

The Effectiveness Of Siganta Games In Improving Knowledge Of First Aid In Accidents And Emergencies

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ABSTRACT

Background: Accidents in school environments can occur suddenly and lead to injuries or emergencies requiring immediate treatment. First aid knowledge is essential for all school members, but the education provided so far has been limited in terms of both content and scope. Innovative learning media such as the SIGANTA educational game are one alternative for improving students' knowledge interactively. Objective: This study aims to determine the effectiveness of the SIGANTA game as an educational medium for improving first-aid knowledge of accidents and emergencies at SMPN 3 Banguntapan. Method: This study employed a quasi-experimental design with a pretest-posttest control group design. A total of 200 seventh-grade students were randomly assigned to an intervention group (SIGANTA game-based education) and a control group (leaflet education). Data collection used a first aid knowledge questionnaire that had been validated and reliability-tested. Data analysis was conducted using the Wilcoxon Signed-Rank Test and the Mann-Whitney Test at a significance level of $p < 0.05$. Results: Before the intervention, most students in both groups had low levels of knowledge. After the education, the intervention group showed a significant increase in the good knowledge category (47%), while the control group only reached 23%. There was a significant difference in posttest scores between the intervention and control groups ($p = 0.000$). Conclusion: The SIGANTA game is an effective educational medium for improving knowledge of first aid in accidents and emergencies at school. The integration of interactive learning media into school health education is recommended to enhance students' preparedness to handle emergencies.

Keywords: education, SIGANTA game, first aid, emergencies, board game

INTRODUCTION

Accidents are unwanted events or incidents that can occur at any time and suddenly, causing injury or even death ¹. Accidents can cause injuries and emergency conditions that require quick and appropriate first aid ². Data from the Riskesdas survey indicates that injuries in schools are quite high, particularly among children aged 5–14 years, with various types of accidents such as fainting, falling, and choking. If not properly addressed, these incidents can impact students' health, academic performance, and even their continued education ³.

Knowledge is crucial in developing first aid skills/actions ⁴. Knowledge of first aid is essential for all school community members, not just Red Cross Youth (PMR)

members; however, the education provided so far has been limited in terms of content and reach ⁵ . One innovation that can be used to enhance students' knowledge is educational games, such as the SIGANTA board game, designed to teach first aid concepts in an interactive and enjoyable manner.

A preliminary study at SMPN 3 Banguntapan revealed high accident rates at the school and low levels of first aid knowledge and training among students. This raises the question of how effective education through the SIGANTA game is in improving first aid knowledge in accidents and emergencies at SMP Negeri 3 Banguntapan. Therefore, this study aims to determine the effectiveness of the SIGANTA game as an educational medium in improving first aid knowledge in accidents and emergencies at SMPN 3 Banguntapan.

MATERIAL AND METHOD

This study is a quantitative study with a quasi-experimental design using a pretest-posttest with control group design, involving the measurement of first aid knowledge levels before and after intervention in the intervention group (education through SIGANTA games) and the control group (education through leaflets) at SMPN 3 Banguntapan in February 2025. The study population consists of all 224 seventh-grade students, using total sampling with the following criteria: dropouts who did not complete the health education process, those who did not participate in or were late for the pretest or posttest, and respondents who withdrew during the research process. Based on these criteria, a sample of 200 students was obtained, divided into an intervention group of 100 students and a control group of 100 students using simple random sampling for group allocation.

Data collection was conducted using a first aid knowledge questionnaire that had been validated using Pearson's correlation with 30 valid questions (P-value <0.05) and reliability using Cronbach's alpha with a Cronbach's alpha value of 0.93 (>0.6), supported by secondary data from school documentation. The SIGANTA media itself has been deemed highly suitable based on a feasibility test by experts in health promotion media and emergency nursing. The research procedure included preparation, implementation of the intervention with pre-test data collection followed by education through the SIGANTA game, then post-test data collection, and completion in the form of computerized data processing and analysis using SPSS 21.

Statistical analysis used the Wilcoxon Signed Rank Test to determine knowledge differences before and after the intervention in each group, and the Mann-Whitney test to compare post-test results between the intervention and control groups, with a significance level of $p < 0.05$. This study was approved by the Health Research Ethics Committee (KEPK) of Poltekkes Kemenkes Yogyakarta, as evidenced by the ethical approval recommendation letter from the Health Research Ethics Committee No. DP.04.03/e-KEPK.1/208/2025.

RESULTS AND DISCUSSION

Cross-tabulation of Knowledge Levels in the Intervention and Control Groups

Table 1 Cross-tabulation of Knowledge Levels in the Intervention and Control Groups

Categories		Intervention Group							
		Pretest				Posttest			
		Good	Fair	Poor	Total	Good	Fair	Poor	Total
Age									
12	number	0	3	2	5	2	1	2	5
	%	0	3	2	5	2	1	2	5
13	number	6	27	39	72	34	29	10	73
	%	6	27	39	72	34	29	10	73
14	number	4	9	10	23	11	10	1	22
	%	4	9	10	23	11	10	1	22
Total	number	10	39	51	100	47	40	13	100
	%	10	39	51	100	47	40	13	100
Gender									
Male	number	5	17	26	48	15	22	11	48
	%	5	17	26	48	15	22	11	48
Female	number	5	22	25	52	32	18	2	52
	%	5	22	25	52	32	18	2	52
Total	number	10	39	51	100	47	40	13	100
	%	10	39	51	100	47	40	13	100
PMR Membership									
PMR Members	number	4	3	4	11	7	3	1	11
	%	4	3	4	11	7	3	1	11
Non-PMR Members	number	6	36	47	89	40	37	12	89
	%	6	36	47	89	40	37	12	89
Total	number	10	39	51	100	47	40	13	100
	%	10	39	51	100	47	40	13	100
Exposure to Information									
Ever	number	6	10	9	25	12	10	3	25
	%	6	10	9	25	12	10	3	25

Never	number	4	29	42	75	35	30	10	75
	%	4	29	42	75	35	30	10	75
Total	number	10	39	51	100	47	40	13	100
	%	10	39	51	100	47	40	13	100
Control Group									
Categories		Pretest				Posttest			
		Good	Fair	Poor	Total	Good	Fair	Poor	Total
Age									
12	number	1	4	7	12	4	4	4	12
	%	1	4	7	12	4	4	4	12
13	number	5	28	40	73	18	21	34	73
	%	5	28	40	73	18	21	34	73
14	number	1	2	12	15	1	3	11	15
	%	1	2	12	15	1	3	11	15
Total	number	7	34	59	100	23	28	49	100
	%	7	34	59	100	23	28	49	100
Gender									
Male	number	2	8	38	48	3	7	38	48
	%	2	8	38	48	3	7	38	48
Female	number	5	26	21	52	20	21	11	52
	%	5	26	21	52	20	21	11	52
Total	number	7	34	59	100	23	28	49	100
	%	7	34	59	100	23	28	49	100
PMR Membership									
PMR Members	number	3	6	8	17	6	5	6	17
	%	3	6	8	17	6	5	6	17
Non-PMR Members	number	4	28	51	83	17	23	43	83
	%	4	28	51	83	17	23	43	83
Total	number	7	34	59	100	23	28	49	100
	%	7	34	59	100	23	28	49	100
Exposure to Information									
Ever	number	1	12	13	26	9	5	12	26
	%	1	12	13	26	9	5	12	26
Never	number	6	22	46	74	14	23	37	74
	%	6	22	46	74	14	23	37	74
Total	number	7	34	59	100	23	28	49	100
	%	7	34	59	100	23	28	49	100

Table 1 shows the characteristics of the respondents in the intervention and control groups, consisting of 145 people (72.5%) aged 13 years, which according to Piaget's cognitive development theory, 13-year-old adolescents are in a transitional period from the concrete operational stage to the formal operational stage, where they begin to develop abstract thinking skills, rational reasoning, and draw conclusions from

acquired knowledge while being aware of the limitations of their cognitive abilities⁶. This implies that providing first aid education to adolescents is an appropriate step, as they are already capable of rational thinking and easily absorb information.

Based on the data, 104 respondents (52%) were male, which also contributed to the effectiveness of the intervention, as gender differences can influence readiness and response to education^{7,8}. A total of 172 respondents (86%) from both groups did not participate in PMR extracurricular activities, and 149 respondents (74.5%) had never been exposed to prior information or had never attended first aid training/counseling for accidents and emergencies. Membership in organizations such as the Red Cross Youth (PMR) can play a significant role in enhancing knowledge, as PMR members have educational and training backgrounds that support understanding of health-related materials, thereby contributing significantly to improving adolescents' health knowledge⁹.

The data shows that before the health education using the SIGANTA game, the intervention group had a “Poor” level (51%). After the health education, the intervention group experienced a change, resulting in a ‘Good’ knowledge level (47%). Meanwhile, in the control group, most respondents were in the “Poor” category (59%) before the intervention. After the first aid health education using leaflets, the level of knowledge changed, with most respondents in the “poor” category decreasing to 49%.

Overall, the data indicate that the intervention was successful in improving knowledge levels, particularly among 13-year-old participants, female students, Red Cross Society members, and those previously exposed to information. This suggests that new education has a significant impact on groups that previously had limited access to knowledge, as well as on those with prior experience or knowledge¹⁰.

Level of Knowledge of First Aid for Accidents and Emergencies Among Students Before and After Education Was Provided to the Intervention and Control Groups

Table 2 Differences in Pre-test and Post-test Knowledge Levels Between the Intervention Group and the Control Group

Group	Category	f	Mean	Sum of Rank		Sig (2-tailed)
				Negative	Positive	
Intervention	Posttest<pretest	2	33.75			
	Posttest>pretest	96	49.83	67.50	4783.00	0.000
	Posttest=pretest	2				
	Total	100	83.58	67.50	4783.00	0.000

Kontrol	Posttest<pretest	27	42.41			
	Posttest>pretest	59	44.00	1145.00	2596.00	0.002
	Posttest=pretest	14				
	Total	100	86.41	1145.00	2596.00	0.002

Table 2 shows that the Wilcoxon test indicates a significant difference in mean scores (4.20) between the intervention group, which received the SIGANTA Game intervention, and the control group, with a p-value of 0.000 (p-value <0.05). This indicates that the educational intervention using the SIGANTA Game affects the level of first-aid knowledge in accident and emergency situations.

This study aligns with the research by Amelia et al. (2023), which showed that after receiving education through e-books, there was an increase in students' learning outcomes regarding first aid knowledge in accidents ¹¹. Other researchers have noted that board games can enhance students' knowledge and serve as an engaging educational tool^{12,13}.

Meanwhile, the control group that received education through leaflets also experienced an average increase of 1.09 (p-value < 0.05), indicating that education through leaflets had an effect on the control group's level of knowledge about first aid in accidents and emergencies. These results align with the research conducted by Maptukhah & Anita (2023), which states that education through leaflets is effective in increasing adolescent girls' knowledge about the risks of early marriage ¹⁴.

Differences in Post-Test Knowledge Levels Between the Intervention and Control Groups

Table 3 Differences in Post-Test Knowledge Levels Between the Intervention Group, which was educated through the SIGANTA Game, and the Control Group, which was educated through leaflets

Variabel	Kelompok	Mean	Sig (p value)
Nilai <i>Post test</i>	Intervensi	122.94	0.000
	Kontrol	78.06	
	Total	201	0.000

Table 3 shows the difference in posttest scores between the intervention group and the control group with a p-value of 0.000 (p-value <0.05), indicating a significant difference in the results of education through the SIGANTA game and leaflet on the level of knowledge of first aid in accidents and emergencies among students at SMPN

3 Banguntapan. In the control group, the change in categories before and after education via leaflets was less significant than in the intervention group.

The type of media used in learning can influence and improve knowledge, and each person has a different learning style¹⁵. The SIGANTA game is more effective at improving first aid knowledge than leaflets because it is interactive and engages participants in the learning process. Throughout the game, respondents not only passively receive information, as in a leaflet, but are also encouraged to play and learn interactively, thereby improving their memory and understanding of first aid concepts. This aligns with research showing that learning methods using board games can help students concentrate during the learning process¹².

The limitations of this study include a narrow sample scope, restricted to students at SMPN 3 Banguntapan, which makes the results difficult to generalise to a broader population. Additionally, the measurement focused solely on knowledge, without assessing changes in attitude or practical first-aid skills. Furthermore, the short follow-up period did not allow for the assessment of long-term knowledge retention, and potential respondent bias in completing the questionnaire may also affect the validity of the data.

CONCLUSION

This study shows that education through SIGANTA games can improve first-aid knowledge for accidents and emergencies at SMP Negeri 3 Banguntapan. The findings of this study can be applied in schools, particularly junior high schools, by integrating interactive learning media, such as the SIGANTA game, into health education programs. This will enhance students' knowledge and preparedness regarding first aid for accidents and emergencies. The study's results also encourage teachers and health personnel to continue developing innovative and participatory educational methods to make health-related content more easily accessible.

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DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the corresponding author upon reasonable request. All data were collected and analysed specifically for this research and are not publicly available due to privacy and institutional restrictions.

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