

Effect of Poster-Based Nutrition Education on Breakfast Knowledge among Elementary School Students at SDN 2 Aceh Besar

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Abstract

Breakfast is an essential dietary practice that contributes to children's nutritional adequacy, cognitive performance, concentration, and academic achievement. However, breakfast skipping remains common among school-aged children, often due to limited knowledge regarding its importance. This study aimed to evaluate the effect of nutrition education using poster media on breakfast knowledge among fourth-grade students at SDN 2 Aceh Besar. A quasi-experimental study employing a one-group pretest–posttest design was conducted among 52 students selected through total sampling. Students' breakfast knowledge was assessed using a validated structured questionnaire administered before and after the intervention. The educational intervention consisted of a poster-based nutrition education session focusing on the definition, benefits, and importance of breakfast. Data were analyzed using the Wilcoxon Signed-Rank Test with a significance level of 0.05. The results showed a significant improvement in students' breakfast knowledge following the intervention. The mean knowledge score increased from 13.31 ± 3.02 before the intervention to 17.81 ± 2.84 after the intervention, representing an average increase of 4.50 points. Statistical analysis revealed a significant difference between pretest and posttest scores ($Z = -6.231$; $p < 0.001$). These findings indicate that poster-based nutrition education is an effective strategy for improving breakfast knowledge among elementary school students. The use of visually engaging educational media should be considered in school-based nutrition programs to promote healthy eating behaviors from an early age.

Keywords: breakfast, elementary school students, knowledge, nutrition education, poster media

Introduction

Breakfast is widely recognized as an essential component of a healthy diet for school-aged children because it provides energy after an overnight fast and supports cognitive performance, learning capacity, and overall health. Regular breakfast consumption has been associated with improved attention, memory, academic achievement, and psychosocial well-being, whereas breakfast skipping has been linked to reduced cognitive performance, poorer dietary quality, and an increased risk of overweight and metabolic disorders (Adolphus et al., 2019; O'Neil et al., 2014).

Despite its well-established benefits, breakfast skipping remains common among children worldwide. The Food and Agriculture Organization and the World Health Organization emphasize that establishing healthy eating habits during childhood is essential for promoting lifelong health and preventing nutrition-related diseases (FAO & WHO, 2019). In Indonesia, national data indicate that breakfast consumption among school-aged children remains suboptimal, with many children

consuming inadequate breakfasts or skipping breakfast entirely (Kementerian Kesehatan Republik Indonesia, 2018). Insufficient nutritional knowledge, limited parental supervision, time constraints before school, and unhealthy lifestyle habits are among the factors contributing to poor breakfast practices.

Nutrition education is considered one of the most effective strategies for improving children's knowledge and promoting healthy eating behaviors. Among various educational approaches, poster-based education offers several advantages because it combines concise messages with attractive visual illustrations that facilitate comprehension and memory retention. Visual educational media are particularly suitable for elementary school students, whose learning processes rely heavily on visual stimuli and simple messages (World Health Organization, 2023). Previous studies have demonstrated that nutrition education using visual media can significantly improve nutrition knowledge and encourage healthier dietary behaviors among school-aged children (Contento, 2020).

Although numerous studies have evaluated nutrition education in school settings, most have focused on general nutrition knowledge or healthy eating practices. Evidence regarding the effectiveness of poster-based nutrition education specifically targeting breakfast knowledge among elementary school students, particularly in Aceh Province, remains limited. Moreover, preliminary observations and discussions with teachers at SDN 2 Aceh Besar revealed that many fourth-grade students frequently attended school without eating breakfast. Teachers also reported that several students appeared less attentive and easily fatigued during morning lessons. These observations highlight the need for simple, low-cost educational interventions that can be readily implemented in elementary schools.

Therefore, this study aimed to evaluate the effect of nutrition education delivered through poster media on breakfast knowledge among fourth-grade students at SDN 2 Aceh Besar. The findings are expected to provide evidence supporting the use of poster-based nutrition education as an effective strategy for improving breakfast knowledge among elementary school students and to contribute to the development of school-based nutrition promotion programs.

Methods

This study employed a quasi-experimental design using a one-group pretest–posttest approach. The design was selected to evaluate changes in students' breakfast knowledge before and after a nutrition education intervention using poster media. The study was conducted at SDN 2 Aceh Besar, Aceh Province, Indonesia, between March and April 2025. The target population comprised all fourth-grade students enrolled at the school. Total sampling was applied, and all 52 eligible students participated in the study. Students were included if they were enrolled in the fourth grade, attended the educational session, completed both the pretest and posttest, and obtained parental or guardian consent. Students who were absent during data collection or did not complete both questionnaires were excluded from the analysis.

The independent variable was nutrition education delivered using poster media, whereas the dependent variable was students' knowledge regarding breakfast. Students' breakfast knowledge was assessed using a structured questionnaire consisting of multiple-choice questions covering the definition of breakfast, its health benefits, the consequences of skipping breakfast, and examples of balanced breakfast menus. Each correct answer received one point, whereas incorrect answers

received zero points. The total score represented each student's level of breakfast knowledge, with higher scores indicating better knowledge.

The questionnaire was reviewed by experts in nutrition and health education to evaluate content validity, language clarity, and suitability for elementary school students. Prior to implementation, the questionnaire was pilot-tested to ensure that all items were understandable for the target population. The educational poster was specifically developed for this study using concise language, colorful illustrations, and age-appropriate educational messages. The poster emphasized the importance of breakfast, its health benefits, and examples of balanced breakfast meals. The content and visual design were reviewed by nutrition education experts and categorized as "very good" based on expert evaluation. The study was conducted in four stages.

1. **Preparation:** Permission was obtained from the school administration, research instruments were prepared and validated, and the educator was briefed regarding the intervention protocol.
2. **Pretest:** Participants completed the breakfast knowledge questionnaire before receiving the educational intervention.
3. **Nutrition Education:** Students attended a 20–30-minute nutrition education session delivered by a nutrition educator using poster media. The session covered the definition of breakfast, its role in supporting growth, health, and learning performance, the consequences of skipping breakfast, and examples of balanced breakfast meals. Interactive discussion and question-and-answer sessions were included to encourage student participation.
4. **Posttest:** Seven days after the intervention, participants completed the same questionnaire to evaluate changes in breakfast knowledge.

Data were analyzed using **IBM SPSS Statistics**, descriptive statistics were used to summarize participants' characteristics and knowledge scores. Because the data were not normally distributed, differences between pretest and posttest knowledge scores were analyzed using the Wilcoxon Signed-Rank Test. Statistical significance was established at $p < 0.05$.

Results

This section presents the characteristics of the participants, the validation results of the educational poster, descriptive statistics of breakfast knowledge before and after the intervention, and the results of the inferential statistical analysis.

Validation of Poster Media

Prior to implementation, the educational poster underwent expert validation to evaluate its content, visual design, and language appropriateness. As shown in Table 1, the poster achieved an overall feasibility score of 93.9%, indicating that it was classified as "**Very Good**" and considered suitable for use as an educational medium.

Table 1. Expert validation results of the poster media.

Expert Validator	Primary Assessment Aspect	Mean Score	Eligibility (%)	Category
Content Expert	Accuracy and relevance of nutrition information	4.91	98.2	Very Good
Media Expert	Visual design, layout, and attractiveness	4.45	89.0	Very Good

Expert Validator	Primary Assessment Aspect	Mean Score	Eligibility (%)	Category
Language Expert	Language clarity and readability	4.73	94.6	Very Good
Overall	Media feasibility	—	93.9	Very Good

The high validation scores indicate that the educational poster met the required standards for content accuracy, visual quality, and language suitability for elementary school students.

Participant Characteristics

A total of 52 fourth-grade students from SDN 2 Aceh Besar participated in this study. All participants completed both the pretest and posttest assessments. The participants were between 10 and 11 years of age. Although the distribution of male and female students was relatively balanced, sex was not included as an analytical variable because it was not the focus of the study.

Changes in Breakfast Knowledge

Students' breakfast knowledge increased following the nutrition education intervention. The mean pretest score was 13.31 ± 3.02 , whereas the mean posttest score increased to 17.81 ± 2.84 , representing an average improvement of 4.50 points.

Table 2. Breakfast knowledge scores before and after the intervention.

Measurement	n	Mean $\pm$ SD	Minimum	Maximum
Pretest	52	13.31 ± 3.02	6	18
Posttest	52	17.81 ± 2.84	12	20

Inferential Analysis

The Wilcoxon Signed-Rank Test was performed to determine whether the observed difference between pretest and posttest knowledge scores was statistically significant. As presented in Table 3, the analysis yielded a Z value of -6.231 with a p -value < 0.001 , indicating a statistically significant increase in students' breakfast knowledge after the poster-based nutrition education.

Table 3. Wilcoxon Signed-Rank Test results.

Comparison	n	Z	p-value
Pretest vs. Posttest	52	-6.231	<0.001

The statistically significant difference between pretest and posttest scores demonstrates that students' breakfast knowledge improved following the nutrition education intervention using poster media.

Discussion

The present study demonstrated that nutrition education delivered through poster media significantly improved breakfast knowledge among fourth-grade students at SDN 2 Aceh Besar. The mean knowledge score increased from 13.31 ± 3.02 before the intervention to 17.81 ± 2.84 after the intervention, with an average increase of 4.50 points. The Wilcoxon Signed-Rank Test confirmed that this improvement was statistically significant ($p < 0.001$), indicating that poster-

based nutrition education effectively enhanced students' understanding of breakfast.

The improvement in knowledge can be explained by the characteristics of poster media as an educational tool. Posters combine concise written information with attractive visual illustrations, making health messages easier to understand and remember, particularly among elementary school children whose learning process is highly dependent on visual stimuli. Educational interventions that employ age-appropriate visual materials have consistently been shown to improve nutrition knowledge and facilitate learning among children by increasing attention, comprehension, and memory retention. Furthermore, school-based nutrition education interventions that integrate engaging educational components are more likely to improve nutrition knowledge than conventional teaching methods.

The significant increase in breakfast knowledge observed in this study is consistent with previous evidence demonstrating that nutrition education is an effective strategy for improving children's understanding of healthy eating behaviors. A systematic review by Thakur and Mathur (2021) concluded that higher nutrition knowledge is positively associated with healthier dietary behaviors among children and adolescents, emphasizing the importance of educational interventions during the school years. Likewise, an umbrella review of school-based nutrition interventions reported that educational programs implemented in primary schools consistently improve nutrition knowledge and contribute to healthier eating practices.

Improved knowledge regarding breakfast is particularly important because breakfast plays a fundamental role in children's nutritional status and cognitive performance. Children who regularly consume breakfast generally have better daily micronutrient intake than breakfast skippers, contributing to improved health and learning capacity. A systematic review and meta-analysis also demonstrated that breakfast consumption is associated with higher intakes of calcium, iron, magnesium, zinc, potassium, iodine, and several vitamins, highlighting breakfast as an important contributor to dietary quality in children and adolescents.

The effectiveness of the intervention may also be attributed to the use of validated educational media. The poster developed for this study achieved an overall expert validation score of 93.9%, indicating excellent content quality, visual attractiveness, and language appropriateness. Educational materials that are scientifically accurate, visually engaging, and easy to understand are more likely to increase students' motivation and facilitate knowledge acquisition. The colorful illustrations and concise messages presented in the poster were appropriate for elementary school students, enabling them to understand key concepts related to breakfast more effectively.

Although this study demonstrated significant improvements in breakfast knowledge, knowledge acquisition alone does not necessarily result in sustained behavioral change. A systematic review of breakfast interventions reported that educational programs frequently increase knowledge and awareness; however, long-term improvements in breakfast consumption require additional behavioral strategies, family involvement, and supportive school environments. Therefore, future nutrition education programs should combine poster-based education with parental engagement, teacher reinforcement, and regular follow-up activities to encourage sustainable breakfast habits.

This study has several limitations. First, the one-group pretest-posttest design did not include a control group, making it difficult to completely exclude the influence of external factors on knowledge improvement. Second, the study evaluated only short-term changes in knowledge one week after the intervention and did not assess whether the increased knowledge translated into

actual breakfast behavior. Third, the participants were recruited from a single elementary school, which may limit the generalizability of the findings. Future studies should employ randomized controlled trial designs, include larger and more diverse populations, and evaluate long-term behavioral outcomes to provide stronger evidence regarding the effectiveness of poster-based nutrition education.

The findings of the present study are consistent with previous studies conducted in Indonesia. Muzakir et al. (2021) reported that nutrition counseling using poster media significantly improved students' knowledge regarding the importance of breakfast among junior high school students in Bener Meriah Regency, Aceh. The authors concluded that posters are an effective educational medium because they present concise messages supported by attractive visual illustrations, thereby facilitating students' understanding and retention of nutrition information. These findings support the present study, in which poster-based nutrition education significantly increased breakfast knowledge among elementary school students.

Similarly, Indriasari et al. (2021) demonstrated that a school-based nutrition education program implemented among Indonesian adolescents significantly improved breakfast-related knowledge, attitudes, self-efficacy, and breakfast behaviors. Their study suggested that continuous nutrition education delivered through engaging educational strategies can positively influence students' health-related behaviors. Although the present study focused only on knowledge outcomes and employed poster media as the primary educational tool, the findings reinforce the importance of integrating nutrition education into school-based health promotion programs to establish healthy breakfast habits from an early age.

Conclusion

This study demonstrated that poster-based nutrition education significantly improved breakfast knowledge among fourth-grade students at SDN 2 Aceh Besar. The findings indicate that poster media are an effective, practical, and low-cost educational tool for enhancing children's understanding of the importance of breakfast in elementary school settings. Given their visual appeal and ease of implementation, posters can serve as valuable learning resources to support school-based nutrition education programs. The results also highlight the importance of collaboration between schools and families in promoting healthy breakfast habits. Schools are encouraged to integrate nutrition education into regular health promotion activities, while parents should reinforce healthy breakfast practices at home to strengthen the knowledge gained through school-based interventions. Although this study demonstrated significant improvements in students' knowledge, further research is recommended to evaluate whether these knowledge gains lead to sustained changes in breakfast behavior. Future studies should employ randomized controlled designs, include larger and more diverse populations, and assess the long-term effectiveness of poster-based nutrition education on dietary practices and nutritional outcomes.

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