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Effect of Healthy Lifestyle and Balanced Nutrition Education on Knowledge Among Junior High School Students: A One-Group Pretest-Posttest Study

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Abstrac: This study aimed to determine the effect of healthy lifestyle and balanced diet education on improving students' knowledge at SMPN 4 Belawang, Barito Kuala Regency. This research employed a quantitative pre-experimental method using a one-group pretest-posttest design. The population consisted of all students at SMPN 4 Belawang, and 55 students were selected using total sampling. Data were collected using a validated knowledge questionnaire administered before and after the educational intervention. Data analysis was performed using descriptive statistics and the Paired Sample t-test. The results showed that the mean knowledge score increased from 58.70 before the intervention to 87.18 after the intervention, with a significant difference ($p = 0.000$). The findings indicate that healthy lifestyle and balanced diet education effectively improves students' knowledge. Therefore, school-based health education programs are recommended to promote healthy behaviors among adolescents.

Keyword: Balanced Diet, Health Education, Healthy Lifestyle, Knowledge

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INTRODUCTION

Adolescence is a critical stage of human development characterized by rapid physical, psychological, and social changes. During this period, nutritional requirements increase substantially to support growth, cognitive development, and physical activity. Therefore, adopting a healthy lifestyle and balanced dietary pattern is essential to promote optimal health and prevent both communicable and non-communicable diseases in later life. A healthy lifestyle includes consuming balanced nutrition, engaging in regular physical activity, maintaining personal hygiene, obtaining adequate sleep, and avoiding unhealthy behaviors. Globally, unhealthy dietary habits and physical inactivity remain major public health concerns among adolescents. Reported that unhealthy diets and sedentary lifestyles contribute significantly to overweight, obesity, diabetes mellitus, cardiovascular diseases, and other non-communicable diseases. Healthy eating habits established during adolescence often continue into adulthood, making nutrition education an important preventive strategy (World Health Organization, 2023, 2024).

In Indonesia, adolescent nutrition remains a significant public health concern. The National Basic Health Research (Riskesdas) indicates that the prevalence of overweight and obesity among adolescents has increased, while fruit and vegetable consumption remains below recommended levels. Furthermore, implementation of balanced nutrition guidelines among adolescents remains relatively low, highlighting the need for ongoing nutrition education (Kementerian Kesehatan Republik Indonesia, 2018, 2020).

Previous studies have demonstrated that health education effectively improves adolescents' nutritional knowledge. Chandra and Agustina (2021) found that health promotion using booklet and video media significantly improved adolescents' knowledge of balanced nutrition. Likewise, Hidayah et al. (2021) reported that nutrition education significantly increased students' knowledge and attitudes toward balanced nutrition. Similarly, Indriasari et al. (2021) showed that school-based nutrition education positively influenced breakfast behavior and healthy eating practices among Indonesian adolescents.

Health education in schools plays an important role in improving students' knowledge, motivation, and healthy lifestyle behaviors. The school environment provides a strategic setting for promoting healthy habits during adolescence through various educational activities. A study conducted by Mashur et al. (2023) found that students demonstrated a high level of motivation to participate in physical education, sports, and health learning activities, indicating that school-based education has considerable potential to enhance students' health awareness and promote healthy behaviors. Furthermore, Ansyari et al. (2024) reported that the implementation of structured and appropriate instructional methods significantly improved students' learning outcomes. These findings suggest that well-designed educational interventions are effective not only in enhancing students' practical skills but also in increasing their health-related knowledge. Therefore, education on healthy lifestyles and balanced nutrition should be implemented as an essential component of school-based health promotion programs. However, studies examining the effect of healthy lifestyle and balanced nutrition education on students' knowledge, particularly among junior high school students at SMPN 4 Belawang, Barito Kuala Regency, remain limited. Therefore, this study aims to investigate the effect of healthy lifestyle and balanced nutrition education on improving students' knowledge, providing evidence to support the development of effective school health education programs.

The importance of school-based nutrition education is also supported by international evidence. Baltag et al. (2022) emphasized that schools play a strategic role in improving adolescent nutrition because they provide an appropriate environment for developing lifelong healthy behaviors. In addition, O'Brien et al. (2021) concluded that school-based nutrition interventions significantly improve nutrition knowledge, healthy eating behavior, and dietary practices among children and adolescents. Likewise, Rah et al. (2021) stated that Indonesian adolescents continue to experience the triple burden of malnutrition, including undernutrition, micronutrient deficiencies, and overweight, highlighting the urgent need for nutrition education.

The findings of this study are supported by several behavioral theories. According to Green and Kreuter (2015), knowledge is one of the predisposing factors influencing health

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behavior. Furthermore, the Theory of Planned Behavior proposed by Ajzen (2020) explains that increased knowledge strengthens beliefs, attitudes, and behavioral intentions toward healthy lifestyles. Similarly, the Health Belief Model developed by Rosenstock (2014) states that individuals are more likely to adopt healthy behaviors when they perceive the benefits of preventive actions and understand the health risks associated with unhealthy behaviors.

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Preliminary observations conducted at SMPN 4 Belawang, Barito Kuala Regency, revealed that many students frequently skipped breakfast, consumed unhealthy snacks, and engaged in insufficient physical activity. In addition, structured health education programs regarding healthy lifestyles and balanced nutrition had not yet been systematically implemented. These conditions indicate that students' knowledge regarding healthy lifestyle practices and balanced nutrition remains inadequate and requires educational intervention.

Although previous studies have demonstrated that health and nutrition education effectively improve adolescents' knowledge and healthy behaviors, most studies have focused on balanced nutrition education or specific educational media, such as booklets and videos (Chandra & Agustina, 2021; Hidayah et al., 2021; Indriasari et al., 2021). Furthermore, limited studies have evaluated an integrated educational intervention combining healthy lifestyle and balanced nutrition education among junior high school students, particularly in rural school settings such as Barito Kuala Regency. Consequently, empirical evidence regarding the effectiveness of this integrated educational approach remains limited, indicating the need for further investigation.

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The novelty of this study lies in the implementation of an integrated healthy lifestyle and balanced nutrition education program among junior high school students using a one-group pretest–posttest design in a rural school setting. Unlike previous studies that mainly focused on nutrition education alone or specific educational media, this study integrates healthy lifestyle and balanced nutrition into a comprehensive school-based educational intervention and evaluates its effect on students' knowledge.

Therefore, this study aimed to determine the effect of healthy lifestyle and balanced nutrition education on students' knowledge at SMPN 4 Belawang, Barito Kuala Regency. The findings are expected to contribute to the development of evidence-based school health promotion programs that improve adolescents' knowledge and encourage healthier lifestyle behaviors. Based on the existing literature and theoretical framework, this study hypothesized that healthy lifestyle and balanced nutrition education would significantly improve students' knowledge among junior high school students at SMPN 4 Belawang, Barito Kuala Regency.

METHOD

Research Design

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This study employed a quantitative approach using a pre-experimental method with a one-group pretest–posttest design. This design was used to determine the effect of healthy lifestyle and balanced nutrition education on students' knowledge by comparing knowledge scores before and after the educational intervention (Sugiyono, 2019; Creswell, 2018).

Participants

The study was conducted at SMPN 4 Belawang, Barito Kuala Regency, South Kalimantan, Indonesia. The population consisted of 55 students participating in extracurricular activities. Because the population was relatively small, all eligible students were included using purposive sampling. The inclusion criteria were students aged 12–14 years, actively enrolled in school, willing to participate in the study, and had not previously received structured education regarding healthy lifestyles and balanced nutrition. Therefore, the final sample comprised 55 students.

Research Instrument

Data were collected using a structured knowledge questionnaire consisting of 34 multiple-choice questions covering healthy lifestyle practices and balanced nutrition. The questionnaire included questions on the principles of balanced nutrition, healthy eating habits, physical activity, personal hygiene, adequate rest, and disease prevention. Each correct answer

was scored 1, while an incorrect answer was scored 0, resulting in a total score ranging from 0 to 34, with higher scores indicating better knowledge.

Before data collection, the questionnaire was reviewed by experts in health promotion and nutrition to establish its content validity. The instrument was subsequently pilot-tested on 30 students from SMPN 2 Alalak. The item validity test indicated that all 34 questionnaire items were valid, with item validity coefficients (r-count) ranging from 0.459 to 0.649, exceeding the critical value of $r\text{-table} = 0.361$. Therefore, all questionnaire items were retained for use in the study. The reliability of the questionnaire was assessed using Cronbach's Alpha, yielding a coefficient of 0.914, indicating excellent internal consistency. Thus, the questionnaire was considered reliable for measuring students' knowledge regarding healthy lifestyles and balanced nutrition (Arikunto, 2020).

Research Procedure

The study was conducted over six meetings. During the first meeting, participants completed a pretest to assess their baseline knowledge regarding healthy lifestyles and balanced nutrition. The second to fifth meetings consisted of health education sessions delivered through interactive lectures, group discussions, question-and-answer activities, and educational media. The educational materials covered balanced nutrition, healthy eating habits, regular physical activity, personal hygiene, adequate sleep, and disease prevention. The educational content was developed based on the Indonesian Balanced Nutrition Guidelines issued by the Ministry of Health of the Republic of Indonesia and the recommendations of the World Health Organization. During the sixth meeting, participants completed the posttest using the same questionnaire to evaluate changes in knowledge following the educational intervention.

Data Analysis

Descriptive statistics were used to summarize respondents' characteristics and knowledge scores, including frequencies, percentages, means, standard deviations, minimum scores, and maximum scores. Before hypothesis testing, the normality of the pretest and posttest scores was assessed using the Shapiro-Wilk test, which is appropriate for sample sizes of fewer than 100 participants. Data were considered normally distributed when the significance value was greater than 0.05. Because the data met the assumption of normality, differences between the pretest and posttest scores were analyzed using a paired-samples t-test at a significance level of 0.05. A $p\text{-value} < 0.05$ indicated a statistically significant difference between students' knowledge before and after the educational intervention. All statistical analyses were performed using IBM SPSS Statistics version 29 (Sugiyono, 2019).

RESULT

Table 1. Characteristics of the Respondents

Characteristics	n	%
Male	30	54.5
Female	25	45.5
Age (years)		
12	15	27.3
13	22	40.0
14	18	32.7

The study involved 55 students from SMPN 4 Belawang. Male students represented 54.5% of the participants, while female students accounted for 45.5%. Most respondents were 13 years old (40.0%), followed by 14 years (32.7%) and 12 years (27.3%).

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Table 2. Distribution of Knowledge Levels Before and after the Educational Intervention

Knowledge Level	Pretest n (%)	Posttest n (%)
Good	7 (12.7)	45 (81.8)
Moderate	19 (34.5)	10 (18.2)
Poor	29 (52.8)	0 (0.0)
Total	55 (100)	55 (100)

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Before the intervention, more than half of the students had poor knowledge regarding healthy lifestyles and balanced nutrition (52.8%). After the educational intervention, the proportion of students with good knowledge increased substantially to 81.8%, whereas no students remained in the poor knowledge category. These findings indicate a marked improvement in students' knowledge following the intervention.

Table 3. Descriptive Statistics of Pretest and Posttest Scores

Variable	n	Minimum	Maximum	Mean $\pm$ SD
Pretest	55	50.00	64.71	58.70 $\pm$ 4.39*
Posttest	55	76.47	97.06	87.18 $\pm$ 5.18*

The mean pretest score was 58.70, ranging from 50.00 to 64.71. Following the educational intervention, the mean posttest score increased to 87.18, with scores ranging from 76.47 to 97.06. The average knowledge score increased by 28.48 points, indicating substantial improvement after the intervention.

Table 4. Results of the Kolmogorov–Smirnov Normality Test

Variable	Test	Statistic	p-value	Interpretation
Pretest	Kolmogorov–Smirnov	0.111	0.086	Normal
Posttest	Kolmogorov–Smirnov	0.108	0.094*	Normal

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The Kolmogorov–Smirnov test showed that both the pretest and posttest scores were normally distributed ($p > 0.05$). Therefore, the assumption of normality was met, allowing the use of the paired sample *t*-test to evaluate the effectiveness of the educational intervention.

Table 5. Results of the Paired Sample *t*-test

Comparison	Mean Difference	95% CI	t	df	p-value
Pretest vs. Posttest	-28.40	-29.59 to -27.21*	-47.93	54	<0.001

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The paired sample *t*-test demonstrated a statistically significant difference between the pretest and posttest scores ($t = -47.93$, $df = 54$, $p < 0.001$). The mean difference of -28.40 indicates that students achieved significantly higher knowledge scores after receiving education on healthy lifestyles and balanced nutrition. Thus, the educational intervention was effective in improving students' knowledge.

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DISCUSSION

The present study demonstrated that students' knowledge regarding healthy lifestyles and balanced nutrition was relatively low before the educational intervention. The pretest mean score was 58.70, with more than half of the participants (52.8%) categorized as having poor knowledge. These findings indicate that many junior high school students had limited understanding of balanced nutrition, regular physical activity, adequate rest, and other healthy lifestyle practices. This condition is consistent with the Riskesdas 2018 report, which showed that Indonesian adolescents continue to experience unhealthy dietary habits and inadequate consumption of fruits and vegetables (Kementerian Kesehatan Republik Indonesia, 2018). Similarly, the World Health Organization (2023) reported that unhealthy dietary behaviors and physical inactivity remain important public health concerns among adolescents worldwide.

According to Notoatmodjo (2018), knowledge is the result of an individual's sensory process and serves as the basis for developing health-related attitudes and behaviors. Students

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with limited health knowledge are less likely to make appropriate decisions regarding healthy eating and lifestyle practices. This finding is also consistent with the Health Belief Model, which explains that individuals are more likely to adopt healthy behaviors when they understand the benefits of those behaviors and recognize the health risks associated with unhealthy practices (Rosenstock, 2014). Therefore, insufficient knowledge before the intervention may reduce adolescents' motivation to practice healthy behaviors.

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Following the educational intervention, students' knowledge increased substantially. The mean posttest score increased to 87.18, and 81.8% of participants were classified as having good knowledge, while no students remained in the poor knowledge category. These findings suggest that health education effectively improved students' understanding of healthy lifestyles and balanced nutrition. The improvement may be attributed to the structured educational sessions, which provided practical information regarding balanced nutrition, physical activity, personal hygiene, healthy daily habits, and disease prevention.

The effectiveness of the educational intervention may also be explained by the interactive learning approach implemented throughout the program. The combination of lectures, group discussions, question-and-answer sessions, and educational media encouraged students to actively participate in the learning process rather than passively receiving information. Active learning promotes greater cognitive engagement, improves knowledge retention, and enables students to relate health information to their daily experiences. Furthermore, presenting practical examples of healthy eating habits, regular physical activity, adequate sleep, and personal hygiene helped students better understand how healthy lifestyle practices can be applied in everyday life. These findings are consistent with Bavishi et al. (2022), who reported that active learning strategies significantly improve students' engagement, understanding, and retention of health-related knowledge.

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The findings support the concept proposed by Green and Kreuter (2015), who stated that knowledge is one of the predisposing factors influencing health behavior. Increasing knowledge through educational interventions is expected to encourage healthier behavioral choices. Furthermore, the Theory of Planned Behavior suggests that increased knowledge strengthens behavioral beliefs, which subsequently influence attitudes, intentions, and eventually health-related behaviors (Ajzen, 2020). Although this study only measured knowledge outcomes, the improvement observed after the intervention may contribute to healthier behavioral intentions among students.

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The effectiveness of the educational intervention was further confirmed by the inferential analysis. The paired-samples t-test revealed a statistically significant difference between pretest and posttest scores ($p < 0.001$), indicating that the intervention successfully improved students' knowledge. The average score increased by 28.48 points, demonstrating a meaningful educational effect. These results are consistent with previous studies showing that nutrition and health education significantly improve adolescents' knowledge. Chandra and Agustina (2021) reported that health promotion using booklet and video media significantly increased adolescents' knowledge regarding balanced nutrition. Likewise, Hidayah et al. (2021) found that nutrition education significantly improved students' knowledge and attitudes toward balanced nutrition. In addition, Indriasari et al. (2021) demonstrated that school-based nutrition education effectively improved healthy eating behaviors among Indonesian adolescents.

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From a practical perspective, the findings suggest that healthy lifestyle and balanced nutrition education can be integrated into school health promotion programs, extracurricular activities, and routine health campaigns. Schools provide an appropriate environment for implementing sustainable health education because students spend a considerable amount of time in school and are influenced by teachers, peers, and the school environment. Collaboration among teachers, school administrators, health professionals, and parents is essential to reinforce healthy lifestyle messages delivered during educational sessions. This finding is supported by Dodd et al. (2022), who concluded that school-based health education interventions effectively improve students' health knowledge and promote healthier behaviors when implemented consistently.

Overall, this study confirms that structured health education is an effective strategy for improving knowledge related to healthy lifestyles and balanced nutrition among junior high school students. Integrating regular nutrition and healthy lifestyle education into school health programs may contribute to better health literacy and encourage the adoption of healthier behaviors during adolescence, thereby supporting long-term health outcomes (World Health Organization, 2023).

Despite these encouraging findings, this study has several limitations. First, the use of a one-group pretest–posttest design without a control group limits the ability to conclude that the observed improvement was solely attributable to the educational intervention because external factors may also have influenced the results. Second, the relatively small sample size and the inclusion of participants from only one junior high school limit the generalizability of the findings to broader populations. Third, this study assessed only students' knowledge immediately after the intervention and did not evaluate long-term knowledge retention or actual changes in healthy lifestyle behaviors. Therefore, the findings should be interpreted with these limitations in mind.

Future studies should employ more rigorous research designs, such as randomized controlled trials or quasi-experimental studies involving comparison groups, to provide stronger evidence regarding the effectiveness of healthy lifestyle and balanced nutrition education. Future research is also recommended to involve larger and more diverse samples from different schools and regions, conduct long-term follow-up assessments, and evaluate whether improvements in knowledge lead to sustained changes in healthy eating habits, physical activity, and other health-related behaviors. These recommendations are consistent with Flores-Vázquez et al. (2024), who emphasized the importance of using stronger research designs and long-term evaluation to determine the effectiveness of school-based nutrition education programs.

CONCLUSION

This study demonstrates that healthy lifestyle and balanced nutrition education is effective in improving junior high school students' knowledge regarding healthy lifestyle practices and balanced nutrition. The findings provide empirical evidence that structured school-based health education can enhance students' understanding of essential health concepts, thereby supporting the development of health literacy during adolescence. This study contributes to the existing literature by demonstrating the effectiveness of an integrated healthy lifestyle and balanced nutrition education program implemented among junior high school students in a rural school setting. The findings also highlight the importance of incorporating healthy lifestyle and balanced nutrition education into school health promotion programs through collaboration among teachers, school administrators, parents, and health professionals. Such collaboration may facilitate the development of sustainable health education initiatives that encourage healthier lifestyle practices among adolescents.

Nevertheless, the findings should be interpreted in light of several limitations, including the use of a one-group pretest–posttest design without a control group, the relatively small sample size, and the inclusion of participants from only one school, which may limit the generalizability of the results. Therefore, future studies are recommended to employ more rigorous experimental designs involving larger and more diverse samples, as well as to evaluate long-term changes in students' attitudes and health-related behaviors in addition to knowledge.

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