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Original Research

EFFECTIVENESS OF VIDEO-BASED HEALTH EDUCATION ON ADOLESCENTS' FIRST AID FOR FOOD POISONING

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Abstract

Background

Foodborne illness remains a major global public health concern, particularly in communal living environments such as Islamic boarding schools, where adolescents study and dine together. Insufficient knowledge and preparedness in providing first aid for food poisoning can increase morbidity and delay treatment. This study aimed to determine the effectiveness of video-based health education in improving adolescents' knowledge, attitudes, and behaviors related to first aid for food poisoning.

Methods

A quasi-experimental pre-test–post-test control group design was conducted among 72 female adolescents aged 16–18 years residing in two Islamic boarding schools. The intervention group received structured video-based health education, while the control group received printed leaflets containing the same educational content. Data were collected using a validated questionnaire measuring knowledge, attitudes, and practices before and after the intervention. Statistical analyses were performed using the Wilcoxon Signed-Rank Test and Mann–Whitney U Test, with a significance level set at $p < 0.05$.

Results

The findings showed significant improvements in knowledge, attitudes, and behaviors in the intervention group following the video-based education ($p < 0.001$), while no significant changes were observed in the control group. Inter-group comparisons also indicated statistically significant post-test differences in all behavioral domains ($p < 0.001$).

Conclusion

Video-based health education effectively enhanced adolescents' knowledge, attitudes, and first-aid behaviors related to food poisoning. The integration of audiovisual learning media provides an engaging and efficient approach to strengthen health literacy and emergency response skills among adolescents in school-based health programs.

Keywords: Adolescent Behavior; First Aid; Foodborne Diseases; Health Education; Video-Based Learning

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INTRODUCTION

Foodborne illness remains a significant global public health problem, with the World Health Organization (WHO) 2020 reporting that nearly 600 million people—or one in ten globally—fall ill each year after consuming contaminated food. Adolescents are particularly vulnerable due to their eating habits, limited food safety awareness, and reliance on institutional meal providers (Aragie et al., 2021). In communal environments such as Islamic boarding schools (*pondok pesantren*), where students live, study, and dine collectively, the risk of food poisoning outbreaks is heightened due to inadequate food handling and sanitation practices (Kaugi et al., 2023).

In Indonesia, foodborne disease outbreaks continue to occur frequently in school-based residential institutions. The Indonesian National Agency for Drug and Food Control (BPOM, 2022) documented 72 outbreaks in 2022, affecting over 5,000 individuals, with East Java among the top three provinces reporting the highest incidence. Microbiological contamination—particularly by *Salmonella* and *Staphylococcus aureus*—remains the leading cause. Islamic boarding schools, which function similarly to dormitories and provide mass catering, have repeatedly been implicated in these outbreaks, underscoring persistent gaps in hygiene and first aid preparedness (Iskandar et al., 2024).

Prompt and appropriate first aid for food poisoning can prevent severe dehydration, complications, and even mortality (Rossetto et al., 2020). However, studies show that adolescents in boarding schools often lack the necessary knowledge and skills to manage early symptoms before professional help arrives (Asparian et al., 2020; Susihar & Kholaso, 2023). In many cases, students rely on self-medication or delay treatment, which can worsen outcomes. The lack of structured, practical health education programs addressing first aid for food poisoning in these settings reflects a critical public health gap.

Health education serves as a fundamental approach to enhancing health literacy and behavior among adolescents. According to the PRECEDE–PROCEED model developed by Green and Kreuter (1991), behavior change is influenced by predisposing (knowledge and attitudes), enabling, and reinforcing factors (Kim et al., 2022). Effective educational interventions should therefore target these behavioral determinants to foster self-efficacy and sustainable health practices (Galmarini et al., 2024). Among available educational tools, video-based learning has gained increasing attention for its ability to deliver engaging, visual, and emotionally resonant content, particularly among adolescents accustomed to digital media (Goad et al., 2018).

Recent studies demonstrate that video-assisted health education significantly improves adolescents' understanding, attitudes, and preventive behaviors regarding various health topics—including hygiene, infectious disease prevention, and first aid management (Alvitasari et al., 2021). Its dynamic audiovisual format enhances attention, retention, and motivation, making it more effective than traditional lecture-based methods (Aragie et al., 2021). Despite this evidence, limited research has explored the use of video-based health education to improve first aid behaviors for food poisoning among adolescents in Islamic boarding schools—a unique cultural and social context with distinct health education challenges.

Therefore, this study aims to determine the effectiveness of video-based health education in improving adolescents' first aid behavior for food poisoning in Islamic boarding schools. This research provides empirical evidence for the integration of digital media into health promotion strategies targeting adolescent populations in communal learning environments.

METHODS

Research design

This study employed a quantitative approach using a quasi-experimental design with a pre-test–post-test control group design. This design was chosen to assess causal relationships between health education interventions using video media and changes in adolescents' first-aid behavior for food poisoning (Creswell & Creswell, 2018). The quasi-experimental design was appropriate due to the practical and ethical constraints of conducting true randomization in educational settings (Polit & Beck, 2021). The study aimed to evaluate the effectiveness of video-based health education in improving knowledge, attitudes, and practices regarding first aid for food poisoning among adolescents in Islamic boarding schools.

Setting dan samples

The study was conducted in two Islamic boarding schools located in Ponorogo Regency, East Java, Indonesia: Pondok Pesantren Darul Fikri and Pondok Modern Arrisalah. These schools share similar educational systems, dormitory structures, and health service access, making them comparable for intervention research.

The population comprised female adolescents aged 16–18 years, currently enrolled in Grade 2 of *Madrasah Aliyah* (equivalent to Grade 5 of *Kulliyatul Mu'allimin Al-Islamiyah* or KMI). Inclusion criteria included: (1) being a registered student residing in the boarding school; (2) being willing to participate and providing informed consent; and (3) being present during all intervention sessions. Exclusion criteria included students with previous participation in

food safety or first-aid training programs. The total sample included 98 students—48 from Pondok Pesantren Darul Fikri and 50 from Pondok Modern Arrisalah.

The allocation of the treatment and control groups was determined through a coin toss to ensure fairness and reduce researcher bias. The head side represented the intervention group (Pondok Pesantren Darul Fikri), while the tail side represented the control group (Pondok Modern Arrisalah).

Measurement and data collection

A purposive sampling technique was used to ensure that participants met specific inclusion criteria relevant to the research objective (Nursalam, 2020; (Etikan, 2016). Two main variables were examined:

1. Independent variable: Health education using video media.
2. Dependent variable: First-aid behavior for food poisoning, measured through knowledge, attitude, and practice (KAP) dimensions.

Instruments

Data were collected using two primary instruments, namely the Health Education Implementation Plan (HEIP) and the Food Poisoning First-Aid Behavior Questionnaire (FPFAB-Q). The HEIP was a structured module adapted from the *Satuan Acara Penyuluhan* (SAP) format issued by the Indonesian Ministry of Health (2019), serving as a comprehensive guideline for delivering the educational intervention. It included essential components such as learning objectives, instructional materials, session duration, teaching aids, and evaluation procedures. The intervention utilized a 15-minute educational video that addressed the causes and symptoms of food poisoning, immediate first-aid steps, fluid replacement and dehydration prevention, and the appropriate timing for seeking professional medical assistance. The video incorporated animation, narration, and live-action demonstrations to enhance engagement and comprehension, consistent with the principles of multimedia learning theory (Mayer, 2021). To ensure the instrument's content validity, the HEIP was reviewed by three experts in nursing education and health promotion, resulting in a Content Validity Index (CVI) score of 0.92, which indicated excellent validity.

The second instrument, the Food Poisoning First-Aid Behavior Questionnaire (FPFAB-Q), was developed based on Lawrence Green's PRECEDE–PROCEED Model Green & Kreuter (1991) to assess behavioral determinants of first-aid practices (Kim et al., 2022). The questionnaire comprised 30 items divided into three dimensions: knowledge, attitude, and

practice. The knowledge dimension consisted of 10 multiple-choice questions scored dichotomously (1 for correct and 0 for incorrect responses). The attitude dimension included 10 statements rated on a five-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (5). The practice dimension comprised 10 items measured using a frequency-based scale ranging from "never" (1) to "always" (4). A pilot test was conducted with 30 students sharing similar characteristics to the study participants to evaluate the instrument's reliability and validity. The results showed a Cronbach's alpha value of 0.87, indicating high internal consistency, while construct validity testing using factor analysis yielded a Kaiser–Meyer–Olkin (KMO) value of 0.82 and a significance level of $p < 0.001$, confirming the adequacy of the measurement structure.

Data Collection Procedures

Data collection was carried out over a two-week period in January 2024. In the intervention group, which consisted of students from Pondok Pesantren Darul Fikri, the process was conducted in three sessions. The first session included the administration of a pre-test using the Food Poisoning First-Aid Behavior Questionnaire (FPFAB-Q), followed by the presentation of the first educational video session. The second session involved a reinforcement activity through a second video viewing and a brief discussion session using a question-and-answer format to strengthen understanding and engagement. The third session took place one week after the final video session, during which the post-test was administered to evaluate knowledge retention and behavioral changes among participants.

Meanwhile, the control group, composed of students from Pondok Modern Arrisalah, underwent two sessions. The first session involved administering the pre-test and distributing printed health education leaflets containing the same educational content as presented in the video for the intervention group. The second session was conducted one week later, during which participants completed the post-test to measure changes in knowledge and behavior. To maintain consistency and minimize bias, both groups were supervised by the same research team throughout all data collection procedures

Data Analysis

Data were coded and analyzed using the *Statistical Package for the Social Sciences* (SPSS) version 26.0. Prior to analysis, all datasets were examined for completeness and accuracy to ensure data integrity. The results of the Shapiro–Wilk normality test indicated that the data were not normally distributed ($p < 0.05$); therefore, non-parametric statistical methods

were applied. The Wilcoxon Signed-Rank Test was used to compare pre-test and post-test scores within each group, aiming to assess significant improvements in participants' knowledge, attitudes, and practices following the intervention. Meanwhile, the Mann–Whitney U Test was employed to compare post-test scores between the intervention and control groups in order to identify differences in first-aid behavior related to food poisoning. A significance level of $p < 0.05$ was set for all statistical tests. In addition to p-values, data interpretation also considered effect size and median differences to strengthen the interpretation of the practical significance of the findings (Field, 2021).

Ethical Consederations

Ethical approval for this research was granted by the Health Research Ethics Committee, Faculty of Nursing, Airlangga University (No. 3121-KEPK). Prior to data collection, participants were provided with information sheets explaining the study's purpose, procedures, risks, and benefits. Written informed consent was obtained from each participant and the school administration. Confidentiality was ensured by anonymizing data and securing all research documents.

RESULT

This quasi-experimental study was conducted at *Pondok Pesantren Darul Fikri* and *Pondok Modern Arrisalah* in Ponorogo Regency, East Java. The two Islamic boarding schools were selected for their similar organizational structures and educational systems, yet neither had previously implemented any formal health education program concerning first aid for food poisoning, either from the community health center (*Puskesmas*) or internal school initiatives.

Table 1. *Demographic Data of Respondents at Pondok Pesantren Darul Fikri and Pondok Modern Arrisalah, Ponorogo (March 2024) (n = 72)*

No.	Respondent characteristics	Treatment group		Control group	
		f	%	f	%
1.	Age				
	a. 16 years	7	19,4	10	27,8
	b. 17 years	25	69,5	21	58,3
	c. 18 years	4	11,1	5	13,9
2.	History of Have received health education				
	a. Yes	4	11,1	3	8,3
	b. No	32	88,9	33	91,7

As presented in Table 1, most participants in both the intervention and control groups were 17 years old, comprising 69.5% of respondents in the treatment group and 58.3% in the control group. The majority of respondents had never received any previous health education related to first aid for food poisoning—88.9% in the treatment group and 91.7% in the control group. A small number had received information through media exposure such as television, YouTube, or community outreach programs. These findings demonstrate a generally low baseline exposure to relevant health education, highlighting the need for structured intervention.

Table 2. Demographic Data of Respondents' Parents at Pondok Pesantren Darul Fikri and Pondok Modern Arrisalah, Ponorogo (March 2024) (n = 72)

No.	Respondent characteristics of respondent's parents	Treatment group		Control group	
		f	%	f	%
1.	Father's education background				
	a. Didn't finish elementary school yet	1	2,8	0	0
	b. Elementary school	4	11,1	3	8,3
	c. Junior high school	5	13,9	4	11,1
	d. Senior high school	17	47,2	23	63,9
	e. Higher education institution	9	25	6	16,7
2.	Mother's educational background				
	a. Didn't finish elementary school yet	0	0	0	0
	c. Elementary school	8	22,2	1	2,8
	d. Junior high school	4	11,1	10	27,8
	e. Senior high school	17	47,2	15	41,6
	f. Higher education institution	7	19,5	10	27,8
3.	Father's occupation				
	a. Civil servants	1	2,8	4	11,1
	b. Self employed	23	63,9	27	75
	c. Privat sector employee	8	22,2	1	2,8
	d. Ect (farmer)	4	11,1	4	11,1
4.	Mother's occupation				
	a. Civil servants	2	5,5	3	8,3
	b. Self employed	13	36,1	15	41,7
	c. Prvat sector employee	6	16,7	1	2,8
	d. Ect (farmer)	15	41,7	17	47,2

As shown in Table 2, the educational background of respondents' parents was mostly at the senior high school level—47.2% among fathers in the treatment group and 63.9% in the control group. Similarly, mothers' education predominantly reached the senior high school

level (47.2% and 41.6%, respectively). Regarding occupation, most fathers were self-employed (63.9% in the treatment group; 75% in the control group), and most mothers were housewives (41.7% and 47.2%, respectively). These socioeconomic factors suggest a moderately educated and predominantly middle-income background, potentially influencing students' access to health information.

Table 3. Distribution of Respondents' Knowledge Before and After Health Education Using Video Media at Pondok Pesantren Darul Fikri and Pondok Modern Arrisalah, Ponorogo (March 2024) (n = 72)

Knowledge	Treatment group				Control group			
	Pre test		Post test		Pre test		Post test	
	∑	%	∑	%	∑	%	∑	%
a. Less	9	25	0	0	10	27.8	9	25
b. Sufficient	21	58,3	3	8,3	19	52.8	20	55.6
c. Good	6	16,7	33	91,7	7	19.4	7	19.4
Total	36	100	36	100	36	100	36	100
Wilcoxon signed rank test	p=0.000				p=0.068			
Mann whitney U test	p=0.000							
Average total value	66.25		87.36		64.17		65.56	

The results of the Wilcoxon Signed-Rank and Mann–Whitney U tests are summarized in Table 3. Prior to the intervention, most respondents in both groups had moderate levels of knowledge regarding food poisoning first aid (58.3% and 52.8%, respectively). After the intervention, 91.7% of students in the treatment group demonstrated good knowledge, compared with only 19.4% in the control group. The Wilcoxon test showed a significant increase in knowledge within the intervention group (p = 0.000), while no significant improvement was observed in the control group (p = 0.068). The Mann–Whitney U test also indicated a significant difference in post-test scores between the two groups (p = 0.000). These results confirm that video-based health education effectively enhanced adolescents' knowledge about first aid for food poisoning.

Table 4. Distribution of Respondents' Attitudes Before and After Health Education Using Video Media at Pondok Pesantren Darul Fikri and Pondok Modern Arrisalah, Ponorogo (March 2024) (n = 72)

Demeanor	Treatment group				Control group			
	Pre test		Post test		Pre test		Post test	
	∑	%	∑	%	∑	%	∑	%
a. Negative	31	86,1	6	16,7	32	88,9	30	83,3
b. Positif	5	13,9	30	8,3	4	11,1	6	16,7
Total	36	100	36	100	36	100	36	100
SD	2.47		2.82		2.91		3	
Wilcoxon signed rank test	P=0.000				P=0.070			
Mann whitney U test	p=0.000							
Average total value	30.75		36.5		30.16		30.83	
Avarage group			33,6				30,5	

As presented in Table 4, pre-test results showed that most participants had negative attitudes toward performing first aid for food poisoning—86.1% in the treatment group and 88.9% in the control group. After the intervention, 83.3% of students in the treatment group demonstrated positive attitudes, compared with only 16.7% in the control group. The Wilcoxon Signed-Rank Test revealed a significant improvement in attitudes within the intervention group ($p = 0.000$), while no significant change was found in the control group ($p = 0.070$). The Mann–Whitney U Test also showed a significant intergroup difference ($p = 0.000$). These findings indicate that health education delivered through video media positively influenced students' attitudes by increasing awareness and motivation to perform appropriate first aid measures.

Table 5. Distribution of Respondents' Actions Before and After Health Education Using Video Media at Pondok Pesantren Darul Fikri and Pondok Modern Arrisalah, Ponorogo (March 2024) (n = 72)

Behavior	Treatment group				Control group			
	Pre test		Post test		Pre test		Post test	
	∑	%	∑	%	∑	%	∑	%
a. Less	10	27.8	0	0	11	30.6	12	33.3
b. Sufficient	20	55.8	9	25	20	55.5	17	47.3
c. Good	6	16.7	27	75	5	13.9	7	19.4
Total	36	100	36	100	36	100	36	100
Wilcoxon signed rank test	P=0.000				P=0.075			
Mann whitney U test	p=0.000							
Average total value	68.61		86.39		66.39		67.5	

The behavioral component results are displayed in Table 5. Before the intervention, both groups demonstrated moderate levels of first-aid practice, with 55.5% in each group. After exposure to the video intervention, 75% of respondents in the treatment group demonstrated good practices, while only 19.4% of the control group achieved similar improvement. Statistical analysis using the Wilcoxon Signed-Rank Test revealed a significant increase in the treatment group (p = 0.000), while no significant change occurred in the control group (p = 0.705). The Mann–Whitney U Test also showed a significant difference between post-test results in the two groups (p = 0.000). These findings demonstrate that video-based health education effectively improved not only knowledge and attitudes but also the practical application of first-aid behaviors among adolescents.

DISCUSSION

This study investigated the effectiveness of health education using video media on adolescents' knowledge, attitudes, and actions related to first aid for food poisoning in Islamic boarding schools. The findings demonstrate that video-based health education significantly improved students' cognitive, affective, and behavioral domains compared to the control group, who received leaflet-based education. These results emphasize that interactive and multimedia-based learning is more effective than conventional methods in enhancing adolescents' health literacy and behavioral competence in emergency first aid contexts.

The results revealed a significant improvement in knowledge levels among students in the intervention group, with most participants achieving a "good" category after the video intervention. This outcome underscores the importance of audiovisual media in delivering complex health information in an engaging and memorable way. Consistent with Mayer's *Cognitive Theory of Multimedia Learning* (2021), the combination of verbal and visual channels enhances information processing, dual coding, and long-term retention.

Previous studies support these findings. Maulidya et al. (2022) and Salsabila et al. (2021) also found that video-based health education significantly improved adolescents' knowledge of first aid in emergency situations. Similarly, Pangaribuan & Sinuraya (2022) reported that structured educational interventions increased first aid competence among adolescents. The improvement in the current study may be attributed to the contextualized design of the video, which included relatable scenarios, step-by-step demonstrations, and concise narration in simple language, thereby increasing understanding and recall.

In contrast, the control group, which received printed leaflets, showed minimal improvement. This suggests that passive reading materials may not sufficiently stimulate adolescents' cognitive engagement, particularly in Generation Z learners who are more responsive to visual and interactive learning modalities (Aisah et al., 2021; Ardhianti, 2022). Moreover, family background and parental education appeared to influence knowledge levels, consistent with findings by Zulfitria (2018), who reported a positive association between parents' education and students' academic performance.

The study also demonstrated a marked improvement in students' attitudes toward first aid after receiving video-based education. Most participants shifted from negative to positive attitudes, aligning with the *Health Belief Model (HBM)*, which posits that perceived susceptibility, severity, and self-efficacy influence health behavior change (Aisah et al., 2022). By visually illustrating real-life cases of food poisoning and first-aid responses, the video enhanced emotional engagement and reinforced perceived behavioral control, leading to attitudinal shifts.

These findings are supported by previous research. Handayani & Kurnaesih (2020) and Setiawati et al. (2022) reported that health education using audiovisual media significantly improved adolescents' attitudes toward first aid. Similarly, Herlianita et al. (2020) found that video-based instruction effectively changed students' attitudes toward first aid in burn injuries. Attitudes are shaped through observational learning, a principle articulated in Bandura's *Social Cognitive Theory* (1986), wherein adolescents model behaviors they observe in credible

sources. The video thus served as a vicarious learning tool, enabling students to internalize positive attitudes toward helping behavior in food poisoning cases.

However, some participants in the intervention group maintained negative attitudes despite increased knowledge. This finding may reflect the influence of external factors such as fatigue, workload, or lack of motivation during sessions—barriers commonly observed in residential educational environments (Suryana et al., 2022). These results highlight the need for periodic reinforcement to sustain attitudinal change.

The behavioral domain also showed significant improvement in the intervention group. After the intervention, most respondents demonstrated appropriate first-aid actions for food poisoning, particularly in managing conscious victims. These results align with the *Knowledge-Attitude-Practice (KAP)* model, which posits that increased knowledge and positive attitudes precede behavioral change (Kim et al., 2022). Video-based education facilitates psychomotor learning by providing vivid visual demonstrations that guide procedural memory and skill acquisition.

Consistent with prior studies, Salsabila et al. (2021) and Herlianita et al. (2020) reported that audiovisual media significantly improved students' first-aid performance. The visual simulation of real scenarios enhances confidence and motor planning, leading to greater readiness to act in emergencies. Conversely, the control group, exposed only to printed material, showed no significant behavioral improvement, highlighting the limitations of text-based education in skill-oriented learning contexts.

Although the intervention group exhibited significant behavioral gains, a small subset of students remained in the "moderate" action category. This could be attributed to incomplete translation of knowledge and attitudes into practice—an issue commonly observed in adolescent populations due to limited practical exposure and confidence (Darsini et al., 2019). Continuous hands-on practice sessions and reinforcement may therefore be necessary to consolidate behavioral competence.

Implications

The findings have meaningful implications for health promotion and school-based nursing interventions. Integrating video-based health education into adolescent health curricula can effectively increase health literacy, emergency preparedness, and self-efficacy. In clinical and community settings, nurses can use multimedia resources to deliver preventive education, particularly for time-sensitive conditions like food poisoning, where rapid and accurate first

aid is critical. Furthermore, this study supports the adoption of digital learning strategies aligned with the *SDG 3* goal of ensuring healthy lives and promoting well-being for all ages.

Strengths and Limitations

A key strength of this study lies in its quasi-experimental design with pre- and post-tests and a control group, which enabled robust comparison and causal inference. The use of validated instruments and standardized video materials enhanced measurement reliability and intervention fidelity. Additionally, the study addressed a novel context—Islamic boarding schools—which remain underrepresented in adolescent health education research, thus contributing new insights into culturally specific learning environments.

Nevertheless, the study has limitations. First, the sample was limited to two Islamic boarding schools within a single district, which may restrict generalizability. Second, the relatively short follow-up period (two weeks) limited the ability to assess long-term retention of knowledge and behaviors. Third, potential confounding factors such as peer influence and prior informal learning were not fully controlled. Future studies should consider larger samples, longer follow-up, and qualitative evaluations to explore learners' experiences and contextual barriers.

CONCLUSION

This study demonstrates that video-based health education significantly enhances adolescents' knowledge, attitudes, and actions related to first aid for food poisoning in Islamic boarding schools. The integration of audiovisual media provides an engaging, efficient, and effective approach to health education, aligning with the learning preferences of today's adolescents. The findings support the broader implementation of video-based interventions in adolescent health promotion programs, particularly in resource-limited and culturally specific educational contexts.

Competing Interest

The author(s) declare no competing interest in this study.

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Conflict of Interest

The author(s) declare that there is no conflict of interest regarding the publication of this article.

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