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ANALYSIS OF THE EFFECT OF PROTEIN SNACKS ON THE NUTRITIONAL STATUS OF ELEMENTARY SCHOOL STUDENTS IN WEST ACEH IN THE GENIUS PROGRAM IN 2023

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Abstract

Student nutritional status is a crucial indicator of health and development, particularly regarding adequate nutrition. One effective intervention to enhance nutritional status is providing high-protein snacks. Indonesia's Genius Program aims to improve child nutrition through targeted interventions in select schools nationwide, including 17 schools in Aceh. Quantitative study analyzed the impact of high-protein snacks on student nutritional status in West Aceh elementary schools using secondary data from the 2023 Genius Program. Employing a quantitative design and Wilcoxon statistical analysis, 339 students were categorized into three nutritional status groups based on BMI-for-age z-scores: undernutrition, good nutrition, and overnutrition. Results showed that 14-day high-protein snack provision significantly improved student nutritional status, increasing good nutrition proportions and reducing undernutrition cases. The Genius Program in West Aceh elementary schools (2023) effectively enhanced student nutritional status by reducing undernutrition and increasing good nutrition proportions. Recommendations include extending program duration and expanding sample sizes for future research generalization.

Keywords: ***Nutritional status, high-protein snacks, Genius program, students, BMI-for-age z-scores***

INTRODUCTION

Nutritional status is a condition resulting from nutrient intake and bodily requirements to maintain a healthy metabolic balance. Individual nutritional needs vary based on age, sex, physical activity level, height, weight, and other factors. According to Par'i et al. (2017), nutritional status can be categorized into various levels reflecting different health conditions. There are four types of nutritional status: undernutrition, overnutrition, malnutrition, and optimal nutrition. Optimal nutritional status occurs when the body receives sufficient nutrients, utilized effectively, supporting physical growth, intellectual development, work capacity, and overall health. Conversely, undernutrition results from inadequate essential nutrients, while overnutrition occurs from excessive nutrient intake, potentially causing adverse effects. Nutrition-related problems, primary or secondary, often arise from undernutrition and overnutrition. Therefore, implementing measures to fulfill nutritional requirements is crucial for improving nutritional status (Almatsier, 2015).

Nutritional issues can be addressed by balancing energy intake and expenditure, achievable through reduced food consumption, increased physical activity or exercise, and stress avoidance. Additionally, energy balance involves limiting carbohydrate and fat intake. Furthermore, understanding protein's role in overall health is crucial (Anisa et al., 2019). Protein plays a crucial role in energy production, growth, and maintenance of bones, muscles, skin, blood, and other tissues and organs. Adequate protein intake is essential for school-age children's growth and nutritional health. Protein deficiency can cause abnormal growth delays and increased susceptibility to infections. According to the Indonesian Ministry of Health (2018), daily protein requirements vary by age and gender: males aged 7-9 years require 40g, 10-12 years require 50g, while females aged 7-9 years require 40g, and 10-12 years require 55g.

Here's the translation:

The National Food Agency (BPN) and the Indonesian Association of Nutrition Higher Education Institutions (AIPGI) have partnered in the GENIUS initiative (Gerakan Edukasi dan Penyediaan Makanan Bergizi untuk Siswa). This program benefits 25,000 students across 10 Indonesian regions. The two-month program aims

to support students' nutritional needs, aligning with President Jokowi's vision for Indonesia's Golden Generation 2045 (Kusumaningsih et al., 2024). In 2020, approximately 149.2 million children globally suffered from nutritional issues, according to the World Health Organization (WHO), remaining a leading cause of child mortality worldwide (World Health Organization, 2020). Malnutrition predominantly affected South Asia (46%) and Sub-Saharan Africa (28%), followed by Latin America (7%) and Central/Eastern Europe and Commonwealth of Independent States (5%). UNICEF reports indicate that most of the 167 million preschool-age children suffering from malnutrition (underweight) reside in South Asia. The nutritional situation in Indonesia and globally warrants attention (Dipasquale et al., 2020).

Based on the 2023 Indonesian Health Survey (SKI), the prevalence of childhood nutritional status in Indonesia is as follows: 3.5% severely underweight, 7.5% underweight, 69.4% normal, 11.9% overweight, and 7.8% obese (Kemenkes, 2023). Notably, the nutritional status in Aceh is a primary focus of this research. Aceh's Health Department reported in 2020 that the target achievement for child nutrition indicators was set at 28%, with an actual realization of 19% (based on e-PPGMB data), achieving 132.14%, categorized as excellent. Despite fluctuations from 2017-2020, the results remained satisfactory. Specifically, nutrition percentages were 32% in 2017, 37% in 2018, 22.55% in 2019, and 19% in 2020 (Dinkes Aceh, 2020).According to Indonesia's 2023 Health Survey (SKI), Aceh's child nutrition prevalence is: severely underweight (5.3%), underweight (7.0%), normal (70.5%), overweight (10.2%), and obese (7.0%) (Kemenkes, 2023).

According to Aceh Barat District Health Office (2021), based on students' BMI, 29% were severely underweight, 17% underweight, 4.8% overweight, and 77.36% obese. In 2022, the figures changed: 15% severely underweight, 55.6% underweight, 4.8% overweight, 3.2% obese, and 5.3% stunted.The initial survey by Aceh Barat Health Office found 13 Community Health Centers (Puskesmas). Sampling 24 children from 12 sub-districts revealed: 79% had normal nutrition, 12.5% were underweight, and 8.3% were obese (Aceh Barat District Health Office, 2022). Based on the above background, the researcher is interested in investigating the issue of "Analysis of the Effect of Protein Snack Provision on Nutritional Status in West Aceh in the Genius Program 2023."

LITERATURE REVIEW

The term "gizi" originates from Arabic, "ghidza," meaning food. In English, it translates to "nutrition," referring to food or nutrients, often interpreted as the science of nutrition (Syampurma, 2018). Nutrition encompasses the process of utilizing consumed food, involving absorption, transportation, storage, metabolism and excretion of essential substances. These processes maintain life, growth, organ function and energy production (Purnamasari et al., 2022). Nutrition is a crucial factor determining health levels and balance between physical and mental well-being. During childhood development, adequate nutrition is essential, as deficiencies can lead to impaired cognitive function, suboptimal physical growth, stunted posture and reduced physical activity. Conversely, excessive nutritional intake increases the risk of degenerative diseases later in life. School-age children are particularly vulnerable to nutritional imbalances and excesses (Nuryanti & Hadi, 2022).

Nutritional status assessment is the interpretation of data obtained through various methods to identify populations or individuals at risk of or suffering from poor nutritional status (Nuryanti & Hadi, 2022). Anthropometric measurements assess body dimensions and composition. According to Indonesia's Ministry of Health (2011), nutritional status categories are determined by Z-scores: underweight (-3SD to < -2SD), normal (-2SD to < 1SD), overweight (1SD to < 2SD), and obese (> 2SD). Protein originates from the Greek word "Protos," meaning "primary" or "most important" (Rismayanthi, 2015). Protein is a crucial macronutrient, playing a vital role in forming biomolecules, surpassing carbohydrates and fats. As the body's primary building block, protein is essential for life (Umar, 2022). Adequate protein intake depends on factors like body weight, age (growth stage), and dietary protein quality (Kemenkes, 2014).

Protein serves as the primary substance for body growth and development. As a key component, protein forms body cells and provides energy when carbohydrate and fat reserves are depleted (Azhar, 2016). Protein also serves as an energy source during energy deficiencies. Notably, proteins have unique structures, comprising nitrogen, carbon, hydrogen, oxygen, sulfur, phosphorus and iron (Rismayanthi, 2015). School-age children are vulnerable to nutritional issues due to ongoing growth and development. Short-term risks include apathy, impaired communication and developmental issues. Long-term consequences encompass decreased IQ, cognitive decline, sensory integration disorders, attention deficits, low self-esteem and impaired academic performance (Saputri et al., 2021). Additionally, malnutrition can lead to lethargy, lack of enthusiasm and impaired learning and cognitive function (Susilowati & Hengky, 2019).

METHOD

This study utilizes secondary data from the 2023 Genius program's baseline and endline results. A quantitative approach is employed to answer research questions through statistical analysis.The population consists of 16 elementary schools in Aceh Province (2023-2024) participating in the Genius program, totaling 2,459 students. The sample comprises three West Aceh elementary schools: SDN Tanjong Meulaboh (192 students), SDN Mego Rayeuk (74 students), and SDN Blang Teungoh (73 students), totaling 339 students.

This study's data collection utilized secondary data, including gender, birthdate and anthropometric measurements of grades 1-6 students from three Genius program-participating elementary schools. Measurements, taken before and after 2023's protein snack intervention, included height and weight to analyze protein's impact on physical growth. Trained university enumerators, adhering to standard protocols, ensured data accuracy and consistency. Secondary data sources included enumerator archives and Genius program reports.

RESULTS AND DISCUSSION

RESULTS

This study employed a quantitative approach using pre-test and post-test methods to measure changes in students' nutritional status before and after receiving protein snacks. Initially, students' nutritional status was assessed using anthropometric data (height and weight) to calculate z-scores (BMI-for-age). Following the Genius program's protein snack intervention, anthropometric data were re-measured to determine changes in students' nutritional status. The results are presented below.

Table 1: Frequency of Nutritional Status

Nutritional status	Before intervention	After intervention	%
Malnutrition	34	21	38%
Good Nutrition	259	269	4%
Overweight	46	49	7%

The table above illustrates the distribution of students' nutritional status before and after the protein snack intervention during the program. Students' nutritional status was categorized into three groups: underweight, normal, and overweight, based on BMI-for-age z-scores. The results show significant improvement, particularly a 38% increase in students transitioning out of underweight status. Additionally, slight improvements were observed in the normal (4%) and overweight (7%) categories.

Table 2. Frequency of giving snacks

Number of students	Number of snacks received	
	Frequency	%
339	14 times	100%

The table above shows that 339 students participated in this study, all receiving equal protein snack interventions. Each student received 14 snacks at both baseline and endline stages.

Table 3. Test of Normality

	Klomogrov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
z-score Baseline	.397	339	.000	.090	339	.000
z-score Endline	.422	339	.000	.072	339	.000

a. Lilliefors Significance Correction

Results of the Kolmogorov-Smirnov normality test indicate that z-score BMI baseline and endline data are not normally distributed, with a significance value (p) of 0.000 (<0.05). Thus, the null hypothesis stating normal distribution is rejected.Given these results, non-parametric analysis was chosen since the data doesn't meet normal distribution requirements for parametric testing. Consequently, the Wilcoxon test was employed as an alternative to the t-test.

Table 4. Wilcoxon Ranks

		N	Mean Rank	Sum of Ranks
z-score baseline – z-score endline	Negative Ranks	80[a]	73.67	5893.50
	Positive Rank	254[b]	197.05	50051.50
	Ties	5[c]		
	Total	339		

a. Z-score endline < z-score baseline
b. Z-score endline >z-score baseline
c. Z-score endline = z-score baseline

Table 4 reveals changes in students' nutritional status post-intervention. Eighty students experienced a decline (negative rank), with an average rank of 73.67 and total rank of 5893.50. Conversely, 254 students showed improvement (positive rank), with an average rank of 197.05 and total rank of 50,051.50. Five students exhibited no change (ties) in nutritional status. The analysis encompassed 339 students.

Table 5. Hasil uji wilcoxontest statistics[a]

	z-score endline – z-score baseline
Z	-12.506[b]
Asymp.Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks

Table 5 reveals significant improvements in students' nutritional status. The Z-Value (-12.506) indicates a substantial difference between baseline and endline z-scores, primarily driven by positive ranks, suggesting most students experienced improvement. The asymptotic significance (p-value) of 0.000 confirms statistically significant results. Since $p < 0.05$, the difference between baseline and endline is significant at a 0.05 significance level.

DISCUSSION

This study evaluated the impact of protein snacks on students' nutritional status. Given protein's importance in supporting growth and development, protein snacks were expected to improve nutritional status. Results showed that providing protein snacks 14 times significantly impacted students' nutritional status. Statistical analysis using the Wilcoxon test revealed a Z-value of -12.506 (p-value: 0.000), indicating significant differences between pre- and post-intervention nutritional statuses. Notably, undernourished students decreased from 34 to 21 (38% reduction). Additionally, students with good nutrition improved by 4% and those with excess nutrition by 7%. These findings suggest consistent protein snack provision benefits students across various nutritional categories, improving and maintaining their nutritional status.

This study reinforces evidence that protein snack provision is an effective strategy for enhancing schoolchildren's nutritional status. This intervention merits consideration in preventing and addressing nutritional deficiencies among children, particularly in school settings. The Wilcoxon test yielded a Z-value of -12.506, indicating significant differences between baseline and endline measurements. The substantial Z-value suggests non-random variability. The significant negative Z-value and asymptotic significance (p-value: 0.000) confirm statistically significant results, surpassing the 0.05 significance threshold. These findings conclusively demonstrate protein snacks positively impact students' nutritional status.

Although significant improvements were observed in most students, further research is necessary to understand factors influencing students who didn't show improvement or experienced nutritional decline. Future

studies can explore snack duration, protein quantity, eating habits, physical activity and external factors affecting nutritional changes. Overall, this study demonstrates protein snacks' effectiveness in enhancing students' nutritional status, contributing significantly to nutrition intervention programs, particularly in improving schoolchildren's nutrition through optimal protein intake.

Sutrio's 2016 study, "Correlation Between Protein Intake and Nutritional Status Based on BMI/Age in Grades 1-3 Students at SD N 01 Kemiling Permai, Kemiling District, Bandar Lampung City, 2015," supports this research. Chi-square statistical analysis revealed a significant correlation ($p=0.003 < 0.05$) between protein intake and nutritional status based on BMI/age. Findings indicate children with abnormal nutritional status tend to consume inadequate protein.

The Genius program offers high-protein snacks, including quail egg satay, a traditional Indonesian treat made from boiled quail eggs skewered on sticks. Each skewer typically holds 3-5 eggs. Despite their small size, quail eggs are rich in nutrients. A 100g serving (10-12 eggs) contains approximately 158 calories, 13g protein, 11g fat, 0.4g carbohydrates, 64mg calcium, 3.6mg iron, 543 IU vitamin A, and 1.58µg vitamin B12. Quail eggs are also rich in essential fatty acids, choline, and antioxidants, supporting children's growth and development.

UHT milk is another high-protein snack offered in the Genius program. Rich in nutrients, UHT milk contains protein, calcium, vitamin D and essential vitamins and minerals supporting children's growth. Each 100ml serving provides approximately 60-70 calories, 3g protein, 2.5g fat, 5g carbohydrates and 120mg calcium. Additionally, it's enriched with vitamins A and D, crucial for bone health and immune system development.

UHT milk offers numerous benefits for school-aged children. The calcium and vitamin D strengthen bones and teeth, supporting optimal growth. Protein aids muscle and tissue development, while providing sufficient energy for daily school activities. Additionally, vitamin A maintains healthy vision and boosts immunity. Regular consumption of milk provides children with balanced nutrition, enhancing focus and overall well-being. Milk is an excellent choice as a healthy beverage that complements daily nutritional needs for school-aged children.

CONCLUSION

The study's results lead to the following conclusions:

1. The Genius program, providing protein snacks 14 times, significantly improved students' nutritional status, reducing malnutrition cases.
2. The Genius program at SD Aceh Barat (2023) effectively enhanced students' nutritional status, decreasing malnutrition and promoting healthy nutrition.
3. Regular protein snack provision in the Genius program positively impacted students' nutritional status, reducing malnutrition and increasing healthy nutrition rates. This intervention demonstrates the effectiveness of targeted nutritional support in improving student health.

REFERENCES

Almatsier, S. (2016). Basic Principles of Nutrition Science.

Anisa et al. (2019). Community Nutrition Problems and Improvement Efforts. Journal of Community Nutrition, 40, 1-22.

Dipasquale, V., Gottrand, F., Sullivan, P. B., & Romano, C. (2020). Top-Ten Tips for Managing Nutritional Issues and Gastrointestinal Symptoms in Children with Neurological Impairment. Italian Journal of Pediatrics, 46(1), 1-8.

Kusumaningsih, P., et al. (2024). Education on Food Waste Reduction for Elementary School Students in Dawan Kaler, Klungkung Regency. Paradharma (Journal of Applied Science and Technology), 8(1), 13-19.Ministry of Health. (2023). Indonesian Health Survey in Figures.

Ministry of Health of the Republic of Indonesia. (2018). Basic Health Research.

Nuryanti, L., & Hadi, H. (2022). Identification of Talent Based on Nutritional Intake in High and Low Altitude Areas in Children Aged 11-15. Unnes Journal of Sport Sciences, 6, 36-41.

Par'i, M., Wiyono, S., & Priyo Harjatmo, T. (2017). Nutrition Status Assessment.

Purnamasari, A., et al. (2022). Human Physiology and Nutrition. Cendekia Publisher.

Susilowati, E., & Hengky, I. (2019). The Effect of Nutritional Status on Learning Styles in School-Aged Children.