The Effect of Nutrition Education using Animated Video Media on the Knowledge, Attitude, Behavior of Fruit and Vegetable Consumption in the 4th Grade Students of SDN 129 Gresik

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Abstract. According to the findings of the 2018 Basic Health Research, very few school children in Gresik District consume fruits and vegetables. Therefore, there is a need to improve nutritional knowledge and foster positive attitudes through a healthy eating culture via nutrition education. This study aims to examine the effects of nutrition education using animated video media on the knowledge, attitudes, and behaviors of fruit and vegetable consumption among fourth-grade students at SDN 129 Gresik. This research utilized a Pre-Experimental Design with a pretest-posttest one-group design involving 32 fourth-grade students at SDN 129 Gresik. Data collection was done using a knowledge questionnaire as the measuring tool, attitude questionnaire, and behavior questionnaire using FFQ forms. All research questionnaires were administered through interviews. The results of the study showed that the average knowledge score increased by 33.12, the average attitude score increased by 10.01, and the average behavior score increased by 108.47. The statistical test results for knowledge and behavior had a p-value of 0.000 (<0.05), while for attitude, the p-value was 0.001 (<0.05). The test results indicate an influence on the variables in this study, including knowledge, attitude, and behavior.

Keywords: Animated video, Knowledge, Attitudes, and Behavior of fruit and vegetable consumption

1 Background

Nutrients are the types of food and beverages needed by the body as a sustained source of energy for growth[1]. Nutrients in the body can be supplied through the consumption of fruits and vegetables. Fruits and vegetables are essential components of a healthy diet because they contain high levels of micronutrients, phytochemicals, and fiber[2]. The chances of developing a range of non-communicable diseases may increase because children do not consume an adequate amount of fruits and vegetables during their formative years. Furthermore, longitudinal studies have indicated that fruit and vegetable consumption during childhood is associated with a reduced risk of non-

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communicable diseases in adulthood[3]. Fruits and vegetables are rich in beneficial micronutrients, fiber, and bioactive compounds. Insufficient intake of these is a major contributor to the global disease burden, especially non-communicable diseases. High consumption of fruits and vegetables has been associated with increased blood vitamin concentrations in children in Europe[4]. Consuming a variety of vegetables, including dark green, red or orange, starchy, and other types, as well as fruits, especially whole fruits, is recommended by the 2015-2020 Dietary Guidelines for Americans (DGA). Healthy eating habits include fruits and vegetables because they are sources of fiber, phytochemicals, and many essential nutrients[5].

Now school-age children tend to have insufficient fruit and vegetable consumption. Therefore, the age of the child can be an important factor in fruit and vegetable intake[6]. However, it is undeniable that optimal patterns and behaviors should be instilled during the school years. The school environment, including policies, curriculum, and staff, can have a significant impact on children's eating habits and behaviors[7]. When children have an understanding of the benefits of incorporating fruits and vegetables into their meals, they are more likely to choose and consume these foods[8]. Based on the prevalence data of fruit and vegetable consumption among the age group above 5 years, as indicated by the 2018 Basic Health Research, the data shows that in Gresik District, the proportion of fruit and vegetable consumption in the age group above 5 years is relatively low, with less than 5 servings per day, with a prevalence rate of 93.4%[9].

The chance of developing a number of non-communicable diseases, can rise as a result of children not eating enough fruits and vegetables throughout their formative years. This is due to the fact that fruits and vegetables are abundant in necessary nutrients, vitamins, minerals, and dietary fiber, all of which help to maintain general health and lower the risk of developing chronic diseases [3]. Consuming various vegetables, such as dark green, red or orange, starchy, and other vegetables, as well as fruit, particularly whole fruit, is advised by the Dietary Guidelines for Americans (DGA), 2015-2020. Healthy eating habits include fruits and vegetables because they are sources of fiber, phytochemicals, and many critical nutrients and are linked to a lower risk of chronic diseases. This study looks at the proportion of kids and teenagers, ages 2 to 19, who ate fruits and vegetables on any given day between 2015 and 2018[5].

The World Health Organization (WHO) generally recommends the consumption of 400 grams of vegetables and fruits per person per day to lead a healthy life. This paradigm shift leads to the understanding that our bodies require not only healthy proteins and calories but also vitamins and minerals. The implementation of this health paradigm is carried out through two efforts, namely through a family-based approach and through public health[10]. Balanced nutrition education from an early age is crucial to change societal behaviors, especially among elementary school students, in order to create a high-quality human resource. Changing knowledge and attitudes towards nutrition require supportive learning media, both in print and visual formats, such as mobile phones, comics, videos, brochures, and others[11]. The research conducted by Nirmala in 2018 showed an influence of nutrition education about vegetables on the knowledge of fruits and vegetables among elementary school children, and the results

were significant (p=0.000). This was supported by the initial results before receiving nutrition education, where the average score was 4.13 and increased to 9.00[12].

One of the efforts to improve fruit and vegetable consumption patterns is to enhance knowledge and attitudes, which can be achieved through educational methods. Nutritional counseling can be carried out using animated video media. Media is a tool to convey messages and communicate to the target audience with the aim of increasing knowledge, which ultimately can lead to positive behavior change in children[13]. Educational media using animated videos have indeed been shown to effectively capture participants attention[14]. Animated videos provide an opportunity to convey a message to the target audience in an entertaining, educational, and informative manner simultaneously[15]. The animated video is created with consideration of multimedia learning principles[16]. This has changed the way people access information and educational resources, creating opportunities for multimedia use in educational activities, including health education. Animated video media is a product of technological advancement in audio and visual elements, combining sound and visual components that can be easily understood[17]. The presence of animated instructional videos is intended to make it easier for students to understand the topics presented[18]. Based on a study conducted by Sónia Gonçalves, this study examined the impact of watching cartoons promoting healthy food on children's food preferences and choices. The study found that watching these animations had a positive effect on food choices, and children who watched animations promoting healthy food chose more healthy foods compared to children in the control group[19]. Moreover, supported by the findings of a study conducted by Azhari & Fayasari in 2020, it indicates that the use of animated video media in nutrition education is more effective in improving fruit and vegetable consumption behavior. Based on the description above, researchers are interested in conducting a study on the Influence of Nutrition Education Using Animated Video Media[20].

Based on a preliminary study conducted by researchers at SDN 129 Gresik using a questionnaire distribution method, it was found that 66.5% of the total 4th-grade students, numbering 30 students, rarely consume fruits and vegetables as recommended. According to them, the reasons for infrequent consumption of fruits and vegetables are the bitter taste, blandness, or lack of flavor. Additionally, it was also found that 12 out of 30 students (40%) had never received education on the importance of consuming fruits and vegetables. Therefore, the researcher is interested in conducting a study on the Influence of Nutrition Education Using Animated Video Media on the Knowledge, Attitudes, and Behavior of Fruit and Vegetable Consumption among 4th-grade students at SDN 129 Gresik.

2 Research Methods

The researcher is using a pre-experimental design with a pretest-posttest design, where the first step is to administer a pretest to assess students' abilities, then provide the research-related treatment, and the final step is to administer a posttest to determine the extent to which the treatment can change students' knowledge, attitudes, and behavior regarding fruit and vegetable consumption[21]. The data collection method used by the

researcher involves collecting data through questionnaires and conducting direct interviews with respondents. For the behavior variable, interviews are conducted using a qualitative form of FFQ (Food Frequency Questionnaire).

The population in this study consists of 32 students, with an average age of 10-11 years. The data collected includes personal identification data and pretest-posttest data on knowledge, attitudes, and behavior. The tests used in this research are the Wilcoxon signed-rank test used to test the knowledge and attitude variables because the data produced are not normally distributed. Meanwhile, for the behavior variable, normally distributed data are obtained, so the paired sample T-test is used. Data collection started with a preliminary study in November 2022, and the research was conducted in March 2023 with a two-week interval. In the first week, a pretest was conducted followed by an intervention in which students participated. After the intervention, the researcher conducted interviews related to the posttest questionnaire on knowledge and attitudes regarding fruit and vegetable consumption. One week later, in the second week, direct interviews related to behavior were conducted using a qualitative FFQ form.

3 Result

There are two characteristics of respondents that will be examined in this study, namely the age and gender of 4th-gradestudents at SDN 129 Gresik. Based the data collection results, the age of the 4th-grade students at SDN 129 Gresik is classified as Table 1:

Table 1. Frequency Distribution of Age Among 4th-Grade Students at SDN 129 Gresik in 2023

Age	n	Percentage (%)
10	27	84.4
11	5	15.6
Total	**32**	**100**

Based on Table 1, it can be observed that the majority of respondents are 10 years old, totaling 27 students with a percentage of 84.4%.

Table 2. Frequency Distribution of Gender Among 4th-Grade Students at SDN 129 Gresik in 2023

Gender	n	Percentage (%)
Male	20`	62.5
Famale	12	37.5
Total	**32**	**100**

Based on Table 2, it can be observed that the majority of respondents are male, totaling 20 students with a percentage of 62.5%.

Table 3. Frequency Distribution of Knowledges about Fruit and Vegetable Consumption Among 4th-Grade Students at SDN 129 Gresik in 2023

Knowledge	Before		After	
	n	%	N	%
Good	1	3.1	27	84.4
Enough	15	46.9	4	12.5
Less	16	50	1	3.1
Total	**32**	**100**	**32**	**100**

Based on Table 3, it can be observed that students with good knowledge were initially 3.1%, and after receiving nutritional education in the form of animated videos, this percentage increased to 84.4%. Students with poor knowledge were initially 50%, and after receiving nutritional education through animated videos, the percentage of respondents with good knowledge became 84.4%.

Table 4. Average Knowledge Score About Fruit and Vegetable Consumption Among 4th-Grade Students at SDN 129 Gresik in 2023

Knowledge score	n	Minimum	Maximal	Average
Before	32	20	80	54.38
After	32	50	100	87.50

Based on Table 4 data, there is an average increase in knowledge after receiving nutritional education through animated video media, amounting to 33.12.

Table 5. Frequency Distribution of Attitudes about Fruit and Vegetable Consumption Among 4th-Grade Students at SDN 129 Gresik in 2023

Attitude	Before		After	
	n	%	n	%
Good	24	75	30	93.8
Enough	8	25	2	6.2
Less	0	0	0	0
Total	**32**	**100**	**32**	**100**

Based on Table 5, it can be observed that students with a "good" attitude were initially at 75%, and after receiving nutritional education in the form of animated videos, this percentage increased to 93.8%. Students with a "enough" attitude were initially at 25%, and after receiving nutritional education through animated videos, the percentage of students with a " enough " attitude decreased to 6.2%.

Table 6. Average Attitude Score About Fruit and Vegetable Consumption Among 4th-Grade Students at SDN 129 Gresik in 2023

Attitude score	N	Minimum	Maximal	Average
Before	32	60	100	81.87
After	32	70	100	91.88

Based on table 6, there is an average increase in attitude after receiving nutritional education through animated video media, amounting to 10.01.

Table 7. Frequency Distribution of Behavior about Fruit and Vegetable Consumption Among 4th-Grade Students at SDN 129 Gresik in 2023

Behavior	Before		After	
	n	%	N	%
Rarely	21	65.6	19	59.4
Often	11	34.4	13	40.6
Total	**32**	**100**	**32**	**100**

Based on Table 7, it can be observed that the behavior of students who rarely consume fruits and vegetables was initially at 65.6%, and after receiving nutritional education in the form of animated videos, the percentage of students with rare fruit and vegetable consumption decreased to 59.4%. Meanwhile, the behavior of students who frequently consume fruits and vegetables was initially at 34.4%, and after receiving nutritional education through animated videos, the percentage of students with frequent fruit and vegetable consumption increased to 40.6%.

Table 8. Average Behavior Score About Fruit and Vegetable Consumption Among 4th-Grade Students at SDN 129 Gresik in 2023

Behavior score	N	Minimum	Maximal	Average
Before	32	2	206	81.28
After	32	10	436	189.75

Based on Table 8, There`s an average increase in behavior after receiving nutritional education through animated video media, amounting to 108.47, as indicated in the study.

3.1 Description the results of the impact of nutritional education on several variables

Based on the data collected, the results of the normality test show that the data does not follow a normal distribution. Therefore, an alternative approach used is the non-parametric statistical test, which is the Wilcoxon signed-rank test. The results for knowledge show a p-value of 0.000 ($p < 0.05$), and the results for attitudes show a p-value of 0.001 ($p < 0.05$). This indicates that there is an influence of nutrition education using animated video media on knowledge about fruit and vegetable consumption among 4th-grade students at SDN 129 Gresik.

Based on the data collected regarding behavior, the results of the normality test show that the data follows a normal distribution. Therefore, a parametric statistical test, namely the paired sample T-test, is conducted. The results for behavior show a p-value of 0.000 ($p < 0.05$), indicating that there is an influence of nutrition education using animated video media on fruit and vegetable consumption behavior among 4th-grade students at SDN 129 Gresik.

4 Discussion

The aim of this study is to assess whether the nutrition education program in this school is effective in improving the knowledge, attitudes, and behavior related to fruit and vegetable consumption among elementary school students[22]. Based on the research findings, it is clear that the majority of 4th-grade students are 10 years old, with a predominance of male students. Nutrition education is a combination of educational strategies designed to facilitate an individual's food choices and other nutrition-related behaviors that support health and well-being[23]. The alignment of nutrition topics in the elementary school curriculum should support the acquisition of nutritional knowledge in various ways and indirectly promote the development of healthy eating habits in children[24]. The impact of providing nutrition education on knowledge resulted in an improvement among 4th-grade students at SDN 129 Gresik, as evidenced by the higher average knowledge scores after receiving nutrition education through animated video media. Supported by the research conducted by Fajar Salekah (2022), which also showed an increase in knowledge before and after receiving education through animated videos. Additionally, based on the results of the Wilcoxon signed-rank test in the knowledge category, the results showed a p-value of 0.000 ($p < 0.05$)[25]. A similar study conducted by Zalfaa Azizah Firdaus (2021) on the impact of animated videos on knowledge of fruit and vegetable consumption among elementary school students resulted in a p-value of 0.000 ($p < 0.05$), indicating a significant increase in respondents knowledge before and after receiving nutrition education through animated video media[26]. Knowledge about nutrition is one of the crucial factors in determining an individual's food-related behavior. The better the knowledge of nutrition, the more individuals will consider the type and quality of food they choose to consume[10].

In terms of attitudes, there was also an increase, as indicated by the higher average attitude scores after receiving nutrition education through animated video media. The results of this study align with the research conducted by Mey Fita Dwi Sulistiyani (2022) regarding the impact of health education on fruit and vegetable consumption attitudes among obese children. Based on the results of the Wilcoxon signed-rank test in the attitude category, the result was 0.001 ($p < 0.05$). A similar study by Mey Fita Dwi Sulistiyani (2022) on the impact of health education on the attitudes of obese children towards fruit and vegetable consumption, both before and after education, showed a p-value of $p=0.000$ (<0.05)[27]. These results indicate that the intervention has a positive impact on students' attitudes towards fruit and vegetable consumption in elementary school students.

Furthermore, one of the outcome measures should be consumption, not just preference. Preference does not measure actual consumption and can lead to an overestimation of consumption[28]. In this study, there was an increase in fruit and vegetable consumption, as indicated by the higher average behavior scores after receiving nutrition education through animated video media. Another supporting study is the research by Fatimah (2022), which showed an improvement in behavior after nutrition education with increased scores[29]. This research also aligns with the study conducted by Wisuda Andeka Marleni (2018), which found differences in behavior before and after the intervention in the intervention group. It can be concluded that there is an influence

of showing animated videos about fruits and vegetables on changing the behavior of children related to fruit and vegetable consumption in the intervention group[10].

Overall, the research findings indicate a positive effect of providing nutrition education through animated video media on knowledge, attitudes, and behaviors related to fruit and vegetable consumption. Animations have an advantage over static images because they can visually represent conceptual changes, processes, and dynamics. Compared to still images, animations are not only more realistic but also more effective in conveying practical information[30]. The animations in this study were created using the Canva platform. Character dialogues in the script were developed and edited by the researcher. The narrative of the story was conveyed through the animation storyboard, which was effective in influencing changes in the fruit and vegetable consumption patterns of students[31]. In the future, it will be important to determine the content that children watch on computers and which content has the most influence on fruit and vegetable consumption[6]. However, in some studies with similar interventions, there is a common finding that animation-based interventions increase fruit and vegetable consumption among participants in the short term, but with long-term monitoring, the effects diminish. Therefore, it is recommended that this research be tested again over an extended period to confirm the validity of the results.

5 Conclusion

Based on the research objectives and findings, several conclusions can be drawn. The characteristics of the respondents in 4th grade at SDN 129 Gresik indicate that the majority are 10 years old, and there is a higher proportion of male respondents. There is an improvement in the average scores of knowledges, attitude, and behaviors related to fruit and vegetable consumption before and after receiving nutritional education through animated video media. Furthermore, there`s a significant effect of nutritional education using animated video media, as evidenced by the p-values of $0.000 < 0.05$ for the knowledge and behavior categories, and a p-value of $0.001 < 0.05$ for attitude. The test results indicate an effect on the variables in this research, among them knowledge, attitude, and behavior variables.

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