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Effect of an Interactive Educational Intervention on Knowledge and Attitudes toward Cervical Cancer and Its Prevention among Adolescent Girls

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ABSTRACT

Introduction: Cervical cancer continues to pose a major public health challenge, particularly in low- and middle-income countries. Adolescent girls are the primary target group for prevention efforts, but their knowledge and attitudes about cervical cancer and its prevention are still limited. This study aimed to determine the effect of an interactive educational intervention on the knowledge and attitudes of adolescent girls.
Method: This quasi-experimental study, with a one-group pretest–posttest design, involved 87 adolescent girls aged 15–18 years selected through simple random sampling from a total of 500 students at SMAN 1 Pangkalan Baru, Central Bangka, Indonesia. The intervention consisted of a single 90-minute interactive educational session combining group presentations and discussions. Knowledge and attitudes were measured using a valid and reliable questionnaire (Cronbach's alpha of 0.772 and 0.743). Data were analyzed using the Wilcoxon signed-rank test.
Results: After the intervention, all participants (100%) achieved high knowledge levels, and attitude scores improved significantly. Significant improvements were observed in knowledge ($Z = -8.063$; $p < 0.001$) and attitudes ($Z = -3.135$; $p = 0.002$), with large and medium effect sizes, respectively.
Conclusion: An interactive educational intervention significantly improved adolescent girls' knowledge and attitudes regarding cervical cancer and its prevention. School-based health education has the potential to be an effective strategy to support cervical cancer prevention.

Keywords: Attitudes, cervical cancer, educational intervention, knowledge

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Introduction

Cervical cancer remains a major public health problem worldwide. In 2022, an estimated 660,000 new cases and 350,000 deaths were reported, making it the fourth most common cancer among women globally.[1] The impact of this disease is disproportionately allocated, with almost 90% of cases and 85% of fatalities arising in low- and middle-income nations, particularly in Sub-Saharan Africa, which exhibits the highest cervical cancer fatality rate.[2] In several developing countries such as Ghana, Nigeria, and Sudan, cervical cancer ranks as the primary cause of cancer-induced fatalities in women.[3–5] Indonesia persists in grappling with a considerable disease burden, having recorded approximately 36,964 new cases and 20,708 fatalities in 2022, positioning the nation among nations with the highest incidence of cervical cancer globally.[6]

The principal factor contributing to cervical cancer is Human Papillomavirus (HPV), accountable for over 99% of global cervical cancer instances.[2,5] HPV is the predominant viral infection affecting the reproductive system, with the majority of women encountering the virus soon after initiating sexual activity.[2] High-risk HPV variants, especially strains 16 and 18, are responsible for about 70% of cervical cancer instances.[2,7] Nevertheless, cervical cancer is essentially a preventable disease through two main approaches: HPV vaccination and regular cervical screening to detect precancerous lesions before they progress to invasive cancer.[3,5] Scientific evidence shows that the HPV vaccine can prevent more than 75% of cervical cancer cases.[2]

The World Health Organization (WHO) initiated the Global Strategy to Expedite the Eradication of Cervical Cancer in 2020, aiming for 90% of girls to be completely vaccinated against HPV by the age of 15, 70% of women to be screened with high-efficacy tests, and 90% of women diagnosed with cervical disease to receive treatment by 2030.[8] However, actual global HPV vaccination coverage remains far below this target. The full-course vaccination coverage among adolescent girls aged 10–20 years was recorded at only 1.2% in Africa, 1.1% in Asia, and 31.1% in Europe in 2014.[2] HPV vaccination coverage varies from 15% to 66.5% in Ethiopia, whereas Sudan's national immunization schedule does not currently contain HPV vaccination.[2,5]

In line with the WHO targets, the Ministry of Health of the Republic of Indonesia aims to have 90% of 15-year-old girls vaccinated against HPV by 2030. This effort is being carried out through the School Children Immunization Month (*Bulan Imunisasi Anak Sekolah*, BIAS) program, which provides free HPV vaccines to fifth- and sixth-grade girls in elementary school. However, adolescent girls in high school are no longer targeted by this program, so vaccination

coverage in this group remains poorly documented and they may not be receiving optimal vaccination services.[9]

The persistently low HPV vaccination coverage highlights challenges regarding public knowledge and attitudes toward HPV vaccination and cervical cancer prevention. These knowledge gaps are not limited to adolescents but are also evident among parents or guardians who play a role in vaccination-related decision-making. For example, a study in Sudan reported that more than half of the respondents were unaware that cervical cancer is preventable, while 68% had never heard of a Pap smear.[5] In Ethiopia, only 55.12% of adolescent girls have adequate knowledge about the HPV vaccine, while 45.34% hold a positive attitude toward vaccination.[2] In Nigeria, more than 90% of adolescent girls in secondary school were unaware that HPV is the leading cause of cervical cancer before receiving educational interventions.[4] A similar situation occurred in Japan, where HPV vaccination coverage among adolescent girls born after 2002 dropped dramatically to below 1% due to the spread of misinformation regarding the vaccine's side effects. This situation led the Japanese government to suspend its active recommendation for HPV vaccination for eight years.[10]

Adolescent girls are a strategically important target population in cervical cancer prevention efforts, as the HPV vaccine is most effective when administered before a person becomes sexually active.[4,11] It is commonly acknowledged that one of the most successful and efficient methods for addressing this demographic at scale is through school-based educational initiatives.[2,3] A study conducted in Ghana demonstrated that overall knowledge about cervical cancer improved significantly from 79.1% to 92.3% following a multimodal educational intervention comprising drama performance, PowerPoint presentation, a question-and-answer session, and the distribution of informational leaflets.[3] Research in Nigeria confirmed that peer education was capable of raising the mean knowledge score from 12.94 to 53.74 following peer training in schools.[4] In Turkey, a structured two-session health education program delivered over 12 weeks significantly improved HPV knowledge, health beliefs, and mothers' intention to vaccinate their daughters compared to the control group.[11]

However, the relationship between increased knowledge and changes in attitude and vaccination behavior is not always clear. A randomized trial in Japan found that health literacy among participants improved regardless of the educational method used, whether print-based or social networking service-based, although between-group differences did not reach statistical significance.[10] In Turkey, despite significant improvements in knowledge and vaccination intention, actual vaccination rates did not increase substantially due to affordability barriers.[11] Additional factors such as urban versus rural residence, maternal education level,

access to digital information, socioeconomic status, and ethnicity have also been shown to significantly influence HPV vaccine uptake.[2,7] A study representative of the national population in Brazil found that mothers' educational attainment, access to cell phones, and sexual health education—each independently—were associated with a higher likelihood that adolescents would receive the HPV vaccine.[7]

Several studies examining the effectiveness of educational interventions on adolescent girls' knowledge and attitudes toward cervical cancer and its prevention have been conducted in various countries; however, the available evidence remains specific to certain contexts and has not yet yielded definitive conclusions.[11] There is still a significant gap between awareness levels and actual preventive behaviors in many communities, underscoring the continued need for well-designed educational strategies tailored to specific population groups.[3,5] It is widely believed that an early and accurate understanding of cervical cancer and its prevention can shape health-promoting mindsets and behaviors, which will benefit individuals well into adulthood.[3]

However, evidence on the impact of educational interventions among adolescent girls in Indonesia, particularly in underserved areas, remains limited. Furthermore, data on adolescent girls' knowledge and attitudes toward cervical cancer prevention in Central Bangka Regency are scarce. Because SMAN 1 Pangkalan Baru has the largest female student population in the regency, SMAN 1 Pangkalan Baru is an important target for cervical cancer prevention initiatives. Therefore, this study was conducted to evaluate the effect of an interactive educational intervention on knowledge and attitudes toward cervical cancer and its prevention among adolescent girls at SMAN 1 Pangkalan Baru, Central Bangka, Indonesia.

Methods

This study used a quasi-experimental framework with a single-group pretest-posttest methodology to assess the impact of health education on knowledge and attitudes about cervical cancer and its prevention among adolescent girls. This design was chosen because the educational intervention was implemented as a school-based health promotion program intended for all eligible participants. Establishing a non-intervention control group was considered ethically inappropriate, as withholding evidence-based cervical cancer education from a subset of adolescent girls could limit their opportunity to receive potentially beneficial health information. Furthermore, the primary objective of this study was to assess immediate changes in knowledge and attitudes following an interactive educational intervention rather than to compare different intervention strategies. The pretest–posttest design allowed each participant to serve as her own control, thereby reducing between-subject variability and

enabling assessment of within-group changes after the intervention. Nevertheless, this design does not permit definitive causal inference because it lacks a comparison group to control for potential confounding factors, such as maturation, history, or concurrent exposure to other health information. To minimize the influence of external factors, the posttest was administered immediately after completion of the educational intervention, which consisted of a structured presentation and interactive group discussion. This limitation is further addressed in the Discussion section.

The study was conducted at SMAN 1 Pangkalan Baru, Bangka Tengah Regency, Bangka Belitung Islands Province, Indonesia, between April and October 2025. The study population consisted of all female students enrolled at the school (N = 500). The minimum required sample size was calculated using the Slovin formula, $n = N / (1 + N(e)^2)$, with a margin of error (e) of 10%, yielding a minimum requirement of 84 participants. A total of 87 female students aged 15–18 years, exceeding the minimum required sample size, were subsequently selected from the sampling frame of 500 students using simple random sampling, conducted through a computer-generated random number list.

The inclusion criteria were: (1) female students aged 15–18 years, (2) actively enrolled at SMAN 1 Pangkalan Baru, (3) had not received HPV vaccination, and (4) willing to participate in the study. Students with a history of chronic illness or immunocompromising conditions and those who had previously received HPV vaccination were excluded.

This educational intervention was conducted using an interactive learning approach consisting of a structured presentation followed by a group discussion session. The intervention took place in a single 90-minute session, comprising a 45-minute PowerPoint-based presentation followed by a 45-minute facilitated group discussion. All 87 participants took part in the intervention together in a single large group session. The presentation was delivered by one of the researchers, a midwifery instructor with expertise in reproductive health. During the subsequent discussion session, four facilitators, including the keynote speaker, were involved in answering questions and facilitating discussions among the participants. All facilitators were midwifery instructors with expertise in midwifery, reproductive health, and public health. Participants were encouraged to actively engage in the learning process by sharing their opinions, asking questions, and discussing misconceptions and facts related to cervical cancer and its prevention. This interactive approach is intended to increase participant engagement and facilitate a better understanding of the educational material. This educational intervention material includes an explanation of cervical cancer, risk factors, clinical signs and symptoms, HPV infection, HPV vaccination, and steps to prevent cervical cancer, and is presented using

a standardized PowerPoint presentation to ensure consistency of content among all participants.

Participants first completed a pretest questionnaire assessing their baseline knowledge and attitudes. Following the pretest, the educational session was conducted, and participants were encouraged to actively engage through discussion and questions. Immediately after the educational session, participants completed the posttest questionnaire.

Participants' knowledge about cervical cancer and HPV vaccination was assessed using a 12-item structured multiple-choice questionnaire adapted from Ambarwulan, where each item had one correct answer. One point was awarded for each correct answer, while incorrect answers and "don't know" responses received a score of zero. Based on the total score obtained, knowledge levels were classified into three categories: low (≤4), moderate (5–8), and high (>8). In addition, attitudes toward cervical cancer prevention and HPV vaccination were measured using a separate five-item instrument, also adapted from Ambarwulan, using a five-point Likert scale ranging from strongly disagree (0) to strongly agree (4).[12] For descriptive purposes, total attitude scores (range 0–20) were divided into three approximately equal categories: poor (score 0–6), fair (score 7–13), and good (score 14–20); the bivariate analysis comparing pretest and posttest scores was conducted using the continuous (numeric) scores.

As validity and reliability data for these instruments were not reported in the source publication, the psychometric properties of both questionnaires were evaluated by the researcher using baseline (pretest) responses from all 87 participants. Item validity was assessed using corrected item–total correlation, and internal consistency was evaluated using Cronbach's alpha. All knowledge items demonstrated satisfactory validity (corrected item–total correlation > 0.201), with acceptable internal consistency (Cronbach's alpha = 0.772). For the attitude questionnaire, four of the five items met the corrected item–total correlation criterion (≥0.30), with acceptable internal consistency for the attitude questionnaire (Cronbach's alpha = 0.743).

Statistical analysis was performed with IBM SPSS Statistics version 27. Participant characteristics and study variables were described using descriptive statistics, with continuous variables reported as means and standard deviations, and categorical variables—including the descriptive categorization of knowledge and attitude scores—reported as frequencies and percentages. The Kolmogorov-Smirnov test was applied separately to examine whether the distributions of knowledge and attitude scores met the assumption of normality, which is considered appropriate for the present sample size (n = 87). For each variable, if the pretest and posttest scores were normally distributed, the paired-samples t-test was used to compare mean scores; if the data were not normally distributed, the Wilcoxon signed-rank test was used to

compare median scores. Statistical significance was set at $p < 0.05$.

Ethical approval for this study was granted by the Health Research Ethics Committee of Poltekkes Kemenkes Pangkal Pinang, Ministry of Health (No. 078/EC/KEPK-PKP/IX/2025). Institutional permission to conduct the study was obtained from the school administration of SMAN 1 Pangkalan Baru prior to data collection. As all participants were under 18 years of age, written informed consent was obtained from both the participants and their parents or legal guardians following a full explanation of the study. Participation was voluntary, and participants could withdraw at any time without penalty. Confidentiality of participant information was maintained throughout the study through anonymized data coding and secure data storage.

Result

A total of 87 adolescent girls completed all phases of the study and were included in the final analysis. The findings presented below describe changes in knowledge and attitudes toward cervical cancer and its prevention observed before and after the educational intervention and evaluate the intervention's effectiveness in improving both outcomes.

A total of 87 adolescent girls participated in this study. Based on age, 44 respondents (50.6%) were in the 15–16 years age group, and 43 respondents (49.4%) were in the 17–18 years age group. In terms of grade level, 44 respondents (50.6%) were in Grade X (tenth grade), and 43 respondents (49.4%) were in Grade XI (eleventh grade). Regarding prior exposure to information on cervical cancer and HPV vaccination, 66 respondents (75.9%) had previously received related information, while 21 respondents (24.1%) had never been exposed to such information. **Table 1** presents the characteristics of the respondents.

Table 2 presents the distribution of knowledge and attitude categories before and after the educational intervention. Before the educational intervention, most respondents had a moderate level of knowledge (66.7%), followed by high (17.2%) and low knowledge (16.1%). After the intervention, all respondents (100%) achieved a high level of knowledge. Regarding attitudes toward cervical cancer and its prevention, most respondents had a fair attitude before the intervention (62.1%), followed by a good attitude (35.6%) and a poor attitude (2.3%). After the educational intervention, the proportion of respondents with a good attitude increased from 35.6% to 44.8%, while the proportion of those with a poor attitude decreased from 2.3% to 1.1%.

Table 1. Characteristics of respondents (N=87).

Characteristics	n	%
Age		
15-16 years	44	50.6
17-18 years	43	49.4
Grade level		
Grade X	44	50.6
Grade XI	43	49.4
Prior Information		
Exposure		
Previously exposed	66	75.9
Never exposed	21	24.1

Table 2. Distribution of knowledge and attitude categories before and after educational intervention (N=87).

Variable	Pretest n (%)	Posttest n (%)
Knowledge Level		
Low	14 (16.1)	0 (0.0)
Medium	58 (66.7)	0 (0.0)
Height	15 (17.2)	87 (100)
Attitude		
Less	2 (2.3)	1 (1.1)
Enough	54 (62.1)	47 (54.0)
Good	31 (35.6)	39 (44.8)

Table 3 shows that the median knowledge score increased from 7.00 (range: 0–11; IQR: 6–8) before the educational intervention to 11.00 (range: 9–22; IQR: 11–13) after the intervention. Similarly, the median attitude score increased from 12.00 (range: 6–17; IQR: 10–14) before the intervention to 13.00 (range: 3–18; IQR: 12–15) after the intervention.

Based on **Table 4**, the results of the normality test show that all variables produce p-values below 0.05, indicating that the data do not follow a normal distribution. Therefore, the non-parametric Wilcoxon signed-rank test was used to evaluate the effect of educational interventions on knowledge and attitudes.

Table 3. Descriptive statistics of knowledge and attitude scores before and after educational intervention.

Variable	Median (Min-Max)	IQR (Q1-Q3)
Knowledge		
Pretest Knowledge	7.00 (0-11)	6-8
Posttest Knowledge	11.00 (9-22)	11-13
Attitude		
Pretest Attitude	12.00 (6-17)	10-14
Posttest Attitude	13.00 (3-18)	12-15

Table 4. Normality test of knowledge and attitude scores.

Variable		*p*-value
Knowledge	Before education	<0.001*
	After education	<0.001*
Attitude	Before education	0.006*
	After education	<0.001*

Kolmogorov smirnov test. *Significant at $p < 0.05$.

Based on **Table 5**, it shows that there was a statistically significant increase in knowledge after the educational intervention ($Z = -8.063$; $p < 0.001$). Likewise, there was a significant increase in attitude scores following the intervention ($Z = -3.135$; $p = 0.002$). These findings suggest that knowledge and attitude scores were significantly higher following the educational intervention.

Table 5. Effect of educational intervention on knowledge and attitude scores.

Variable	Pretest Median (IQR)	Posttest Median (IQR)	Z	*p*-value
Knowledge	7.00 (6-8)	11.00 (11-13)	-8.063	<0.001*
Attitude	12.00 (10-14)	13.00 (12-15)	-3.135	0.002*

Wilcoxon Signed Rank Test. *Significant at $p < 0.05$.

The magnitude of the educational intervention was further assessed using effect size analysis. The intervention demonstrated a large effect on knowledge improvement (r = 0.86) and a moderate effect on attitude improvement (r = 0.34). These findings indicate that the

observed increase in knowledge scores was of substantial practical magnitude, while the increase in attitude scores was of moderate practical magnitude. Effect size of educational intervention on knowledge and attitude scores are presented in **Table 6**.

Table 6. Effect size of educational intervention on knowledge and attitude scores.

Variable	Z	Effect Size (r)	Interpretation
Knowledge	-8.063	0.86	Large effect
Attitude	-3.135	0.34	Moderate effect

Note: Effect size (r) was calculated using the formula $r = |Z|/\sqrt{N}$, where N = 87.

Discussion

The findings of this study indicate that adolescent girls' knowledge and attitudes regarding cervical cancer and its prevention significantly improved after the educational intervention, compared to baseline. After the intervention, all respondents were classified as "highly knowledgeable," with a statistically significant increase in attitude scores. Furthermore, the large effect size observed for knowledge and the moderate effect size for attitude suggest that these improvements have practical significance beyond mere statistical significance for adolescent girls' understanding and attitudes toward cervical cancer prevention. Overall, these findings highlight reproductive health education as a key strategy in promotion and prevention efforts aimed at reducing the future burden of cervical cancer.

Knowledge improvement following the educational intervention

Prior to the intervention, pre-test results indicated that most respondents had moderate knowledge about cervical cancer and its prevention, while a small proportion still showed low knowledge. These findings indicate an overall limited understanding of cervical cancer and its prevention among young women at an early stage. This limited knowledge may be due to limited access to reproductive health information, inadequate coverage of cervical cancer topics in educational institutions, and the persistence of several misconceptions about the disease and its prevention efforts.

The post-test results showed that all respondents fell into the high knowledge category, and the median knowledge score increased significantly. These results indicate that adolescent girls' understanding of cervical cancer, its risk factors, symptoms, and preventive measures—including healthy lifestyle practices and HPV vaccination. The large effect size (r = 0.86) indicates that the magnitude of the observed increase in knowledge scores was substantial.

These findings align with prior research demonstrating that educational interventions

can enhance knowledge related to cervical cancer prevention. A school-based education program in Ghana increased students' knowledge from 79.1% to 92.3%, while peer-led education in Nigeria and school-based education in Kenya were also shown to increase adolescents' knowledge of cervical cancer.[3,4,13] A study in Indonesia showed that a board-game-based HPV vaccine education intervention significantly improved knowledge about HPV vaccination among adolescent girls.[14] This highlights the necessity of implementing structured health education programs to improve knowledge of and acceptance toward the HPV vaccine. The consistency of these findings suggests that structured and interactive health education is effective in increasing adolescents' knowledge of cervical cancer across various contexts. Nevertheless, the improvement observed in this study appears more substantial than that reported in some earlier studies. This difference is likely influenced by participants' baseline knowledge levels, the methods and duration of the interventions, and the characteristics of the study populations.

The improvement observed in the present study may be attributed to the interactive teaching strategy used. The use of PowerPoint slides likely helped present information in a more visually accessible way, while discussion and question-and-answer sessions may have encouraged active participation, clarification of misconceptions, and better retention of material. This is consistent with evidence that engaging and interactive formats can strengthen learning outcomes and improve both knowledge and preventive attitudes.[14,15]

These findings support the use of school-or community-based educational interventions as an effective approach to raising awareness about cervical cancer prevention among adolescent girls. These interventions are particularly important in settings where limited knowledge about cervical cancer and misconceptions regarding HPV and vaccination remain common. Integrating interactive health education into adolescent reproductive health programs can contribute to greater acceptance of HPV vaccination and stronger efforts to prevent cervical cancer.[3,13,16]

Attitude improvement following the educational intervention

This study showed a significant improvement in attitudes following the educational intervention, although the effect size was moderate ($r = 0.34$). These results indicate that changes in attitudes occur more slowly than increases in knowledge because attitudes are influenced not only by information but also by an individual's beliefs, perceptions, and experiences.

According to attitude formation theory, knowledge is a predisposing factor that plays a role in shaping attitudes. A better understanding of cervical cancer and its prevention can

increase awareness of disease risks and the importance of preventive measures, thereby fostering more positive attitudes. Previous research has also shown that increased knowledge plays a crucial role in improving attitudes toward HPV vaccination and adherence to cervical cancer screening.[17,18] Among adolescents, Higher knowledge levels are also linked to greater acceptance of the HPV vaccine and improved adherence to screening recommendations.[19]

These findings align with studies reporting that educational interventions can improve knowledge, attitudes, and intentions regarding cervical cancer prevention and HPV vaccination acceptance.[20] The improvement in attitudes observed in this study was likely influenced by the interactive educational methods used. Discussions and question-and-answer sessions provided participants with the opportunity to express their opinions, ask questions, and seek clarification. This process helped participants better understand the information and fostered more positive attitudes toward cervical cancer prevention. Ongoing exposure to health information can also encourage preventive behaviors, such as HPV vaccination acceptance and participation in screening.[21]

However, increased knowledge is not always followed by changes in attitudes or behavior. A study in Turkey showed that structured education increased mothers' knowledge and intention to provide the HPV vaccine but did not increase vaccination coverage due to cost barriers.[11] Similar findings were observed in this study, where cost remains one of the barriers to HPV vaccination. Moreover, studies conducted in Japan and China suggest that HPV vaccine acceptance is shaped not only by knowledge levels but also by social norms, financial cost, and accessibility of health services.[21] Therefore, health education must be supported by policies that improve affordability and access to the HPV vaccine so that changes in knowledge can be followed by changes in attitudes and behavior.

The intervention in this study employed an interactive learning approach that combined multimedia presentations with question-and-answer discussions. This approach is participant-centered because participants did not merely receive information passively but were also actively engaged in the learning process. Previous research has shown that interactive educational forums involving two-way communication and group discussions can increase participant engagement and improve understanding of health information.[20] Therefore, interactive educational methods can serve as an effective strategy within reproductive health promotion programs targeting adolescents.

The findings of this study have practical implications: education about cervical cancer and its prevention needs to be continuously integrated into reproductive health programs in schools. Providing education starting in adolescence is expected to raise awareness of the

importance of behaviors that prevent cervical cancer, including maintaining reproductive health and increasing acceptance of HPV vaccination in the future.

This study has several strengths, namely the use of a pretest-posttest design, the measurement of two important outcomes—knowledge and attitude—and the use of an interactive educational approach that demonstrated a large effect size on knowledge improvement. In addition, the use of numerical scores as the primary analysis method allows for more sensitive detection of changes compared to the use of categorical data alone.

However, this study also has several limitations. It employed a single-group pretest-posttest design without random assignment to a control group; thus, the influence of external factors and potential confounding variables could not be fully eliminated or attributed to the intervention. The relatively small sample size (n = 87), drawn from a single school, limits the generalizability of these findings to the broader adolescent population. Assessments were conducted immediately after the intervention, so this study could not evaluate the long-term retention of knowledge and attitudes. Therefore, future research is recommended to include a randomized control group, a larger and more diverse sample, and follow-up assessments to evaluate the sustainability of the educational effects.

Conclusion

This study showed that adolescent girls' knowledge and attitudes toward cervical cancer and its prevention significantly improved after participating in an interactive educational intervention, although the single-group pre-test-post-test design without a control group precludes definitive causal conclusions. These findings suggest that school-based interactive health education is an effective strategy for increasing adolescent awareness and fostering positive attitudes toward cervical cancer prevention. Future research using a controlled study design and a longer follow-up period is recommended to evaluate the long-term sustainability of this educational effect.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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