



# The Effect of Education Using Snakes and Ladders Board Game on Healthy Snacks Selection of Elementary School Students

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## Abstract

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**BACKGROUND:** Primary school age is when the child is in a formal operational state, where the child might think and reason logically and draw conclusions from existing information.

**AIM:** This study determined the effect of using snakes and ladders board game (*ular tangga*) on the selection of healthy snacks in elementary school students. The result sees on students' knowledge, attitudes, and practices. The study used quasi-experiment, group pre-test, and post-test without the control group. The research variables were students' knowledge, attitudes, and practices toward selecting healthy snacks. This research was conducted in March 2020 at an elementary school in Makassar City, Indonesia.

**METHODS:** The sampling method was simple random sampling with a sample size of 79 students. Data collection tools were using questionnaires and educational media for snakes and ladders. The analysis was carried out descriptively on each variable with an analysis of the frequency distribution and testing the differences before and after the intervention using the Wilcoxon signed-rank test.

**RESULTS:** This study showed that the mean of knowledge about healthy snack selection among the students before education with *ular tangga* is 6.34, increasing to 7.18 after education with *ular tangga game*. The mean attitude about healthy snack selection among the students before education with *ular tangga game* is 53.92, increasing to 55.43 after education with *ular tangga game*. The mean of practices healthy snack selection among the students before education with *ular tangga game* is 9.35, increasing to 9.77 after education with *ular tangga game*. Based on the Wilcoxon test, the p-value is obtained for each variable ( $p < 0.05$ ); knowledge ( $p = 0.000$ ), attitude ( $p = 0.009$ ), and practices ( $p = 0.001$ ).

**CONCLUSION:** Snakes and ladders board game education influences elementary school students' knowledge, attitudes, and practices.

## Introduction

School snacks are food and drinks ready to be served by street vendors on the side of the road or in public places [1]. Snack food is an important factor in children's growth because snacks contribute energy and nutrients used while the child is in school. Therefore, quality snacks will affect the quality of food children eat every day at school [2].

Unhealthy foods that are consumed repeatedly will have the risk of developing several health problems or diseases. Some of them commonly occur in children: Poisoning, diarrhea, cancer, kidney failure, and several other infectious diseases due to decreased immunity.

A report from the Indonesian Food and Drug Administration (BPOM RI) in 2017 stated that the KLB (Outbreak event/Kejadian *Luar Biasa*) of food poisoning in educational institutions mainly occurred in elementary schools. The risk factors for food poisoning outbreaks in primary schools are thought to be due

to street food contaminated with pathogenic bacteria, improper storage temperature, and the interval time between processing and serving [3].

In 2019, there was an outbreak of candy poisoning in elementary schools with 10 cases. There were 0 cases in boys (0%), while in the female group, 10 people (100%), namely, eight students (Grade 2) and two teachers. Hard candy poisoning of various flavors occurs from consuming candy bought in the school canteen [4]. Children have their own choices in choosing food at school, including buying snacks at school. By looking at these conditions, the group vulnerable to consuming unhealthy foods is schoolchildren because knowledge about food safety is still low [5].

Efforts can be made to increase knowledge about healthy snacks for elementary school children by providing health education. Health education is an activity that allows individuals to consciously adopt behaviors to eliminate and even reduce risk factors that affect health, prevent disease, and improve the quality of life [6]. In Wang and Fang's research (2020),

health education can positively influence preventing tract infections in elementary, middle, and high school students in Gansu, China [7]. Children spend a lot of time in school, so school is a suitable place to provide continuous health education [8].

Primary school age is when the child is in a formal operational state, where the child might think and reason logically and draw conclusions from existing information. Therefore, providing health education at school age is the right step [9]. The provision of health education materials to school-age children is easier to understand if it uses media that attracts attention. The form of health education through educational games is considered more fun than the teaching method in the class. The game that has been widely used as an educational medium is ular tangga game. The ular tangga game is included in one type of APE (*Alat Permainan Edukatif*/educational toys and games). The use of APE in education can make the teaching-teaching process effective, make it easier for children to understand, increase children's memory, and can increase freshness in teaching [10]. The ular tangga media can stimulate children to find solutions to problems by answering questions and taking directions in the snakes and ladders board game. This study aimed to determine the effect of education using ular tangga game on the selection of healthy snacks for elementary school students in Makassar.

The provision of health education materials to school-age children is easier to reach when using media that attracts attention. The correct method and the use of teaching aids that are right on target, the information conveyed will be readily accepted, absorbed, and absorbed by the target. At the point when we study, 10% we gain from what we read, 20% we earn from what we hear, 30% we gain from what we see, half we gain from what we see and hear, 70% we learn from what we say, and 90% we earn from what we did [11]. The form of health education through educational games is more fun than teaching methods in class or lectures, so it is hoped that it will be easy to understand and remember the health messages conveyed. The game that has been widely used as an educational medium is ular tangga game. Ular tangga game is one type of APE. The use of APE in education can make the teaching process faster, increase understanding, increase children's memory, and increase freshness in teaching [10].

Ular tangga game is a cooperative play therapy. Cooperation is playing together and with clear rules so that a relationship is formed between leaders and members [12]. Through ular tangga game, children can solve problems, namely, answering questions and carrying out commands contained in the ular tangga game. In another study by Hafif Hamdalah titled "Effectiveness of illustrated story media and ular tangga in dental and oral health education for students of SDN 2 Patrang, Jember Regency," there is a difference in

effectiveness between the lecture method and the illustrated story media. The communicative approach is applied in the game of ular tangga. There was an increase in knowledge, attitudes, and practices toward teeth and mouth in the group who received counseling using ladder game media compared to the picture story media group [13].

## Methods

### *Research design*

The research design used the quasi-experiment, group pre-test, and post-test without a control group, which is a research design that takes measurements (pre-test) before being given treatment and returns to measuring (post-test) after being given treatment.

### *Research location*

This research was conducted at an elementary school in Makassar City, Indonesia, in March 2020. This school was chosen based on the observations of researchers. There were several school snack sellers around an elementary school in Makassar. The students were seen buying snacks during rest hours.

### *Type and sources of data*

The primary data obtained information level and average knowledge, attitudes, and practices were measured by questionnaire. Secondary data collected were the number of participants from headmaster an elementary school in Makassar.

### *Data collection techniques*

The population in this study were students in Grades IV and V, with a total of 97 students. Determination of the number of samples using the Slovin formula and obtaining a sample of 79 respondents. The sampling technique used is the simple random sampling method. Data analysis used SPSS with Wilcoxon signed-ranks test. Analysis was carried out descriptively on each variable with an analysis of the frequency distribution. In bivariate analysis, it was conducted to prove the research hypothesis that education using ular tangga game on the selection of healthy snacks among students at an elementary school in Makassar. Data are presented in tabular and narrative form.

## Results

### *Analysis of students sociodemographic characteristics*

This research used 79 respondents. The respondents predominantly were 10 years old, as many as 50.6% and at least 12 years old were 3.8%. Based on gender, males were 50.6%, and females were 49.4%. Based on class, the fourth grade was 50.6%, and the fifth grade was 49.4%. Data are shown in Table 1.

**Table 1: Percentage of characteristics of an elementary school students (n = 79)**

Respondents characteristics	n	%
Age		
9 years old	15	19.0
10 years old	40	50.6
11 years old	21	26.6
12 years old	3	3.8
Gender		
Male	40	50.6
Female	39	49.4
Class		
IV	40	50.6
V	39	49.4

### *Analysis of knowledge categories in students*

The table shows the number and percentage of respondents based on their level of knowledge before and after treatment, education using a ular tangga media. At the time of the pre-test, there were 30.4% who had a good level of knowledge, 41.8% had a sufficient level of knowledge, and there were 27.8% who had a low-level category. At the post-test, the respondents who had a good level of knowledge increased to 54.4%, then respondents who had sufficient knowledge levels were 22.8%, and respondents who had a below level of knowledge were 22.8% (Table 2).

**Table 2: Analysis of knowledge categories in students**

Knowledge categories	Pre-test		Post-test	
	n	%	n	%
Good	24	30.4	43	54.4
Sufficient	33	41.8	18	22.8
Below	22	27.8	18	22.8
Total	79	100.0	79	100.0

### *Analysis of attitudes categories in students*

The number and percentage are based on the respondent's attitude before and after intervention using ular tangga media. At the time of the pre-test, there were 57% who were in the positive attitude category, and there were 43% who were in the negative attitude category. At the time of the post-test, respondents who were included in the positive attitude category increased to 59.5%, while respondents who were in the negative attitude category were 40.5% (Table 3).

**Table 3: Analysis of attitude categories in students**

Attitude categories	Pre-test		Post-test	
	n	%	n	%
Positive	45	57.0	47	59.5
Negative	34	43.0	32	40.5
Total	79	100.0	79	100.0

### *Analysis of practices categories in students*

The data in the table show the number and percentage based on the respondent's practices before and after treatment. At the time of the pre-test, there were 59.5% who were in the good practices category, and there were 40.5% who were in the bad practices category. At the time of the post-test, respondents who were included in the positive practices category increase to 77.2%, while respondents who were included in the harmful practices category were 22.8% (Table 4).

**Table 4: Analysis of practices categories in students**

Practices categories	Pre-test		Post-test	
	n	%	n	%
Positive	47	59.5	61	77.2
Negative	32	40.5	18	22.8
Total	79	100.0	79	100.0

### *The differences in mean of knowledge, attitudes, and practices in students*

Based on table 5, there are differences in the average value of knowledge, attitudes, and practices before and after the intervention. For the knowledge variable, the mean score before intervention was 6.34 and after the intervention was 7.18. In the attitude variable, the mean score before the intervention was 53.92 and after the intervention was 55.43. In the practices variable, the mean value before intervention was 9.35 and after the intervention was 9.77.

**Table 5: Difference in mean of knowledge, attitudes, and practices in students**

Variable	Mean	SD	p-values	n
Knowledge				
Pre-test	6.34	1.686	0.000	79
Post-test	7.18	1.774		
Attitude				
Pre-test	53.92	6.027	0.009	79
Post-test	55.43	5.535		
Practices				
Pre-test	9.35	1.220	0.001	79
Post-test	9.77	0.422		

The p-values of the knowledge, attitude, and practices variables were 0.000, 0.009, and 0.001, respectively, according to statistical testing using the Wilcoxon signed-ranks test, indicating that the p-values were less than 0.05. It means that before and after the intervention, there are significant differences in knowledge, attitudes, and practices.

## Discussion

### **Identification of the effect of education using ular tangga media on students' knowledge in healthy snacks selection**

Knowledge can be obtained through the experiences of others, education, mass media, and the environment. Knowledge is an integral part of the action and is influenced by the learning process. Green stated that an educational approach through health education could be a way to change one's knowledge [14].

Based on the data collection results before the intervention, the knowledge of respondents who were in the good category was 30.4%, in the sufficient category were 41.8%, and in the below, the category was 27.8%. After the intervention using ular tangga media, the knowledge of respondents who were in the good category was 54.4%, the sufficient category was 22.8%, and in the below, the category was 22.8%.

The results of the pre-test on students' knowledge an elementary school in Makassar showed an average value (mean) of 6.34 with a standard deviation of 1.686, while the results of the post-test students' knowledge showed an average value (mean) of 7.18 with a standard deviation of 1.774. The results of statistical tests using the Wilcoxon signed-ranks test showed the value of  $p = 0.000$  ( $p < 0.05$ ) so that hypothesis 0 experienced rejection. This means that there is a significant difference between before and after the intervention. This shows that educational interventions using ular tangga media influence respondents' knowledge.

The results of this study are in line with research conducted by Suryaningsih and Navianti (2012) and research by Saputri which proves that post-test results with education using ular tangga media can increase the knowledge [15]. Increased knowledge comes from information captured by the sense of sight, it's about 75–85% so that simulations using image media can increase knowledge. The ular tangga game is a game that is rich in interesting pictures, the ular tangga medium used in the study was modified by the researcher so that it is rich in interesting pictures and information.

### **Identification of the effect of education using ular tangga media on students' attitudes in healthy snacks selection**

Attitude is a person's closed response to certain object stimuli. In real situations, attitudes indicate harmony with stimuli in everyday life that involves emotions in the person concerned. There are three components of attitude, including belief in ideas and concepts toward objects, emotional life or one's evaluation of objects, and the tendency to act [14].

Based on the results of data collection before the intervention, the attitudes of respondents who were in the positive category were 57% and in the negative category were 43%. After the intervention using ular tangga media, the attitudes of respondents who were in the positive category were 59.5% and in the negative category were 40.5%.

The results of the pre-test on the attitudes of an elementary school in Makassar students showed an average value (mean) of 53.92 with a standard deviation of 6.027, while the post-test results of students' attitudes showed an average value (mean) of 55.43 with a standard deviation of 5.535. The results of statistical tests using the Wilcoxon signed-ranks test showed  $p = 0.009$  ( $p < 0.05$ ), so that hypothesis 0 experienced rejection. This means that there is a difference between before and after the intervention. This shows that educational interventions using ular tangga media influence respondents' attitudes.

Information is a reinforcing factor in the formation of attitudes, information provides suggestive messages to provide an effective basis in assessing something so that attitudes are formed. This is in line with the research of Saputri *et al.*, namely, there is an effect of health education on attitudes in the selection of healthy snacks [16].

### **Identification of the effect of education using ular tangga media on students' practices in healthy snacks selection**

Based on the results of data collection before the intervention, the practices of respondents who were in the good category were 59.5% and in the bad category were 40.5%. After the intervention using ular tangga media, the attitudes of respondents who were in the good category were 77.2% and 22.8% were in a bad category.

The results of the pre-test on the practices of an elementary school in Makassar students showed an average value (mean) of 9.35 with a standard deviation of 1.220, while the post-test results of students' attitudes showed an average value (mean) of 9.77 with a standard deviation of 0.422. The results of statistical tests using the Wilcoxon signed-ranks test showed  $p = 0.001$  ( $p < 0.05$ ) so that hypothesis 0 experienced rejection. This means that there is a difference between before and after the intervention. This shows that educational interventions using ular tangga media influence respondent practices.

The process of changing practices is influenced by age and academic ability. The respondent's age is in the operational development stage so that it is easy to receive information and the time is right for instilling good habits. Good academic abilities can be a support for understanding information [17]. The information presented in the ular tangga media that the

researcher has modified is in the form of quiz cards and info cards. Quiz cards contain questions, and if they cannot be answered, they get a penalty. Because there is a penalty, this is a challenge for respondents in playing this ular tangga game. The answers to the quiz card are on the info card. This card also contains real pictures so that it can reflect the respondents if they find the characteristics of healthy and unhealthy snacks.

The results of this study are in line with the research of Suryaningsih and Navianti (2012) that there is an effect of health education using ular tangga on children's practices in choosing healthy snacks [15]. According to research by Nazari et al. regarding the effect of health education on reducing the consumption of unhealthy snacks in elementary school students in Kermanshah City, Iran showed a positive effect of health education on unhealthy snacks and increased students' willingness to consume healthy snacks [18].

However, the results of this study are not in line with Azizah (2018) research. Respondents cannot avoid foods containing Mono Sodium Glutamate (MSG) because there are many types of snacks in schools that contain MSG. This is also related to student demographic data. Students who often bring supplies to school only carry a small amount of pocket money. A small allowance will prevent them from buying snacks at school. Conversely, students who do not bring supplies will bring a lot of pocket money so that they could buy snacks at school [19].

Students' behavior, perceptions, and emotions and their family, peers, and school environment all influence how they eat snacks at school. Environmental factors, as well as personal and interpersonal factors, influence student snack eating. Health education and understanding of the benefits of eating healthy snacks, as well as the serious short- and long-term repercussions of eating unhealthy snacks, can be helpful to tactics for encouraging students to eat healthy snacks. It is also necessary to pay attention to the school atmosphere. School may be a great location to eat nutritious snacks and for pupils to have a good time [20].

## Conclusion

The mean of knowledge about healthy snack selection among the students before education with *ular tangga* is 6.34, increasing to 7.18 after education with *ular tangga*. The mean of attitude about healthy snack selection before education with *ular tangga* is 53.92, increasing to 55.43 after education with *ular tangga*. The mean of practices healthy snack selection before education with *ular tangga* is 9.35, increasing

to 9.77 after education with *ular tangga*. Based on the Wilcoxon test, the p-value is obtained for each variable ( $p < 0.05$ ); knowledge ( $p = 0.000$ ), attitude ( $p = 0.009$ ), and practices ( $p = 0.001$ ).

There are differences in the average value of the knowledge, attitude, and practices variables before and after the intervention. This indicates that education using ular tangga media influences students' knowledge, attitudes, and practices at an elementary school in Makassar City.

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