

Team Games Tournament: Diarrhea Prevention Education for School Children through Team Play and Video Media

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ABSTRACT

Diarrhea is one of the leading causes of morbidity and mortality among children in Indonesia. Health education in schools serves as a key strategy in reducing the incidence of diarrhea in children. This study aims to analyze the effectiveness of the Team Games Tournament (TGT) method combined with video media in improving elementary school students' knowledge of diarrhea prevention. A quasi-experimental method with a pre-test-posttest design and a Non-Equivalent Control Group Design was employed, involving 70 respondents divided into intervention and control groups. The results showed a significant increase in diarrhea prevention knowledge scores in the intervention group compared to the control group ($p < 0.05$). This indicates that game-based learning is more effective than conventional educational methods. Based on these findings, the TGT method can be considered an innovative and interactive educational strategy within school health programs and is recommended for broader implementation alongside evaluations of behavioral changes in diarrhea prevention.

Keywords: Diarrhea, Health Education, Team Games Tournament (TGT), Video Media

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INTRODUCTION

Diarrhea is a condition characterized by the passage of loose or watery stools three or more times a day. Globally, there are nearly 1.7 billion cases of diarrheal disease among children each year. According to the World Health Organization (WHO), diarrhea accounts for approximately 9% of all deaths among children under five years old, mostly due to poor sanitation, limited access to clean water, and a lack of awareness regarding hygienic and healthy living behaviors (1). In Indonesia, the Ministry of Health reported that diarrhea is among the most common infectious diseases affecting school-aged children, with a prevalence rate of 6.8% in 2023 (2). Data from the South Kalimantan Provincial Health Office in January 2022 recorded 35,092 cases of diarrhea. Specifically, in

Banjarmasin City, there were 5,412 reported cases in 2020. According to the Banjarmasin City Health Office, the incidence of diarrhea among elementary school-aged children in the city reached 1,348 cases in 2020 (3).

The high number of diarrhea cases in Banjarmasin, particularly among toddlers and elementary school children living near riverbanks (4), is primarily influenced by children's hygiene-related behaviors. These include habits related to drinking water consumption, environmental sanitation, personal hygiene such as handwashing, and the selection of healthy snacks—factors that play a critical role in diarrhea prevention among children (5,6). Most of these cases are closely linked to poor sanitation, limited access to clean water, and the low adoption of clean and

healthy living practices in everyday life. Over time, various intervention approaches focusing on promotion and prevention—especially through the WASH (Water, Sanitation, and Hygiene) program—have proven effective in reducing diarrhea incidence in many developing countries (7). Strengthening school-based education, particularly targeting young children, has become a global trend in preventing environmentally related diseases. Health education for school children is highly effective in preventing diarrhea (8).

School-based health education is a key strategy for reducing diarrhea incidence in children. However, conventional educational methods such as lectures and leaflets are often less effective in enhancing children's understanding and engagement. Game-based learning approaches, such as the Team Games Tournament (TGT), have been shown to be more engaging and effective in improving children's comprehension of health concepts. This method enables children to learn through enjoyable social interactions, healthy competition, and active participation in the learning process. Studies have shown that the implementation of TGT can improve students' knowledge and attitudes toward handwashing with soap as a preventive measure against diarrhea (9).

Health education when delivered through audiovisual media has also been proven to be more effective than conventional methods such as lectures or leaflets (10). Animated videos as educational media offer advantages in capturing attention, enhancing understanding, and facilitating the delivery of health information (11). Previous studies indicate that using audiovisual media in health education can increase individuals' knowledge and attitudes toward a disease (12). Furthermore, game-based learning has

been shown to improve children's memory retention and understanding of health topics more effectively than traditional methods. Educational games encourage children to think critically and relate health concepts to their daily experiences, thereby promoting healthy behaviors (13). Additionally, educational games such as puzzles have been proven to effectively stimulate children's cognitive development. Puzzle games not only enhance fine motor skills but also strengthen critical thinking and problem-solving abilities. This demonstrates that educational games can improve children's understanding and retention of important information, including health-related topics (14).

To improve students' knowledge of diarrhea prevention, it is necessary to implement a comprehensive educational approach that combines two methods: video-based education and game-based learning through the Team Games Tournament method. The Team Games Tournament (TGT) is a cooperative learning model that is easy to apply, involves all students equally, encourages peer tutoring, and incorporates elements of play and reinforcement (15).

The TGT model consists of five steps: class presentation, team study, games, tournaments, and team recognition (16). However, there has been no study that attempts to combine video-based education with the team-based learning method using TGT for school children. Therefore, the researcher considers it important to explore the use of the Team Games Tournament method as an educational approach for diarrhea prevention among school children. This study aims to identify the effectiveness of combining the Team Games Tournament method with video-based lectures in improving elementary school

students' knowledge of diarrhea prevention.

METHODS

This study is a comparative quantitative research using a quasi-experimental design with a non-equivalent control group design approach. This design involves two groups: an intervention group and a control group, each of which receives both a pre-test and post-test to determine the differences between the two groups (17). The study includes two variables: the independent variable consists of education provided through the game-based method (Team Games Tournament) and educational video media, while the dependent variable is the level of knowledge regarding diarrhea prevention among elementary school students. The study was conducted at a public elementary school (SDN) in Banjarmasin City, South Kalimantan Province, from October to November 2023.

The population in this study consisted of all fifth-grade students at SDN Sungai A Banjarmasin, totaling 119 students across three classes. The sampling technique used was probability sampling with a simple random sampling method (18). Based on Slovin's formula, the required sample size was calculated to be 64.2, which was then rounded to 64 samples. To account for potential dropout, 10% was added to the minimum sample size, resulting in a total of 70 respondents.

These were divided into two groups: 35 in the intervention group and 35 in the control group. Group allocation was done without randomization. The inclusion criteria for participants in this study were: students aged between 10 and 13 years, currently enrolled in the fifth grade at SDN Banjarmasin, able to read and write, able to communicate effectively or

demonstrate cooperative behavior, and willing to participate as research respondents. Meanwhile, the exclusion criteria (or dropout criteria) included students who were absent during the data collection process due to illness or granted permission to be absent. Participants who did not return the informed consent form signed by their parents were also excluded from the study.

Data were collected using various instruments, with one of the main tools being a questionnaire designed to measure students' knowledge of diarrhea prevention. The questionnaire consisted of 15 multiple-choice questions related to WASH (Water, Sanitation, and Hygiene) topics, including: understanding the concept of diarrhea (definition, causes, symptoms, and prevention); knowledge of WASH as a preventive measure; concepts of clean water; environmental sanitation; and personal and hand hygiene. The scoring followed a qualitative assessment scale: 80–100 = very good, 66–79 = good, 56–65 = fair, 41–55 = poor, and 0–40 = fail (8,19).

Additional educational media used in the study included PowerPoint presentations and illustrated educational videos for the intervention. The Team Games Tournament instrument involved a group-based rapid-answer game (four students per group competing against another group), using randomized questions from the diarrhea prevention knowledge questionnaire. The questionnaire used a Likert scale and had been validated by the researcher. The validity test conducted at SDN X Banjarmasin City with 31 respondents resulted in an *r*-table value of 0.355 (at a 95% confidence level), and item *r*-values ranged from 0.517 to 0.842. These results indicate validity, as all *r*-values exceeded the *r*-table. The reliability test using Cronbach's Alpha yielded a value

of 0.921, indicating a very high degree of reliability (20).

Informed consent was obtained one day prior to the pre-test for both the intervention and control groups. Consent was secured from the parents of respondents under 17 years of age. Students who failed to submit the signed informed consent form were excluded from the study.

In the intervention group, the study was conducted over three days: the first day involved a pre-test; the second day included education through lectures, animated video viewing, and the Team Games Tournament method; and the third day involved a post-test. In the control group, the study lasted five days: a pre-test on the first day; standard diarrhea prevention education using posters displayed in the classroom for three days; followed by a post-test on the fifth day.

The study employed both univariate and bivariate analyses. Univariate analysis was used to describe the frequency distribution of respondent characteristics. Bivariate analysis was conducted using a dependent samples t-test (paired t-test) to compare two variables and evaluate the consistency of the results. A Shapiro-Wilk test for normality was performed beforehand,

revealing that the data were not normally distributed ($p < 0.05$). Consequently, the Wilcoxon Signed-Rank Test was used for analyzing pre-test and post-test data within the same group. To compare post-test knowledge scores between the independent intervention and control groups, the Mann-Whitney U Test was used.

RESULTS AND DISCUSSION

This analysis was conducted to determine the frequency distribution of the research variables, specifically the age and gender of the respondents. The following is a description of the respondents' characteristics.

Table 1 shows the respondent characteristics in a study on the effectiveness of the Team Games Tournament as a strategy to improve knowledge through diarrhea prevention education using team-based play and video media. Among the 70 respondents, divided equally between the intervention and control groups (35 each), the majority fell within the 10–11 age category (86% in the intervention group and 91% in the control group). Regarding gender, the intervention group was predominantly female (54%) compared to male students (46%), whereas the control group had a slightly higher proportion of males (49%) than

Table 1. Characteristics of Fifth-grade Students Related to Their Level of Knowledge and Attitudes in Efforts to Prevent Diarrheal Diseases in the Intervention and Control Groups (n = 35).

No.	Characteristics	Intervention Group (n = 35)		Control Group (n = 35)	
		N	%	N	%
1	Age Category				
	10 – 11 years	30	86	32	91
	12 – 13 years	5	14	3	9
	Total	35	100	35	100
2	Gender				
	Male	16	46	17	49
	Female	19	54	18	51
	Total	35	100	35	100

females (51%).

This analysis utilized the non-parametric statistical test, the Wilcoxon Signed-rank Test, to compare the pre-test and post-test scores within the same group and to test the research hypothesis.

Based on Table 2, the results of the Wilcoxon Signed-rank Test on the knowledge variable before the intervention (pre-test) and after the intervention (post-test) in both the intervention and control groups show that the p-value for knowledge from the Wilcoxon test is 0.000. Since $0.000 < 0.05$, it can be concluded that the alternative hypothesis (H_a) is accepted, indicating a significant difference in respondents' knowledge levels before and after the intervention in both groups.

This means that the educational methods used had an impact on increasing knowledge about diarrhea prevention among school children. Although both groups showed improved knowledge scores after the intervention, the intervention group demonstrated a highly significant change. This indicates that the educational method combining the Team Games Tournament with

lecture-based video media was effective in enhancing diarrhea prevention knowledge in the intervention group.

Based on Table 3, the results of the Mann-Whitney U Test showed a p-value < 0.05 ($p = 0.000$), indicating that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. These results demonstrate a significant difference in the level of knowledge after the educational intervention, which combined the Team Games Tournament method and lecture-based education using video media, between the intervention group and the control group among elementary school students in SDN Kota Banjarmasin. The test results also revealed a highly significant difference in mean rank scores, with the intervention group having a mean rank of 52.17 and the control group having a mean rank of 18.83.

This study aimed to identify the effectiveness of education using the Team Games Tournament (TGT) method combined with a lecture method through educational video media in improving diarrhea prevention knowledge among elementary school children. The results showed a

Table 2. Differences in Diarrhea Prevention Knowledge Scores Before and After the Intervention in the Intervention and Control Groups (n = 70).

No.	Knowledge Score	Median	SD	P- value
Intervention Group				
1	Before Intervention (Pre-test)	7,50	1.055	0.000
	After Intervention (Post-test)	11,00	486	
Control Group				
2	Before Intervention (Pre-test)	7,00	1.085	0.000
	After Intervention (Post-test)	9,00	894	

Table 3. Mann-Whitney Test Results Measuring the Difference in Post-Test Scores of Diarrhea Prevention Knowledge Between the Intervention and Control Groups

Variable	Group	Mann-Whitney U Test		P- value
		Mean Rank	Z	
Diarrhea Prevention Knowledge	Intervention	52.17	-5.237	0.000
	Control	18.83		

significant increase in knowledge scores on diarrhea prevention in the intervention group. Diarrhea remains one of the leading causes of morbidity and mortality among children in Indonesia (21). Based on the study background, one of the main factors contributing to the high incidence of diarrhea is the lack of children's knowledge regarding personal and environmental hygiene (22). Therefore, a more engaging and interactive educational approach is needed, one of which involves the use of educational games such as TGT (16).

The characteristics of respondents in this study showed that the majority of participants were aged 10–11 years old, accounting for 62 out of 70 respondents (88%), while the remaining 8 respondents (12%) were aged 12–13 years. The slight age variation is due to the predetermined inclusion criteria, which selected students in grades 4 and 5. According to Click and Parker (2013), children aged 8–10 are more competitive in school activities but still require significant attention from teachers.

Moreover, at this age, children are capable of maintaining interest, thinking logically about problems, understanding cause and effect, and grasping abstract concepts (24). Children aged 11–12 are able to apply logic, solve problems, and have good oral and written language skills (23). Notoatmodjo (2003) stated that age is one of the factors influencing a person's knowledge (25).

Age also affects comprehension and thinking patterns; as children grow older, their ability to understand and process information improves, which contributes to better knowledge acquisition (Pratiwi, 2021). According to Piaget, the 10–12 age range is part of the concrete operational stage, during which children begin to develop formal logical thinking,

allowing them to use rational strategies (27).

In terms of gender distribution, 52% of the respondents were female (37 students), while 47% were male (33 students), indicating a slight female dominance in the sample. This study found no significant differences in diarrhea prevention knowledge scores between male and female students. However, previous studies have suggested that female students generally possess better knowledge regarding proper handwashing than their male counterparts (24). This is consistent with earlier findings stating that there is no correlation between gender and the incidence of diarrhea (28)(29).

Based on the results in Table 2, pre-test knowledge scores among fifth-grade students regarding diarrhea prevention showed that many students still had low knowledge. In the intervention group, 12 students scored between 40–50, while in the control group, 15 students were in this range. This low level of knowledge was largely due to students primarily obtaining information from parents and the lack of formal health education on diarrhea prevention at school (30).

Post-test results revealed an improvement in knowledge scores in both groups. In the intervention group, the number of students with low knowledge decreased from 12 to 5, indicating a positive shift. Meanwhile, in the control group, the number of students with low knowledge decreased from 15 to 8, showing a less significant change. Statistical analysis using the Wilcoxon Signed-rank Test indicated a significant difference in knowledge levels before and after the intervention in both groups. The p-value of 0.000 ($p < 0.05$) confirmed the first research hypothesis: a significant difference existed between pre-test and post-test scores in both

groups. However, the improvement was notably greater in the intervention group, demonstrating the effectiveness of the TGT method combined with educational video media in enhancing children's knowledge of diarrhea prevention (16).

According to Edgar Dale's Cone of Experience theory (1946), when games are used in the learning process, students retain up to 90% of the material. Games make learning more meaningful and enjoyable, enhancing students' understanding of the material (31). The TGT learning model, developed by Robert Slavin, combines teamwork with team competition to improve understanding of concepts and skills in an interactive way. The competitive element motivates students to actively participate in the learning process. In this study, the TGT model effectively improved students' understanding of diarrhea prevention compared to conventional methods such as posters (16).

This was further supported by data analysis using the Mann-Whitney U Test, which yielded a p -value < 0.05 ($p = 0.000$), leading to the rejection of H_0 and acceptance of H_a . These results provided strong evidence of a significant difference in post-test knowledge scores between the intervention and control groups. The mean rank of the intervention group was 52.17, while the control group was 18.83, indicating a substantial gap between the two. The intervention group, having received multi-method education approach combining lectures and the TGT game, scored higher than the control group that only received poster-based education (32).

TGT requires all students to actively participate, which fosters responsibility, cooperation, honesty, healthy competition, and engagement in learning

(33). Previous research has also shown that TGT not only promotes teamwork but also makes it easier for students to understand and explore material due to the use of peer tutoring. The comprehensive learning model in this study involved several stages: presenting the material, group discussions, game sessions, tournaments, and finally, group rewards (34).

In conclusion, this study found that a comprehensive educational method combining TGT and lecture-based video media significantly improved students' ability to recall and apply knowledge, especially in adopting diarrhea prevention behaviors both at home and in school. Another advantage of TGT is its adaptability across various educational settings without the need for costly equipment. In this study, the games were simple yet appealing, allowing children to interact with peers, exchange ideas, and work together to understand the prevention of diarrhea.

The findings of this study have important implications for nursing practice, especially in health education and promotion at the elementary school level. For clinical nurses, this study highlights the potential of innovative educational strategies such as TGT combined with video media as an effective way to enhance children's knowledge on diarrhea prevention. Nurses are encouraged to integrate this method into health promotion activities at community health centers, schools, and communities, ensuring the involvement of children through fun and easily comprehensible educational games.

Furthermore, parents should also be engaged in reinforcing education at home to support consistent WASH (Water, Sanitation, and Hygiene) behavior. Nurses also play a key role in

monitoring the impact of this comprehensive method by evaluating children's knowledge and behavior changes over time. Future research is needed to evaluate the long-term impact of the TGT method in improving knowledge and behavior change in the prevention of diarrhea and other diseases. Additional studies could also explore the effectiveness of this method across different early childhood education settings, both in urban and rural areas, to assess potential differences in outcomes.

LIMITATIONS

This study has several limitations that should be considered. One of the main limitations is the sample size; the research was conducted in only one school, which restricts the generalizability of the findings to a broader population. In addition, the relatively short duration of the intervention poses another limitation, as more profound behavioral changes typically require a longer period to be measured effectively. Another challenge encountered in this study was the lack of active participation from some students during the game activities, particularly those who were shy or lacked self-confidence. This highlights the importance of the facilitator's role in the implementation of the TGT method to ensure that all students can participate actively and gain maximum benefit from the intervention. Therefore, further studies with a larger and more diverse sample, as well as long-term evaluation, are needed to assess the effectiveness of this method in various educational contexts and age groups.

RESEARCH ETHIC

This study was conducted in accordance with ethical research principles, including respect for the rights of

research subjects, the principle of justice, and the principle of beneficence. All participants were provided with clear information regarding the purpose, benefits, and potential risks of the study. Participation was entirely voluntary and confirmed through written informed consent. Furthermore, the confidentiality and privacy of the respondents were strictly maintained, and the data collected were used solely for research purposes. All respondents—fifth-grade students—received equal treatment in the form of health education on diarrhea prevention. Additionally, all participants received equal rewards upon completing the study. Ethical clearance for this research was granted under the approval number

4XX/KEPKFKIKULM/EC/IV/2023 by the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Lambung Mangkurat University.

CONFLICT OF INTEREST

The researchers declare that there is no conflict of interest in this study, whether in the form of academic affiliations, financial interests, or personal relationships that could influence the results and interpretation of the research. All procedures were conducted independently and objectively in accordance with the predetermined scientific methodology. If there was any support or sponsorship from external parties, it did not influence the analysis or reporting of the research findings.

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CONCLUSION

This study demonstrates that the Team Games Tournament (TGT) method, when combined with educational video media, is effective in increasing elementary school students' knowledge of diarrhea prevention. With significant results in improving understanding and behavioral change, this approach can serve as a model for game-based health education programs in school settings. Overall, the use of the TGT method as a game-based learning strategy presents an innovative alternative to enhance students' understanding of clean and healthy living behaviors, particularly in preventing diarrhea. With broader implementation, this method is expected to contribute to improving children's health in school environments.

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