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Effect of "Nutricase" Pencil Box–Based Nutrition on Knowledge and Attitudes Toward Healthy Snacking among Elementary School Students

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Abstract

School snacks play an important role in children's health and nutritional status. However, many snacks consumed by school-aged children do not meet food safety and nutritional standards, thereby increasing the risk of health problems. Therefore, appropriate nutrition education media are needed to improve students' knowledge and attitudes toward healthy snacking. This study aimed to determine the effectiveness of the Nutricase educational media in improving students' knowledge and attitudes toward healthy snack consumption.This study employed a Research and Development (R&D) approach using the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). Data were collected using questionnaires, and both quantitative and qualitative data were obtained. The study sample consisted of 22 fourth-grade students selected using a total sampling technique. Data analysis was conducted using descriptive and inferential statistics, including the Wilcoxon signed-rank test to analyze knowledge and the independent t-test to assess attitudes. The validation results from material, media, and language experts indicated that the Nutricase media was categorized as very good. The results of the Wilcoxon test showed a significant difference between pre-test and post-test knowledge scores ($p = 0.003$; $p < 0.05$), while the t-test results also showed a significant improvement in students' attitudes toward healthy snacking ($p = 0.026$; $p < 0.05$). It is expected that Nutricase can serve as an effective nutrition education tool to enhance students' awareness of healthy snacking practices.

Keywords: healthy snacks, nutrition education, nutricase

Introduction

According to the Ministry of Health, street food is food that is widely found on the side of the road which is marketed in various shapes, flavors, colors, and sizes so that it attracts the interest and attention of people to buy it. Street food is also one type of food that is often consumed and recognized by many people including school children (Anjani et al., 2021). WHO states that unsafe food causes 600 million cases of foodborne illness and 420,000 deaths each year. Diarrhea, the most common foodborne illness, causes 230,000 deaths. According to the National Action Report on School Children's Snacks (PJAS) in 2014, almost a quarter of snack foods that do not meet the rules for biological contamination sold in schools are syrup, ice, colored drinks, jelly, and meatballs. Microbial contamination (74.9%), excessive use of food additives (BTP) (15.7%), and

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the use of hazardous materials (9%) are factors that cause PJAS not to meet the rules. In addition, these factors are related to people's knowledge and perceptions about their propensity to act, knowledge, and favorable attitudes towards essential replacement foods in school children. (Meitha et al., 2022).

For the ideal development of school-age children, proper food intake and quality are crucial. The World Health Organization's Expert Committee on Food Additives (JECFA) helps regulate and evaluate standards for healthy snacks that do not contain food additives. Furthermore, this regulation was adopted by the Indonesian Ministry of Health and the Food and Drug Monitoring Agency (BPOM) through Minister of Health Regulation No. 722/Menkes/Per/IX/2008. As many as 40% of students do not meet health requirements (Akbar et al., 2021). Unsuitable and unsafe food can cause illness, especially in school-age children. Substandard school snacks can come from various sources. This includes unclean food, unclean equipment, unsanitary vendors, and food contaminated by viruses and bacteria. Other factors include the use of hazardous chemicals such as formalin, borax, rhodamine B, and methanol yellow. Foodborne diseases and waterborne diseases cause two million deaths per year, including elementary school-aged children. Because schoolchildren are the nation's future generation, they are a national investment. The quality of today's children determines the quality of the nation in the future. Efforts to improve human resource quality must be systematic, from an early age, and continuously implemented. Proper and high-quality nutrition is crucial for the optimal growth of school-aged children. Feeding children during their growth period must be tailored to their growth rate, economic and sociocultural conditions, and nutritionally balanced (Nabila et al., 2023).

Schools have a very large role in providing safe and nutritious snacks for school children, so the school canteen must be managed well. Due to the fact that school children often spend a third of their time at school, they are more likely to take or purchase food and drinks from outside the home. Lack of knowledge is one reason why children continue to consume unhealthy foods and drinks. However, these foods contain addictive substances that have negative effects on the body. Consequently, it is important for school-age children to be educated on how to choose healthy foods. This is done so that children acquire new knowledge that they have not yet learned in school about how to choose safe and healthy foods to eat (Sumarni et al., 2020).

Improving the nutrition of elementary school children is a strategic step because its impact is directly related to the achievement of human resources (HR), meaning healthy, intelligent, resilient, and productive HR. Conversely, consuming unhealthy snacks will impact children's nutrition, with the risk of undernutrition or overnutrition (Ministry of Health of the Republic of Indonesia, 2005).

In terms of societal and community well-being, nutritional literacy is key. Nutrition and health problems can arise when people are unaware of what is meant by a balanced and healthy diet. School-Age Children (SAC) are just one of the Several age groups may be affected by this. Nutrition education and information are provided so that the public can learn about healthy eating. To influence public attitudes and actions, nutrition education generally disseminates nutrition messages to the community, individuals, or groups.

The results of a preliminary survey conducted by researchers revealed that although the target school does not permit snacks outside the school grounds, the canteen at the target school still sells many foods such as colored packaged drinks, grilled meatballs, rolled noodles, sausages, jelly, and sauces and packaged snacks believed to contain high levels of preservatives. In this

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regard, researchers also observed that many children still lack understanding in selecting healthy snacks. Food is also often seen in direct contact with air or uncovered food. Some pathogens, such as bacteria, may be able to thrive in these foods. Researchers intend to evaluate the effect of the Nutricase nutrition pencil case media on students' knowledge and attitudes about healthy snack consumption at Nurul Quran Elementary School, Ingin Jaya District, Aceh Besar Regency. This research will be based on the issues and events mentioned above.

The educational method, materials, and messages delivered by educators. These tools are crucial in supporting nutrition education. The Nutrition Pencil Case (Nutricase) is an example of a type of educational media with a realistic design and animated cartoons that elementary school students enjoy. One innovative resource for teaching children about consuming healthy snacks is the Nutrition Pencil Case (Nutricase) (Nabila et al., 2023).

Methods

This research uses the ADDIE (Analysis, Design, Development, Implementation, Evaluation) product development model, with the initial stage being research and development (R&D) media development. This particular development model is used because of its systematic work procedures, which ensure that each step builds on the previous one and is refined to produce a superior product. This research will be conducted in three learning series. Therefore, before the treatment, the first intervention began with a pre-test, followed by educational materials and an introduction to the media. In the second intervention, the treatment only provided educational materials and media. The third intervention did not provide treatment, only a post-test.

The research was conducted at SDIK Nurul Quran, Jl. Soekarno Hatta No. 10, Meunasah Manyet, Ingin Jaya District, Aceh Besar Regency, Aceh Province. The research period was January–February 2025. To assess the media, this study employed material experts, media experts, and language experts. The population in this study was 22 fourth-grade students at SDIK Nurul Quran, aged 9–10 years. The sampling technique was total sampling.

This research began with a literature review, examining several research findings. Next, a research proposal was prepared, accompanied by a preliminary study at SDIK Nurul Quran. Research instruments were developed and research permits were obtained from the Applied Nutrition and Dietetics Undergraduate Study Program at the Aceh Ministry of Health Polytechnic to the Principal of SDIK Nurul Quran. After obtaining permission, the researchers conducted the intervention at the school and measured the students' learning outcomes. The data were analyzed using a structured questionnaire to determine students' knowledge and attitudes.

The research intervention began by providing nutrition education to students using the nutritional pencil box media (Nutri Case) within the study period of approximately two weeks. The first meeting was held to provide the first intervention. Before conducting education using the media, researchers gave pretest questions to respondents. The researcher gave an introductory explanation of the material with the pencil box media for approximately 10-15 minutes. The material presented was about the introduction of healthy and unhealthy snacks. The researcher then distributed nutritional pencil box education media (Nutri Case) and explained the contents of the material in it in the form of examples of healthy and unhealthy snacks, the adverse effects of consuming unhealthy snacks and tips on choosing healthy snacks for approximately 10-15 minutes. Then the respondents filled out the posttest1. Nutrition pencil box media (Nutri Case) is given to respondents to take home and can be used to store stationery. The second meeting was

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conducted on the 3rd day after the implementation of the first day of intervention to provide the second intervention, which was to explain again about the material of healthy snacks consumption with the same intervention as before with the nutrition pencil box media. Researchers did not give posttest questions in the second intervention. The researcher came back to school at the 3rd meeting, which was after one week from the 2nd intervention. Educational materials were not given at the 3rd meeting and immediately conducted posttest 2. The duration of the posttest is approximately 30 minutes. The posttest was conducted twice to see changes in knowledge and attitudes that had been obtained by respondents and to determine the difference between before and after being given nutrition education media at a certain time.

The data analysis carried out in this study is, after making a decision based on the significant value obtained and the number of samples available so that the normality test used is Shapiro Wilk, then in accordance with the decision to test the normality of the data, the test of the education variable on knowledge uses a non-parametric statistical test, namely the Wilcoxon test with a significant value ($p>0.05$) and the test to determine the effect of knowledge on attitude is an independent T-test with a significant value ($p>0.05$). 05) and the test to determine the effect of attitude was carried out an independent T-test with a confidence level of 95% ($\alpha = 0.05$) data were analyzed using SPSS 16.0.

Results

Development of Nutrition Pencil Case Media (Nutricase)

The first stage of this research was a literature study aimed at establishing a conceptual basis for developing the Nutrition Pencil Case (Nutricase) media, based on the 2018 Basic Health Research (Riskesdas) report, which identified malnutrition as a major problem in Indonesia. 6.7% of children aged 5 to 12 years are very short, 16.9% are short, 2.4% are very thin, 6.8% are thin, 10.8% are overweight, and 9.2% are very overweight, based on their nutritional status.

The second stage involved designing the Nutricase media, which will be developed based on the analysis results. Then, the elements needed to develop the Nutricase media were determined by defining key messages. Based on the problems identified in the literature review, several key messages for the Nutrition Pencil Case media (Nutricase) about healthy snacks for schoolchildren were determined, namely: the definition of healthy snacks, the definition of unhealthy snacks, tips for choosing healthy snacks, the benefits of consuming healthy snacks, and examples of healthy and unhealthy snacks. Based on the key messages for the Nutrition Pencil Case media (Nutricase) compiled above, the layout design for the Nutrition Pencil Case media (Nutricase) was carried out in the following stages: 1) Designing the Nutrition Pencil Case, 2) Preparing animations/characters and inputting content/key messages, 3) Editing the Nutrition Pencil Case, and 4) Finishing.

The third stage was conducting expert media, material expert, and media expert testing. There is one expert/expert in the field of material from the Lecturer of the Nutrition Department of the Poltekkes Kemenkes Aceh, one expert/expert in the field of media from the Lecturer of the Nutrition Department of the Poltekkes Kemenkes Aceh and one expert/expert in the field of language from the Lecturer of the Faculty of Teacher Training and Indonesian Language Education, Syiah Kuala University. The results of the study show that the research from the material experts on the aspects assessed is in the very good category, with an average percentage reaching 88.7%, likewise research from media experts on the assessment aspect is also classified

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as very good with an average percentage of 94% and research from language experts on the media assessment aspect gets an average percentage of 96.9% with a very good category.

Respondent characteristics

Table 1. Frequency Distribution of Sample Characteristics

Sample Characteristics	N	%
Gender		
Man	11	50.0
Female	11	50.0
Age		
9 years	10	45.5
10 years	12	54.5
Total	**22**	**100.0**

Based on the table above, it is known that the gender of the sample is the same, with 11 males (50.0%) and 11 females (50.0%). The age distribution of the sample is 9 (45.5%) aged 10 years and 12 (54.5%) aged 10 years.

Descriptive Statistics Before and After the Intervention

Table 2. Descriptive Data Before and After the Intervention

Research Variables	n	Value		Mean	Standard Deviation
		Min	Maks		
Knowledge					
(Pre-test)	22	40	95	70.91	16.303
(Post-test)	22	40	100	77.50	15.641
Attitude					
(Pre-test)	22	32	60	47.27	7.052
(Post-test)	22	34	60	50.18	6.674

Based on the table above, it shows that the average knowledge of students before being given educational media using the nutrition pencil box media (Nutricase). That is an average of 70.91 with a deviation of 16.303 and after being given education using the nutrition pencil box (Nutricase) that is increased to an average of 77.50 with a deviation of 15.641. Meanwhile, the descriptive data of the pre-test and post-test show that the average attitude of students before being given education using the nutrition pencil box media (Nutricase) is an average of 47.27 with a deviation of 7.052 and the attitude of students after being given education using the nutrition pencil box media (Nutricase) increased to 50.18 with a deviation of 6.674.

The Effect of Education on Student Knowledge

Based on the table above, the significance value of the Wilcoxon test to determine the effect of education using nutritional pencil box media (Nutricase) on knowledge about healthy snack consumption of students at Nurul Quran Elementary School, Ingin Jaya District, Aceh Besar Regency was obtained 0.003 ($p<0.05$), this shows the effect of nutritional pencil box media (Nutricase) on increasing students' knowledge about healthy snack consumption**.**

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Table 3. The Effect of Education on Student Knowledge

Ranks					Test Statistics[a]
		N	Mean Rank	Sum of Ranks	Asymp. Sig. (2-tailed)
Posttest Knowledge - Pretest Knowledge	Negative Ranks	2[a]	4.50	9.00	0.003
	Positive Ranks	13[b]	8.54	111.00	
	Ties	7[c]			
	Total	22			

a. Posttest Knowledge < Pretest Knowledge
b. Posttest Knowledge > Pretest Knowledge
c. Posttest Knowledge = Pretest Knowledge

The Influence of Education on Student Attitudes

Table 4. The Influence of Education on Student Attitude

Research Variables	Average	SD	ΔAverage ± SD	CI 95% Lower-Upper	P value
Attitude					
(Pre-test)	47,27	7,05	2,91 ± 0,38	5,428 – 0,390	0,026
(Post-test)	50,18	6,67			

Based on the table above, the significance value of the independent t-test at a 95% confidence level (α = 0.05) to determine the Effect of Education Using Nutrition Pencil Box Media (Nutricase) on Attitudes About Consuming Healthy Snacks for Students at Nurul Quran Elementary School, Ingin Jaya District, Aceh Besar Regency, obtained results of 0.026 (p <0.05), this shows the influence of Nutrition Pencil Box Media (Nutricase) on improving students' attitudes about consuming healthy snacks.

Discussion

The Effect of Nutrition Education Using Nutrition Pencil Box Media (Nutricase) on Healthy Snacks on Students of SDIK Nurul Quran, Ingin Jaya District, Aceh Besar Regency

The respondents in this study were 22 students from SDIK Nurul Qur'an, Ingin Jaya District, Aceh Besar Regency. Based on age, 9 students were 10 years old (45.5%), and 12 students were 10 years old (54.5%). Based on gender, there were 11 male students (50.0%) and 11 female students (50.0%). Age is a factor that influences a person's ability to grasp and think in receiving new information. Children aged 6-14 years generally have more complex and logical thinking skills, making it easier to understand the concepts taught. This is in line with research (Kaluku.2023). Nutrition education should be provided at ages 6-14, with age 11 being the optimal period. At this age, children have reached a more mature stage of cognitive development, enabling them to draw conclusions from the information obtained. The research results showed a significant increase in students' knowledge about healthy snacks after being educated using the Nutricase nutrition pencil case. Descriptive analysis revealed that the average student knowledge score before the intervention (pre-test) was 70.9 ± 16.303, while after the intervention (post-test) it

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increased to 77.5 ± 15.641. Therefore, SDIK Nurul Quran students' knowledge using the Nutricase nutrition pencil case increased by 6.59 (9.3%).

The research results showed a significant increase in students' attitudes about healthy snacks after being educated using the Nutricase nutrition pencil case. Descriptive analysis revealed that the average student knowledge score before the intervention (pre-test) was 47.2 ± 7.052, while after the intervention (post-test) it increased to 50.1 ± 6.674. Thus, it can be seen that the increase in attitudes using the Nutrition Pencil Case media (Nutricase) for students at SDIK Nurul Quran was 2.91 (5.8%).

To test the significance of the effect of nutrition education using the Nutrition Pencil Case media (Nutricase), a Wilcoxon test was conducted, which showed a significant value for the knowledge variable of $p = 0.003$ ($p < 0.05$). This indicates the effect of education using the Nutrition Pencil Case media (Nutricase) on increasing students' knowledge about consuming healthy snacks. Based on the significant value through the independent t-test at the 95% confidence level ($\alpha = 0.05$) to determine the attitude variable obtained $p = 0.026$ ($p < 0.05$). This indicates the effect of education using the Nutrition Pencil Case media (Nutricase) on improving students' attitudes about consuming healthy snacks. This means that nutrition education using the Nutrition Pencil Case media (Nutricase) has an effect on increasing students' knowledge and attitudes about healthy snacks. According to Nabila et al. (2023), Nutricase can enrich intelligence, knowledge, and attitudes through the content presented.

The increase in students' average knowledge scores in this study indicates that the nutrition pencil case (Nutricase) is an effective method for conveying nutritional information to children. The nutrition pencil case (Nutricase) has advantages in conveying educational material because it combines visuals and animations within the material, making the information easier for children to understand and remember.

Conclusion

There is an effect of providing nutritional pencil box education media (Nutri Case) on the level of knowledge and attitudes about healthy snacks consumption in school-age children at SDIK NURUL QURAN. Nutrition pencil box media (Nutri Case) can be used in the process of providing information about nutrition, so that it can be used sustainably and used in everyday life. Evaluation of the use of nutritional pencil box media (Nutri Case) can be studied further using a control group in order to see more clearly the effect of giving this media and examining nutritional behavior with a longer frequency and intervention time.

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