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## The Effect of Nutrition Education Using Quiz Application Games (APKIS) on Knowledge and Consumption of Snacks in Adolescents

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### Abstrak

Adolescents experience rapid growth and development and are a critical period for changes in health-related behaviours such as food choices and physical activity. The prevalence of obesity increased from 1.4% in 2016 to 7.3% in 2017. Nutrition education will be effective if supported by the right media and delivery methods, one of which is android-based media as a tool for nutrition education in children. The advantage of nutrition education with quiz game media is its ability to convey information and increase adolescent knowledge through interesting media. This study aims to determine the effect of nutrition education through quiz game application media (APKIS) on knowledge and consumption of adolescent snacks at MTs Negeri 2 Pontianak. This research is a quasi-experiment with a one group pretest and posttest design, conducted on 22 June-1 July 2022. A sample of 39 respondents was taken by simple random sampling. Variables of knowledge and consumption of snacks were analysed using paired t-test. The results showed a significant effect on knowledge before and after nutrition education ( $p$ -value  $0.00 < 0.05$ ), and there was an effect on the consumption of snacks before and after education ( $p$ -value  $0.00 < 0.05$ ). In conclusion, the use of quiz application game media (APKIS) has an effect on increasing knowledge and changes in snack food consumption.

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## 1. INTRODUCTION

Adolescence is a transitional phase from childhood to adulthood (Hardinsyah & Supriasa, 2016). During this period, teenagers experience rapid growth, development, and behavioral changes related to health, such as food choices and physical activity. Adolescence is a crucial stage that continues into adulthood (Masitah & Sulistyadewi, 2020). Snack foods refer to foods consumed outside of main meals and include both healthy and unhealthy options. Healthy snacks include low-calorie fruits and vegetables, while unhealthy snacks are often high in calories, sugar, sodium, and low in fiber (Puspasari, 2020). Snack foods pose several health risks; for instance, uncovered food exposed to flies can lead to digestive diseases. Limited access to clean utensils like spoons, forks, cups, and plates further increases the risk. Frequent consumption of unhygienic snacks can lead to diseases such as dysentery, typhoid, and other stomach problems. Other negative effects include reduced appetite, obesity, and malnutrition due to uncertain nutritional value (Rahmi, 2017).

Fast food consumption in Indonesia has rapidly increased in both urban and rural areas, driven by appealing advertisements targeting children and adults. Fast food is a common alternative for busy people who prefer not to cook. However, this trend contributes to obesity, which is the fifth leading cause of death globally (Alif, 2020). According to the 2018 Basic Health Research, the obesity prevalence among adolescents in Pontianak City was 11.4%. Nationally, adolescent overweight prevalence reached 8.8% in 2016–2017, which is relatively high compared to Asia's prevalence of 26.4% in males and 16.8% in females. Among 16–18-year-olds, 1.6% were classified as overweight based on BMI-for-age. Obesity rates increased from 1.4% in 2016 to 7.3% in 2017.

Today's adolescent eating habits are strongly influenced by lifestyle changes. Food choices are often based more on peer interaction than nutritional value. Adolescents are more vulnerable to global eating trends that promote a "Western" diet—high in fat and calories but low in fiber—which can affect academic performance (Jannah, 2017). Knowledge significantly influences snack food choices and can come from internal (self-learning) or external (others) sources. Better knowledge leads to healthier food consumption and improved nutritional status (Sukma, 2014). The widespread use of smartphones among teens also exposes them to snack food ads on social media platforms like Facebook and Instagram, making them more likely to try fast food and other unhealthy snacks.

Schools also contribute, as many provide canteens selling various snacks. At break time, students often consume foods high in fat and sugar, such as fried snacks, cakes, biscuits, and packaged foods (Malik et al., 2020). Effective nutrition education requires appropriate methods and media. One strategy is using Android-based media to support children's nutrition education. Quiz applications serve as active and interactive learning tools that increase student interest and motivation to gain new knowledge (Ferwanda & Muniroh, 2017). The advantage of using quiz games for nutrition education is that they offer a unique and engaging way to deliver information, especially to teenagers. This study adopts the concept of game-based learning, which uses games as educational tools to enhance student learning and knowledge retention. The APKIS (Quiz Application) serves as both an educational tool and a source of entertainment—commonly referred to as "edutainment," which combines learning with fun (Irsa et al., 2015).

MTs Negeri 2 Pontianak is an accredited A-level school with a clean and elite environment, making it a top-choice Islamic junior high school. Preliminary data shows that students are prohibited from buying snacks outside during school hours and are required to bring meals from home. However, outside school hours, many students still consume snacks purchased outside. This school has never received nutrition education before.

## 2. METHOD

This study included a quasi experiment with a one group pretest and posttest design, namely there was an initial test before being given treatment, the treatment could be known more accurately by comparing the situation before and after being given treatment. The population used in this study were all students of class VIII C and VIII E at MTs Negeri 2 Pontianak. The sample used was students of Class VIII C & VIII E at MTs Negeri 2 Pontianak because it was based on the class selection determined by the vice principal of MTs Negeri 2 Pontianak.

The types of data used in this study are primary data, namely data on the identity of respondents, knowledge after respondents fill out questionnaires and quiz application games (APKIS), then the consumption of snacks for respondents filling out the food frequency questionnaire form. Then the secondary data used are school description data, number and characteristics of respondents. Data will then be analysed with univariate and bivariate analysis.

## 3. RESULTS AND DISCUSSION

**Table 1.** Distribution of Research Samples

Variable	n	%
Age		
13	9	23,1
14	30	76,9
Total	39	100
Gender		
Male	23	59
Female	16	41
Total	39	100
Father's Occupation		
Labourer	3	7,7
Doctor	1	2,6
PDAM employee	1	2,6
Private employee	11	28,2
Civil Servant	15	38,5
Police	3	7,7
Self-employed	5	12,8
Total	39	100
Mother's Occupation		
Honorer	3	7,7
Housewife	25	64,1
Private Employee	2	5,1
Civil Servant	8	20,5
Self-employed	1	2,6
Total	39	100

Table 1 above shows that most of the respondents were 14 years old at 76.9%. The average gender of respondents was male at 59%. The higher occupation of the father is civil servant, which is 38.5%. Similarly, the higher mother's occupation was housewife at 64.1%.

**Table 2.** Frequency Distribution of Knowledge Before and After Nutrition Education for Adolescents at MTs Negeri 2 Pontianak Year 2022

Knowledge Category	Before		After	
	n	%	n	%
Good (Respondent score > 75)	15	38,5	30	76,9
Fair (Respondent score 60-75)	22	56,4	9	23,1
Poor (Respondent score < 60)	2	5,1	0	0
Total	39	100	39	100

Table 2 shows that knowledge before education is higher in the moderate category, namely 56.4%. While knowledge after education is higher in the good category, namely 76.9%.

**Table 3.** Test Results of Differences in Knowledge Before and After Nutrition Education for Adolescents at MTs Negeri 2 Pontianak Year 2022

Value	Knowledge		Difference	p-value
	Before	After		
Mean±SD	73,33±9,55	83,59±9,41	10,26	0,000*
Minimum	53,33	60	6,67	
Maximum	93	100	7	
Std.Deviation	9,55	9,41	0,14	

Table 3 shows the results of the paired t-test of knowledge can be seen that the statistical test results p-value 0.000 (<0.05). This shows that there is a significant difference in the value of knowledge before and after being given the quiz application game media (APKIS). In addition, the average value of knowledge after is higher at 83.59 compared to before which is 73.3.

**Table 4.** Frequency Distribution of Snack Food Consumption Before and After Nutrition Education in Adolescents at MTs Negeri 2 Pontianak Year 2022

Frequency of Snack Food Consumption	Before		After	
	n	%	n	%
Rare (Mean score < 6.54)	11	28,2	34	87,2
Frequent (Average score >6.54)	28	71,8	5	12,8
Total	39	100	39	100

Table 4 shows that the frequency of consumption of snacks before education is higher in the frequent category, namely 28 71.8%. While the frequency of consumption of snacks after education is higher in the rare category at 87.2%.

**Table 5.** Test Results of Differences in Snack Food Consumption Before and After Nutrition Education for Adolescents at MTs Negeri 2 Pontianak Year 2022

Value	Snack Food Consumption		Difference	p-value
	Before	After		
Mean±SD	10,68±5,88	4,14±5,88	6,54	0,000*
Minimum	0,46	0,60	0,14	
Maximum	23,65	9,65	14	
Std.Deviation	5,88	2,08	3,8	

Table 5 shows the results of the Paired t-test of snack food consumption can be seen that the statistical test results p-value 0.000 (<0.05). This shows that there is a significant difference in the value of consumption of snacks before and after being given a quiz application game (APKIS). In addition, the average value of snack food consumption before is higher at 10.68 than after which is 4.14. The most frequently

consumed snacks by students of MTs Negeri 2 Pontianak before education using quiz game application media (APKIS) are fried chicken, donuts, bread, chocolate, meatballs, siomay, pudding/jelly, cake, french fries, and batagor while the most frequently consumed snacks by students of MTs Negeri 2 Pontianak after intervention using quiz game application media (APKIS) are fried food, fried chicken, bread, chocolate, boba ice, candy, pentol soup, egg rolls, donuts and sachet ice.

## **DISCUSSION**

### **The Effect of the APKIS Quiz Game Application on Snack Food Consumption Knowledge Among Adolescents at MTs Negeri 2 Pontianak.**

Adolescence is a transitional phase from childhood to adulthood (Hardinsyah & Supriasa, 2016). During this period, teenagers experience rapid growth and development, along with behavioral changes related to health, such as food choices and physical activity. This stage is critical and continues into adulthood (Masitah & Sulistyadewi, 2020). In Indonesia, fast food consumption has grown rapidly in both urban and rural areas in the form of ready-to-eat foods and drinks. These are promoted through appealing advertisements targeting both children and adults, making them widely popular. Fast food has become an alternative snack option for busy people who dislike cooking. However, the tendency to consume such snacks can trigger obesity, which is a serious health issue and the fifth leading cause of death globally (Alif, 2020).

Knowledge significantly influences snack food choices. It can be acquired internally (from oneself) or externally (from others), thus increasing awareness of snack foods. Good knowledge is expected to lead to healthier food choices and better nutritional status (Sukma, 2014). In this study, students' knowledge scores at MTs Negeri 2 Pontianak were assessed based on 15 questionnaire items. Correct answers were scored 1, incorrect answers 0. Knowledge levels were categorized as good (>75), moderate (60–75), and poor (<60).

Statistical analysis showed a significant increase in knowledge scores after the intervention with the APKIS quiz game. The findings indicate a meaningful improvement in snack food knowledge after using the APKIS game. The application helped motivate students to distinguish between healthy and unhealthy snack options and apply this knowledge in daily life. The APKIS game uses engaging visuals, sound, and interactivity to enhance learning. This educational game is designed to spark students' interest and make learning fun and easier to absorb (Prasetiyo, 2017).

These results align with Siagian (2021), who found that Android-based nutrition education games yielded better outcomes than other media. However, some students found certain quiz questions challenging, especially questions 21–25, which focused on nutritional science, such as the functions of carbohydrates, proteins, fats, vitamins, and minerals, which they had not learned before.

### **The Effect of the APKIS Quiz Game Application on Snack Food Consumption Among Adolescents at MTs Negeri 2 Pontianak.**

Snack foods refer to various food and beverage items typically sold on the roadside (Devi, 2014). They are consumed outside of main meals and include both healthy and unhealthy types. Healthy snacks are low-calorie vegetables and fruits, while unhealthy ones are high in calories, sugar, sodium, and low in fiber (Puspasari, 2020). Game-based learning is an instructional technique based on games that enhances students' ability to absorb knowledge. The APKIS quiz application serves as both an entertaining and educational medium for teenagers. It combines education and entertainment, often referred to as "edutainment" (Irsa et al., 2015).

To measure students' snack consumption habits, scores were calculated based on frequency: a score above 6.54 indicates frequent consumption, while below 6.54 indicates infrequent consumption. Although the school canteen at MTs Negeri 2 Pontianak is clean and safe, many food vendors sell snacks along the roadside outside the school. These snacks are often exposed to dust and pollution, making them risky to consume.

Statistical analysis showed a decrease in snack consumption after the APKIS game intervention. The post-intervention results indicated a significant difference, with 34 students (87.2%) falling into the "rare consumption" category. This was partly because students were on school break and consumed fewer snacks both at school and at home.

Before the intervention, the most frequently consumed snacks included fried chicken, donuts, bread, chocolate, meatballs, dumplings, pudding/agar-agar, cake, French fries, and batagor. After the intervention, the top consumed items shifted to fried foods, fried chicken, bread, chocolate, boba drinks, candy, spicy meatballs (pentol kuah), egg rolls, donuts, and sachet ice. This is consistent with Oramas et al. (2016), who found a statistically significant change in snack consumption ( $p = 0.002$ ,  $p < 0.05$ ).

#### 4. CONCLUSION

There was a change in nutrition knowledge among adolescents at MTs Negeri 2 Pontianak after using the APKIS quiz game. Before the intervention, most respondents were in the "moderate" category (56.4%), while after the intervention, the majority were in the "good" category (76.9%). Snack consumption also changed—initially, most students frequently consumed snacks (71.8%), but after the intervention, the majority reported infrequent consumption (89.7%). Statistical analysis showed a significant effect of the APKIS game on both nutrition knowledge and snack consumption ( $p = 0.000$ ;  $< 0.05$ ).

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