

Nutrition Education Effect in Increasing Knowledge and Ability to Interpret Nutrition Facts in Adolescents

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Abstract

Objective: To evaluate the effectiveness of nutrition education on the understanding and proficiency in interpreting nutrition labels among adolescents aged 16–18 years.

Methods: This quantitative study adopted quasi-experimental and control group designs with a pre-test and post-test approach. The sample size included 60 participants, divided into 2 equal groups, receiving education through lecture method and leaflets, respectively. The intervention was conducted one day in group 1 and group 2, respectively. Sample selection was conducted using a simple random sampling method. Data were collected through a knowledge questionnaire and details on reading ability were obtained using an interpreting ability checklist through pre-tests and post-tests conducted at the same day. The retrieved data were analyzed using the Wilcoxon Signed Rank Test and the Mann-Whitney U Test ($\alpha=0.05$).

Results: Nutrition education is shown to enhance the understanding (p -value=0,026) and proficiency of students in interpreting nutrition facts (p -value=0,064).

Conclusion: Nutrition education had a positive impact on the understanding and skill of adolescents in reading nutrition facts. Thus, developing educational materials that can be readily applied in daily life will help consumers in making more nutritionally informed choices when selecting packaged foods.

Keywords: Interpretation ability, knowledge, nutrition education, nutrition facts

Introduction

Adolescence is a crucial phase in human development. This phase is characterized by rapid psychological, physical, and behavioral changes that have a significant impact on overall health. Nutritional issues, such as obesity, being overweight, and underweight, are prevalent among this age group¹ In Indonesia, data pertaining to the nutritional status of adolescents are sourced from the 2018 Basic Health Research. According to the report from the Ministry of Health in 2020, 8.1% of individuals aged 16-18 years had thin or fragile nutritional status, while 13.5% fell

into the category of severely overweight or obese.

Furthermore, Palembang, a prominent city in the country, demonstrated a value of 8.69% higher prevalence of overweight among this age group. This figure surpasses the 7.19% average prevalence of overweight in South Sumatra, with obesity being 1.33%, as documented by the Ministry of Health in 2018. Excessive consumption of energy, sugar, salt, and saturated fat represents the primary factors contributing to obesity and non-communicable diseases. In today's modern society, adolescents often gravitate toward packaged foods due to their convenience,

portability, and ease of consumption. It is essential to monitor this dietary preference, as packaged foods tend to be high in sodium, sugar, saturated fatty acids, trans fatty acids, and preservatives.² A careful selection of snacks can play a pivotal role in shaping the dietary patterns of adolescents. An effective strategy in this regard includes the incorporation of nutritional information on processed food labels.³ salt and fat. Factors contributing to the nutrition information label are nutrition knowledge, ability to reading label. The frequency of consumption of instant noodles is seen to determine the relationship of the use of nutrition information label with the frequency of consumption of instant noodles per week. The purpose of this study was to study the relationship between nutritional knowledge, ability to read nutrition information labels, using nutrition information labels on consumers in Jakarta and surrounding areas (Bogor, Depok, Tangerang, and Bekasi This information is designed to offer clear quantitative data about the nutritional content of the food. In addition, it empowers consumers to make more informed choices related to their diet, potentially leading to significant long-term health benefits. The essential message conveyed in the Balanced Nutrition Guidelines emphasizes the importance of becoming accustomed to reading food packaging labels. However, common knowledge often hinders consumers from comprehending and interpreting nutritional information labels, leading to challenges in selecting foods in line with nutritional requirements.³ salt and fat. Factors contributing to the nutrition information label are nutrition knowledge, ability to reading label. The frequency of consumption of instant noodles is seen to determine the relationship of the use of nutrition information label with the frequency of consumption of instant noodles per week. The purpose of this study was to study the relationship between nutritional knowledge, ability to read nutrition information labels, using nutrition information labels on consumers in Jakarta and surrounding areas (Bogor, Depok, Tangerang, and Bekasi The use of scientific language, particularly in nutritional value information, can pose a significant barrier, necessitating assistance for some consumers in comprehending food labels.²

The findings of a study conducted by the National Consumer Protection Agency in 2007 indicated that only 6.7% of consumers in

Indonesia paid attention to labels on packaged food products when making their selections, a proportion considered low⁴. In contrast, a similar study conducted in a different year revealed that 36.5% of Indonesians were more inclined to read and pay attention to halal labels, a figure not significantly different from the 34.9% who focused on expiration dates. Furthermore, 20.6% of consumers paid attention to the product name, while only 7.9% considered the composition and nutritional information⁵.

Studies have shown that individuals who do not read labels tend to consume higher quantities of fat, cholesterol, and sugar in their diets.⁶ The provision of nutritional content information is a crucial educational and practical tool for encouraging healthier food choices. This is because one of the key factors influencing the health of individuals is nutritional understanding. Nutrition education plays an essential role in increasing knowledge and fostering positive attitudes toward selecting foods and snacks.⁷ Recognizing the challenges, a study was initiated in the Ilir Barat 1 District of Palembang City. The selected areas were *SMA Negeri 1* and *SMA Negeri 2* Palembang, due to their strategic location within the city. These places were situated near minimarkets and canteens that offer packaged food. Additionally, high school students aged 16–18 represent a significant segment of the adolescent population. Consequently, this study aimed to investigate the impact of nutrition education on the knowledge and proficiency in reading Nutrition Facts among adolescents aged 16–18 in the city of Palembang.

Methods

This study adopted quasi-experimental and control designs with both pretest and posttest assessments. Group 2 served as a basis for comparison and received interventions through leaflets, while Group 1 consisted of adolescents who received interventions comprising food models (packaged foods) accompanied by explanations. The approach adopted was lecture methods with PowerPoint slides and food models. In this study, packaged food was served as an educational medium and was used to assess the reading ability variable. A total of four types of packaged foods, namely packaged drinks, foods containing MSG, sweet foods, and instant foods, were selected as samples. The sample size for this study was determined using the hypothesis testing

formula for comparing the two independent population means. A total of 60 subjects were selected using a random sampling method facilitated by Microsoft Excel. The study samples comprised students from two high schools, namely SMA Negeri 1 (Group 1) and SMA Negeri 2 (Group 2), in Ilir Barat 1 sub-district, Palembang City. Data were collected during the period of May 17th to 19th, 2022. The inclusion criteria were students aged 16-18 years, willingness to participate as respondents, provision of informed consent, and good health. The obtained data comprised demographic information about the respondents, pretest and posttest outcomes related to the students' knowledge of nutrition facts using a questionnaire, and pretest and posttest data assessing reading abilities related to nutrition facts through a reading ability checklist. According to Arikunto, knowledge is divided into three categories, namely good, sufficient, and limited knowledge, where respondents can correctly answer 76-100%, 56-75%, and less than 56% of the total questions, respectively. In the interpreting ability variable, respondents are considered to have good ability if they can answer all the questions in the reading ability checklist correctly, without a single mistake. Validity testing was conducted on the sections of the

questionnaire pertaining to knowledge and the ability to read Nutrition Facts. Validity testing employed the corrected item-total correlation method. Validity and reliability tests were conducted on 30 individuals who met the same criteria as the study's target population, namely the students of Senior High School 10 Palembang. The statistical tests employed in this study were the Wilcoxon Signed Rank Test and the Mann-Whitney U Test.

Results

Table 1 presents an analysis of respondent characteristics, comprising age, gender, parental income, and pocket money, within both the experimental and control groups. The majority of respondents in the two groups were 17 years old and female. In group 1 and group 2, respectively, the income of most parents was above and below the Regional Minimum Wage of Palembang City. Additionally, the average student school allowances in group 1 exceeded 15,000 IDR, while in group 2, it averaged 15,000 IDR.

Table 2 presents the analysis of the Knowledge category for both group 1 and group 2. The respondents were assessed and classified under "not good," "sufficient," and "good." In both group 1 and group 2,

Table 1 Respondent Characteristics

Characteristics	Group 1		Group 2	
	Frequency (n=30)	Percentage (%)	Frequency (n=30)	Percentage (%)
Age				
16 years old	9	30.0	8	26.7
17 years old	20	66.7	20	66.7
18 years old	1	3.3	2	6.7
Sex				
Male	11	36.7	13	43.3
Female	19	63.3	17	56.7
Parents' Income				
Above Minimum Regional Wage	26	86.7	13	43.3
Under Minimum Regional Wage	4	13.3	17	56.7
School Allowance				
≥15,000 IDR	21	70.0	15	50.0
<15,000 IDR	9	30.0	15	50.0

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Table 2 Categorization of Respondents' Knowledge Before and After Education

Category	Group 1				Group 2			
	Pretest		Posttest		Pretest		Posttest	
	(n=30)	%	(n=30)	%	(n=30)	%	(n=30)	%
Not Good	0	0	0	0	3	10	0	0
Sufficient	22	73.3	6	20	26	86.7	11	36.7
Good	8	26.7	24	80	1	3.3	19	63.3

Table 3 Categorization of Respondents' Interpreting Abilities Before and After Education

Category	Group 1				Group 2			
	Pretest		Posttest		Pretest		Posttest	
	(n=30)	%	(n=30)	%	(n=30)	%	(n=30)	%
Good	6	20	22	73.3	1	3.3	16	53.3
Not Good	24	80	8	26.7	29	96.7	14	46.7

the majority of respondents initially had sufficient knowledge about nutrition facts before receiving education. Subsequently, this variable improved, with the majority attaining a "good" level after the educational intervention.

Table 3 shows the Reading Ability for both group 1 and group 2, classified into "Good" and "Not Good" categories. In both groups, the majority of respondents required improved skills in interpreting nutrition facts, with only a few demonstrating good abilities before the educational intervention. Following the intervention, the number of good abilities increased in both groups. However, group 1 had a more significant number of respondents in this category compared to group 2.

Table 4 presents the results of the Wilcoxon Rank Test statistic in group 1, where food model educational media accompanied by explanations was utilized. A p-value of <0.001 was obtained, signifying the impact of providing nutrition education on the knowledge of the respondents about nutrition facts.

In group 2, using leaflet educational media, a p-value of <0.001 was obtained, indicating the influence of nutrition education on the knowledge of respondents about nutrition facts. Furthermore, based on the results of the Mann-Whitney U Test for the knowledge variable, a p-value of 0.026 was achieved, signifying a significant average difference between group 1 and group 2 following the

Table 4 Bivariate Analysis of Knowledge Variable

Category	Group 1		Group 2	
	Frequency	Percentage	Frequency	Percentage
Wilcoxon Rank Test				
Decreasing score	1	3.3	3	10
Increasing score	24	80	24	80
Stable score	5	16.7	3	10
p-value	0.000		0.000	
Mann Whitney U Test				
Mean rank	35.32		25.68	
p-value	0.026			

Table 5 Bivariate Analysis of Interpreting Ability Variable

Category	Group 1		Group 2	
	Frequency	Percentage	Frequency	Percentage
Wilcoxon Rank Test				
Decreasing Score	2	6.7	2	6,7
Increasing Score	22	73.3	23	76,6
Stable Score	6	20	5	16,7
<i>p-value</i>	0.000		0.000	
Mann Whitney U Test				
Mean rank	34.13		2687	
<i>p-value</i>	0.064			

intervention.

Table 5 displays the results of the Wilcoxon Rank Test statistic in group 1, utilizing food model educational media accompanied by explanations. A p-value of 0.000 was achieved, signifying the impact of providing nutrition education on the reading ability of the respondents related to nutrition facts. In group 2, using leaflet educational media, a p-value of 0.000 was also obtained. However, in the Mann-Whitney U Test for the reading ability variable, a p-value of 0.064 was obtained, indicating that there was no significant average difference between group 1 and group 2.

Discussion

Nutrition education is one of the specific nutritional interventions that can be implemented to observe changes in nutritional knowledge among adolescent groups. Knowledge is one of the factors that stimulate or encourage the implementation of a health behavior.⁸ Knowledge, as a predisposing factor, plays a crucial role in shaping initial perceptions of health and illness. Consequently, nutrition education is an important effort to develop knowledge that will subsequently influence individuals' perceptions, attitudes, and behaviors.

In this study, the data used were primary data collected using questionnaires and pre-test and post-test checklists for both group 1 and group 2. Scores were tabulated by assigning 1 point for each correct answer and 0 points for each incorrect answer. Each set of answers was tabulated and used for the analysis of the knowledge and reading ability

variables. Intervention was administered to both group 1 and group 2 with the same content to minimize bias in the study. The educational material included information about the definition of nutrition facts, the functions of nutrition facts, the components of nutrition facts, how to read and understand nutrition facts, recommendations for sodium, sugars, and saturated fatty acid consumption limits, and the effects of excessive sodium, sugars and saturated fatty acid consumption.

Parents with higher incomes tend to provide their children with more pocket money which is closely associated with the selection of snack foods.⁹ Lack of nutritional knowledge can contribute to errors in food choices and is one of the root causes of nutritional issues. In addition, eating habits during adolescence can have long-term health implications.¹⁰ Understanding how to interpret nutritional information labels is crucial for consumers who need to manage their dietary intake, especially those with an obese nutritional status. These labels facilitate the selection and regulation of food consumption from packaged products. The results of the Wilcoxon Rank Test statistic in the Group 1 indicate that providing nutrition education had a positive effect on the knowledge of the respondents about nutrition facts. These results were in line with the study conducted by Murtiningsih on the impact of health education on the knowledge level of mothers with malnutrition under five in the work area of *Puskesmas Babakan Sari*, Bandung City, in 2018. This study demonstrated the influence of health education on the knowledge of mothers who were dealing with malnutrition.¹¹

Additionally, the report by Yulinda and

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Nurul indicated that counseling using the lecture method predominantly engages the senses of sight and hearing. Approximately 75% of knowledge is transmitted to the brain through the sense of sight, with 87% and 13% being acquired by sight and hearing, respectively. Only about 12% of knowledge is obtained from other senses. Therefore, education group 1 proved to be effective in enhancing the knowledge of respondents.¹² Based on the results of the Wilcoxon Rank Test statistic in Group 2, which utilized leaflet educational media, it was evident that nutrition education had a significant impact. This is consistent with the study conducted by Pakhri et al., which explored the effects of nutrition education on nutrition knowledge, energy, protein, and iron intake in adolescents using leaflet media. The result showed a p-value of 0.000, signifying the influence of nutrition education on the nutritional knowledge of adolescents.¹³

Delivering information and nutrition education through print media such as leaflets, posters, and pocketbooks is more effective. Pictures and color arrangements complement these static visual messages. In the context of this nutrition education study, group 2, which received education through leaflets, experienced an increase in knowledge both before and after nutrition education.¹⁴ Furthermore, educational methods involving a combination of pictures and words, accompanied by sound explanations, are more effective for memory retention compared to those solely comprised of pictures with words.¹⁵ Proficiency in accurately and precisely reading and interpreting nutrition facts is a skill that all consumers of packaged foods should acquire. This ability can empower the making of healthier food choices tailored to nutritional needs and status. To facilitate this, specific nutrition interventions, such as nutrition education, should be implemented to ensure that packaged food consumers comprehend nutrition labels.

Data on the reading ability of respondents were collected through interviews or direct question-and-answer sessions with the respondents. During these interactions, a packaged food item was provided, and inquiries were made concerning quantitative information listed on the nutrition facts label, including the number of servings, total calories, protein, fat, and the significance of terms such as "*Angka Kecukupan Gizi*" and "2150 kcal." When the respondent can answer each of these inquiries, their reading ability is

considered proficient. However, in instances where any indicators are still not met, it is deemed to be adequate.

The results of the Wilcoxon Rank Test statistic in group 1, utilizing food models and PowerPoint (PPT) educational media, showed that nutrition education had a discernible impact on the reading ability of the respondents. This was in line with the study conducted by Kartini et al., which explored the influence of counseling on knowledge and practices related to balanced nutrition among elementary school children. The results indicated an enhancement in the nutritional practices of students following counseling.¹⁶

The Mann-Whitney U Test was conducted to assess the difference in the average outcomes of knowledge and the ability to read nutrition facts after nutrition education was provided between group 1 and group 2. Furthermore, the test for the knowledge variable yielded a p-value of 0.026, signifying a significant difference in the average outcomes between the 2 groups following the intervention. However, the reading ability variable produced a p-value of 0.064, indicating no significant difference in the average outcomes.

The reading ability of students is influenced by two factors, namely internal factors, such as motivation from within students, as well as external factors, including methods, media, and teachers.¹⁷ In this study, the experimental group received education directly through the use of PowerPoint media and packaged food, while the control group utilized leaflet media. However, students in the control group were permitted to pose questions about the leaflets they were provided, and they responded with explanations. Consequently, there is no significant difference in the reading ability variable between the two groups due to external factors, primarily stemming from the provision of explanations related to the material.

In this study, packaged food was served as an educational medium and was used to assess the reading ability variable. A total of four types of packaged foods, namely packaged drinks, foods containing MSG, sweet foods, and instant foods, were selected as samples. However, it would have been beneficial to conduct a preliminary food survey to identify the products or brands most frequently consumed by teenagers. The selection was limited to foods that were familiar to teenagers. Additionally, the educational leaflet for group 2 did not include a breakdown of the types of fats.

To measure the distance of an intervention based on evaluation theory, approximately 2 weeks is needed for knowledge and attitudes, while behavior requires a minimum of 1 month. This is in line with the concept of the sleeper effect proposed by Bringham, which states that people still remember the content of a message 10–14 days after it is delivered.¹⁸ Therefore, in this study, there was no significant difference in the average reading ability between the group 1 and group 2, as the intervention and evaluation were conducted within a relatively short period.

In summary, nutrition education led to increased knowledge and reading ability in both group 1 and group 2. Furthermore, there was a significant difference in knowledge levels between these groups, but no difference was observed in the reading ability variable. Therefore, it was also recommended to conduct further research on the effects of nutrition education about nutrition label on the practice and attitude towards packaged food consumption and its' effects on adolescents' nutritional status through a series of educations and monitoring and evaluation.

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