sexual behavior, sexually transmitted infections (STIs), HIV/AIDS, and substance abuse (KEMENKES RI, 2025; Springer, 2024; Yuanita et al., 2024). These issues are collectively conceptualized in Indonesia as the Triad of Adolescent Reproductive Health (TRIAD KRR), which includes sexuality, HIV/AIDS, and drug abuse.

Globally, adolescent reproductive health remains a major public health concern. Approximately 21 million girls aged 15–19 years experience pregnancy annually in low- and middle-income countries, with nearly half being unintended (UNFPA, 2023; WHO, 2024a; WORLD BANK, 2024). Additionally, around 370,000 new HIV infections occurred among young people aged 15–24 years in 2024 (UNAIDS, 2024; UNICEF, 2024). In Indonesia, the situation reflects similar concerns, with approximately 2,700 adolescents aged 15–19 years living with HIV and nearly 50% of new infections occurring among young people (BPS, 2024; KEMENKES RI, 2025). Furthermore, drug abuse among adolescents continues to rise, with an estimated 312,000 adolescents exposed to narcotics (Andini & Pratama, 2023; Putri et al., 2023).

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Empirical evidence also indicates that adolescent reproductive health problems are closely linked to insufficient knowledge and negative attitudes toward reproductive health (Lestari & Dewi, 2024; Nugroho, Rahmawati, *et al.*, 2023; Sari *et al.*, 2023). Studies show that adolescents with limited knowledge are more likely to engage in risky sexual behaviors, have poor decision-making skills, and lack awareness of preventive measures (Fitriani *et al.*, 2023; Putri *et al.*, 2023; Ramadhani *et al.*, 2024). Conversely, health education interventions have been proven effective in improving knowledge and shaping positive attitudes toward reproductive health (Dewi *et al.*, 2025; Nugroho, Wulandari, *et al.*, 2023; WHO, 2023).

The school environment plays a strategic role in delivering reproductive health education, as it provides a structured setting for adolescents to receive accurate information and develop healthy behaviors (Ajzen, 2023; Rosenstock, 2023). However, in many rural areas, including SMA Negeri 1 Kotarih, access to comprehensive, structured reproductive health education remains limited, leading to knowledge gaps and increased vulnerability to TRIAD KRR-related risks. Previous studies have predominantly focused on urban populations, leaving a gap in understanding the effectiveness of interventions in rural settings with different socio-cultural characteristics (Hidayat *et al.*, 2024; Prasetyo *et al.*, 2023; Siregar *et al.*, 2023).

To address these challenges, the TRIAD KRR educational intervention has been developed as a promotive and preventive strategy to improve adolescents' knowledge and attitudes toward reproductive health. This intervention integrates three key components—sexuality education, HIV/AIDS prevention, and drug abuse awareness—using interactive and participatory methods (BKKBN, 2024; Dewi *et al.*, 2025; WHO, 2023). Theoretical frameworks such as the Health Belief Model (HBM) and the Theory of Planned Behavior (TPB) suggest that increased knowledge can influence attitudes, which in turn shape behavioral intentions and health practices (Ajzen, 2023; Glanz *et al.*, 2024; Rosenstock, 2023).

This study aims to analyze the effectiveness of TRIAD KRR educational intervention in improving adolescents' knowledge and attitudes toward reproductive health among students at SMA Negeri 1 Kotarih. Specifically, it evaluates changes in knowledge and attitudes before and after the intervention using a quasi-experimental design. The findings are expected to provide empirical evidence on the effectiveness of school-based reproductive health education, particularly in rural contexts. The contribution of this research is both theoretical and practical. Theoretically, it enriches the body of knowledge in public health, particularly in adolescent reproductive health promotion and behavioral change models (Glanz & Bishop, 2023). Practically, the results can serve as a reference for schools, health institutions, and policymakers in designing effective, context-specific educational interventions to prevent risky behaviors among adolescents (BKKBN, 2024; UNICEF, 2024).

The results of this study indicate that TRIAD KRR educational intervention significantly improves adolescents' knowledge and attitudes, as evidenced by increased post-test scores and statistically significant differences between pretest and posttest ($p < 0.05$) with a large effect size. These findings imply that structured, interactive, and school-based reproductive health education can effectively promote positive behavioral change among adolescents. Based on these results, it is recommended that schools integrate TRIAD KRR education into regular curricula and collaborate with health institutions to ensure sustainability. Additionally, policymakers should strengthen adolescent health programs by prioritizing preventive education strategies tailored to local contexts. Future research should explore long-term behavioral outcomes and expand the intervention to broader populations.

METHOD

This study employed a quantitative, quasi-experimental design with a one-group pretest–posttest model to evaluate the effectiveness of the TRIAD Adolescent Reproductive Health (TRIAD KRR) educational intervention in improving adolescents' knowledge and attitudes regarding reproductive health. The study was conducted at SMA Negeri 1 Kotarih, located in Serdang Bedagai Regency, North Sumatra, Indonesia, in January 2026. This design was selected to measure changes before and after the intervention within the same group, allowing the researcher to assess the direct impact of the educational program.

The study population consisted of all tenth-grade students enrolled in the 2025/2026 academic year, representing adolescents aged approximately 15–17 years. A total of 63 students were selected as research participants using purposive sampling, based on specific inclusion criteria: active enrollment as students, willingness to participate in all research stages (pretest, intervention, and posttest), and attendance during the intervention sessions. Exclusion criteria included students who were absent at any stage of the study or who were unable to participate in the data collection process fully. The independent variable in this study was the TRIAD KRR educational intervention, which consisted of structured health education covering three main components: sexuality, HIV/AIDS prevention, and drug abuse awareness. The intervention was delivered through interactive lectures,

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discussions, and audiovisual media within approximately 60 minutes. The dependent variables were adolescents' knowledge and attitudes toward reproductive health. Knowledge was defined as students' ability to understand and correctly answer questions related to TRIAD KRR. At the same time, attitude was measured using a Likert scale based on students' responses or tendencies regarding reproductive health issues. Data were collected using structured questionnaires developed based on TRIAD KRR indicators aligned with WHO and BKKBN standards. The knowledge questionnaire consisted of multiple-choice questions, scored 1 for correct answers and 0 for incorrect ones. In contrast, the attitude questionnaire used a four-point Likert scale ranging from strongly agree to disagree strongly. Data collection was conducted in three stages: pretest (baseline measurement), the educational intervention, and posttest (post-intervention measurement). Prior to the main study, validity and reliability were assessed among 30 respondents with similar characteristics. The results indicated that all questionnaire items were valid ($r_{\text{count}} > r_{\text{table}}$, $p < 0.05$), with reliability values of $KR-21 = 0.570$ for knowledge (moderately reliable) and Cronbach's Alpha = 0.876 for attitude (highly reliable).

Data analysis was performed using statistical software. Initially, data were processed through editing, coding, and scoring. Normality testing was conducted using the Kolmogorov–Smirnov and Shapiro–Wilk tests, which indicated that the data were not normally distributed ($p < 0.05$). Therefore, the Wilcoxon Signed Rank Test was used to assess differences between pretest and posttest scores. Statistical significance was determined at a p -value of less than 0.05. Additionally, effect size was calculated using the formula $r = Z/\sqrt{N}$ to determine the magnitude of the intervention effect, with interpretation based on Cohen's criteria (small, medium, and large effect). This analytical approach allowed for a comprehensive evaluation of both statistical and practical significance of the TRIAD KRR educational intervention.

RESULTS AND DISCUSSION

The study involved 63 respondents, tenth-grade students at SMA Negeri 1 Kotarih, aged 15 to 17 years. The school has a total of 328 students, with a slightly higher proportion of female students (177) compared to male students (151). The respondents selected in this study met all inclusion criteria and participated fully in all research stages, including pretest, intervention, and posttest. This demographic reflects adolescents in early developmental stages, a critical period for shaping knowledge and attitudes related to reproductive health. The results showed that all items in both knowledge and attitude questionnaires were valid, with correlation values exceeding the r -table (0.361) and significance values below 0.05. Reliability testing indicated that the knowledge instrument had a $KR-21$ value of 0.570, categorized as moderately reliable, while the attitude instrument demonstrated a Cronbach's Alpha value of 0.876, indicating high reliability. These results confirm that the instruments used were appropriate for measuring the intended variables.

Variabel	Number of Questions	Average Score	Variance Score	KR-21 / Cronbach's Alpha	Remarks
Knowledge	30	25,7	8,2	0,570	Quite Reliable
Attitude	15	42,5	7,3	0,876	Highly Reliable

Table 1. Reliability Test Results

Descriptive statistics revealed an increase in both knowledge and attitude scores following the TRIAD KRR educational intervention. The mean knowledge score increased from 28.63 (SD = 0.867) in the pretest to 29.29 (SD = 0.705) in the posttest. Similarly, the mean attitude score increased from 58.49 (SD = 1.061) before the intervention to 59.16 (SD = 0.787) after the intervention. Additionally, the minimum knowledge score improved from 25 to 28, indicating a general improvement across participants.

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Variabel	N	Minimum	Maximum	Mean	Standar Deviasi
Pretest Knowledge	63	25	30	28,63	0,867
Post-test knowledge	63	28	30	29,29	0,705
Pretest Attitude	63	55	60	58,49	1,061
Post-test attitude	63	57	60	59,16	0,787

Table 2. Distribution of Respondents' Knowledge and Attitude Scores Before and After the Intervention

Before hypothesis testing, normality was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. The results showed that all variables had significance values below 0.05, indicating that the data were not normally distributed. Therefore, a non-parametric statistical test, namely the Wilcoxon Signed Rank Test, was used to assess differences between pretest and posttest scores.

Variabel	Test	Statistic	df	Sig.	Remarks
Difference Between P Pre and P Post Values	Kolmogorov-Smirnov	0,288	63	<0,001	Abnormal
	Shapiro-Wilk	0,738	63	<0,001	Abnormal
Difference Between S Pre And S Post Values	Kolmogorov-Smirnov	0,278	63	<0,001	Abnormal
	Shapiro-Wilk	0,720	63	<0,001	Abnormal

Table 3. Kolmogorov-Smirnov normality test results

The Wilcoxon Signed Rank Test results demonstrated a statistically significant difference between pretest and posttest scores for both knowledge and attitude variables ($p < 0.05$), indicating that the TRIAD KRR educational intervention significantly improved adolescents' knowledge and attitudes toward reproductive health. Furthermore, the effect size analysis showed a large effect, suggesting that the intervention not only had statistical significance but also practical importance in influencing behavioral determinants.

Variabel	Z	Asymp. Sig. (2-tailed)	Conclusion
Knowledge Gap (P POST - P PRE)	-5,248	<0,001	There is an increase in significant knowledge
Difference of Attitude (S POST - S PRE)	-5,287	<0,001	There is a significant increase in attitudes

Table 5. Non-Parametric Test Results (Wiloxcon Signed Rank Test)

These findings answer the research questions by confirming significant improvements in both knowledge and attitudes following the implementation of TRIAD KRR education. The increase in knowledge indicates that the educational content was effectively delivered and understood by students. Meanwhile, the improvement in attitudes reflects a positive shift in students' perceptions and readiness to adopt healthy reproductive behaviors. From a theoretical perspective, the results support the Health Belief Model (HBM) and the Theory of Planned Behavior (TPB), which emphasize that increased knowledge can influence attitudes and, in turn, shape behavior. The TRIAD KRR intervention likely enhanced students' perceived susceptibility and severity of reproductive health risks, as well as their perceived benefits of adopting healthy behaviors, leading to more positive attitudes.

From a practical standpoint, these findings highlight the importance of school-based reproductive health education as a preventive strategy. The use of interactive methods, such as discussions and audiovisual media, improved student engagement and understanding. This aligns with previous studies indicating that participatory and interactive educational approaches are more effective in influencing adolescent behavior. Despite its strengths, this study has several limitations. The use of a one-group pretest–posttest design without a control group may limit the internal validity and generalizability of the findings. Additionally, the study was conducted in a single rural school, which may not fully represent broader adolescent populations with different socio-cultural backgrounds.

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Overall, the TRIAD KRR educational intervention was effective in improving adolescents' knowledge and attitudes regarding reproductive health. These results suggest that integrating structured and comprehensive reproductive health education into school curricula can serve as an effective strategy for preventing risky behaviors among adolescents and promoting long-term health outcomes.

CONCLUSION

This study concludes that the TRIAD Adolescent Reproductive Health (TRIAD KRR) educational intervention is effective in improving adolescents' knowledge and attitudes toward reproductive health. The findings demonstrate a significant increase in both knowledge and attitude scores after the intervention, supported by the Wilcoxon Signed Rank Test ($p < 0.05$) and a large effect size. These results indicate that structured, interactive, and school-based health education can play a crucial role in enhancing adolescents' understanding and shaping positive attitudes toward sexuality, HIV/AIDS prevention, and drug abuse awareness. From a practical perspective, the study's implications suggest that schools should integrate TRIAD KRR education into regular learning activities or extracurricular programs as a preventive strategy against risky behaviors among adolescents. Collaboration between schools, health institutions, and government agencies is also essential to ensure the sustainability and effectiveness of reproductive health programs. The use of interactive educational methods, such as discussions and audiovisual media, is recommended to improve student engagement and learning outcomes.

However, this study has several limitations that should be considered. First, the use of a one-group pretest–posttest design without a control group limits the ability to establish causal relationships and may introduce potential bias. Second, the sample size was relatively small and limited to a single school in a rural area, potentially limiting the generalizability of the findings. Third, the study focused only on short-term outcomes (knowledge and attitudes) and did not assess long-term behavioral changes among adolescents. Given these limitations, future research is recommended to use more robust designs, such as randomized controlled trials or comparative studies with control groups, to strengthen the validity of the findings. Additionally, future studies should include larger, more diverse samples from diverse geographical and socio-cultural backgrounds to enhance generalizability. Longitudinal studies are also needed to evaluate the long-term impact of TRIAD KRR interventions on adolescent behavior. Furthermore, future research could explore integrating digital or technology-based educational approaches to improve the accessibility and effectiveness of reproductive health education for adolescents.

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