Bioedunis Journal
ps://jurnal.uinsyahada.ac.id/index.php/Bioedunisi
Vol. 04 No. 01 Juni 2025

E-ISSN : 2829-7601

The Relationship Between Breakfast Habits and Learning Concentration Among Students at SMP Negeri 9 Padangsidimpuan

Nurhanifah Siregar[1*], Lena Juliana Harahap[2]
Public Health, STIKes Darmais Padangsidimpuan, Indonesia
Public Health, STIKes Darmais Padangsidimpuan, Indonesia

nurhanifah@stikesdarmaispadangsidimpuan.ac.id

Abstract

Breakfast habits play a crucial role in supporting students' cognitive function and learning concentration. This study aims to determine the relationship between breakfast habits and the level of learning concentration among students at SMP Negeri 9 Padangsidimpuan. The research employed a descriptive quantitative design with a cross-sectional approach. The sample consisted of 52 students selected through total sampling. Data were collected using questionnaires and analyzed using the chi-square test. The results showed that most students who regularly had breakfast demonstrated good learning concentration, while those who skipped breakfast tended to have decreased concentration. A significant relationship was found between breakfast habits and students' learning concentration ($p = 0.003$). These findings confirm that breakfast not only affects physical health but also supports brain function in learning processes. Promotive interventions through nutrition education in schools are essential to foster healthy eating habits among school-aged children.

Keywords: Breakfast habits, learning concentration, student health, junior high school students

INTRODUCTION

Health is a fundamental factor in supporting students' academic achievement. At the early adolescent stage, such as in junior high school (SMP), nutritional and energy needs play a crucial role in physical growth, cognitive development, and emotional stability. One often-overlooked yet significant factor influencing learning concentration is breakfast. Breakfast provides the body's initial intake of energy after a night's fast and serves as the main fuel for learning activities that require sustained mental effort.

Biologically, the brain is a metabolically active organ that demands a constant supply of glucose to maintain optimal cognitive function. Although it comprises only about 2% of total body weight, the brain consumes over 20% of the body's basal energy, predominantly used by the prefrontal cortex—responsible for attention, focus, and working memory. Because the brain cannot store large amounts of glucose, insufficient intake in the morning—such as

from skipping breakfast—can impair concentration, memory, and learning performance (Mergenthaler et al., 2021).

When blood glucose levels drop, neural transmission becomes less efficient, resulting in decreased concentration, mental fatigue, and reduced motivation. A study by Kawabata et al. (2021) demonstrated that students who consumed breakfast rich in complex carbohydrates and protein performed significantly better in tasks measuring attention and cognitive processing compared to those who skipped breakfast.

In addition to glucose, other nutrients such as amino acids and micronutrients are vital for the synthesis of neurotransmitters like dopamine, serotonin, and acetylcholine. These neurotransmitters regulate mood, alertness, and academic motivation. Research by Cereceda-Balic et al. (2021) found that adolescents who consumed nutritionally balanced breakfasts displayed better memory and attention during cognitive tasks compared to those who skipped or had nutritionally poor breakfasts.

Findings from the Total Diet Survey (2020–2023) reported that 47.7% of Indonesian children aged 6–12 failed to meet the minimum energy requirements at breakfast, while 66.8% had poor nutritional quality in their breakfast (Ministry of Health RI, 2023). These statistics highlight the lack of adequate energy supply in the morning for cognitive tasks among a majority of school-age children.

Moreover, data from the 2023 GENIUS Program (National Food Agency, 2023) showed that approximately 47.1% of schoolchildren in Indonesia either do not eat breakfast or do so infrequently. This indicates a persistent problem in breakfast habits, which, if left unaddressed, may have long-term consequences for both physical and cognitive development. A healthy breakfast should not only contain complex carbohydrates as a primary energy source but also proteins, healthy fats, and essential micronutrients such as iron and B-complex vitamins. Iron, in particular, plays a vital role in the synthesis of hemoglobin, which transports oxygen to the brain. Iron deficiency can lead to reduced oxygen delivery to neural tissue, resulting in mental fatigue and decreased concentration (Firdaus et al., 2024).

A study by Firdaus, Mahmudah, Rahmat, and Pusparini (2024) in Bandung found that students who regularly consumed breakfast with adequate iron intake had significantly better learning concentration than those who skipped breakfast or had insufficient iron intake. These findings reinforce the importance of breakfast quality in supporting students' cognitive readiness.

Malnutrition, in both undernutrition and overnutrition, remains a pressing issue in Indonesia. The 2023 Indonesia Health Survey (SKI) reported that 3.5% of school-aged children

were severely underweight, 7.5% underweight, 11.9% overweight, and 7.8% obese. In North Sumatra, including Padangsidimpuan, the prevalence of dual nutritional problems is evident, affecting both physical and mental growth among schoolchildren.

In certain regions like North Sulawesi, childhood obesity reached 9.1%, while severe underweight cases were at 2.3% (SKI, 2023). These findings emphasize the urgent need for early nutritional education and behavioral interventions, including instilling the habit of consuming balanced breakfasts among students.

At SMP Negeri 9 Padangsidimpuan, many students reportedly come to school without having breakfast, often due to cultural habits, limited household income, or lack of parental awareness. These local observations are consistent with national data and require specific investigation to determine their impact on learning concentration.

According to Amalia et al. (2024) and Harena (2024), there is a strong correlation between regular breakfast habits and improved academic performance in elementary and junior high school students in Indonesia. Students who regularly eat breakfast demonstrate better material comprehension and classroom engagement compared to those who do not.

Biologically, the morning is a critical period for metabolic activity, making breakfast an essential source of fuel for brain function. Skipping breakfast increases cortisol levels and reduces emotional stability, negatively affecting learning readiness (Schmidt et al., 2021). Moreover, poor dietary choices in the morning—such as high-sugar, low-nutrient foods—may cause rapid glucose spikes followed by crashes, impairing attention and memory.

From a public health perspective, breakfast is a cost-effective and accessible nutritional intervention. Schools should play a proactive role by incorporating breakfast education into health curricula, facilitating parent awareness sessions, and promoting healthy canteen initiatives to encourage positive eating habits.

Given the aforementioned considerations, this study aims to examine the relationship between breakfast habits and learning concentration among students at SMP Negeri 9 Padangsidimpuan. The findings are expected to contribute to public health strategies focused on promotive and preventive nutritional interventions, especially for school-aged populations.

RESEARCH METHODS

This study employed a descriptive-analytic quantitative method with a cross-sectional approach, aimed at determining the relationship between breakfast habits and students' learning concentration. The research activities included problem identification, instrument development, data collection, and data analysis.

The study was conducted at SMP Negeri 9 Padangsidimpuan using purposive sampling among eighth-grade students, based on three indicators: students with high, moderate, and low academic abilities. A total of 52 students were proportionally selected from all eighth-grade classes.

The instruments used included a closed-ended questionnaire on breakfast habits and a concentration test sheet using a symbol-digit matching task under a time constraint. Prior to data collection, the researcher obtained permission and provided information to the school and students. Participation was voluntary, and informed consent forms were completed by the participants.

The data in this study were analyzed using univariate analysis to describe respondent characteristics and bivariate analysis to examine the relationship between breakfast habits and students' concentration levels. The bivariate analysis employed the Chi-Square test. All research procedures were conducted in accordance with research ethics, including maintaining the confidentiality of respondents' identities and obtaining voluntary informed consent from students and school authorities.

RESULTS AND DISCUSSION

1. Student Breakfast Habits

Breakfast habits are a key aspect of this study as they provide essential energy for students' learning activities. The following table presents the distribution of breakfast habits among eighth-grade students at SMP Negeri 9 Padangsidimpuan.

Table 1. Percentage of Student Breakfast Habits

No	Tindakan	Frequency	Percentage (%)
1	Breakfast	36	69,2
2	Skipped Breakfast	16	30,8
	Total	**52**	**100,0**

Based on the table above, the majority of students who participated as respondents in this study were recorded as having the habit of eating breakfast before starting school activities, totaling 36 students (69.2%). In contrast, 16 students (30.8%) were not accustomed to eating breakfast.

2. Learning Concentration Levels

Learning concentration is an important indicator of students' readiness to receive academic materials. Concentration levels were classified into two categories—good and poor—based on the concentration test scores.

Table 2. Student Learning Concentration Levels

No	Good Concentration	Frequency	Percentage (%)
1	Good	32	61,5%
2	Poor	20	38,5%
Total		**52**	**100,0**

The table above shows that 32 students (61.5%) of the total respondents demonstrated a good level of learning concentration, while 20 students (38.5%) were categorized as having poor concentration. These findings indicate that although the majority of students possess good concentration, a considerable proportion still experiences difficulties in maintaining focus during learning activities.

3. The Relationship Between Breakfast Habits and Students' Learning Concentration

Breakfast habits are suspected to be associated with students' levels of learning concentration. The relationship between these two variables was analyzed using a statistical approach to obtain a more objective understanding of how morning eating patterns influence students' cognitive performance at school.

Table 3. The Relationship Between Breakfast Habits and Students' Learning Concentration

Action	Level of Learning Concentration				Total		p-value
	Good		Poor				
	N	%	N	%	N	%	
Breakfast	27	51,9%	9	17,3%	36	69,2%	0,003
Skipped Breakfast	5	9,6%	11	21,2%	16	30,8%	
Total	32	61,5%	20	38,5%	52	100%	

The data in the table shows the distribution of respondents based on their breakfast habits and level of learning concentration. Most students who regularly eat breakfast (36 students) demonstrated good concentration, with 27 students (51.9%) falling into this category, while 9 students (17.3%) showed poor concentration. In contrast, among the 16 students who skipped breakfast, only 5 students (9.6%) had good concentration, and the majority, 11 students (21.2%), had poor concentration.

The Chi-Square statistical test yielded a p-value of 0.003, which is below the significance level of 0.05. This indicates a significant relationship between breakfast habits and students' learning concentration. These findings support biological and health-based assumptions that morning energy intake, especially glucose, plays a crucial role in maintaining cognitive function and attention during learning activities.

DISCUSSION

Breakfast has a direct influence on brain function related to the learning process. One of the key indicators is learning concentration, which refers to a student's ability to focus and absorb instructional materials. Even brief interruptions in concentration can have long-term consequences on academic achievement. Therefore, students' morning dietary habits should be considered a critical factor in supporting their cognitive readiness for learning.

The results of this study showed a significant relationship between breakfast habits and students' learning concentration at SMP Negeri 9 Padangsidimpuan ($p = 0.003$). The majority of students who regularly ate breakfast (69.2%) demonstrated good learning concentration, while most students who skipped breakfast exhibited poor concentration. Breakfast plays a physiological role in maintaining stable blood glucose levels necessary to support neuronal activity in the brain, especially in the prefrontal cortex which governs decision-making, attention, and emotional regulation (Zhou et al., 2023).

Learning concentration is a higher-order cognitive function that is heavily influenced by daily nutritional status. A lack of energy and essential nutrients in the morning can impair information processing speed, reduce comprehension, and decrease students' learning motivation. Potier et al. (2021) found that low morning blood glucose levels were associated with reduced cognitive scores in primary and secondary school-aged children, further confirming the importance of adequate morning nutrient intake.

In this study, students who skipped breakfast were more likely to show lower levels of concentration. This finding aligns with research by Vereecken et al. (2020), which reported that children who do not eat breakfast are twice as likely to experience attention difficulties

and hyperactivity. They also tend to feel more fatigued and unable to maintain focus throughout lessons, affecting their academic performance and classroom behavior.

In addition to glucose, the quality of breakfast also affects neurotransmitter function in the brain. Micronutrients such as iron and zinc are critical for enzymatic activity and the production of neurotransmitters like dopamine and serotonin. Deficiencies in these nutrients can disrupt neural pathways responsible for attention and behavioral regulation (Kemenkes RI, 2023). This reinforces the importance of not only consuming breakfast but ensuring its nutritional adequacy.

This is consistent with data from the 2020–2023 Total Diet Survey (SDT), which showed that 47.7% of children aged 6–12 did not meet their minimum energy needs during breakfast, and 66.8% of their breakfast quality was classified as poor (Kementerian Kesehatan RI, 2023). These figures suggest that the majority of Indonesian children start their day without sufficient nutritional support for optimal learning.

Furthermore, micronutrients in breakfast—such as iron, iodine, and B vitamins—are essential for neural metabolism and neurotransmitter synthesis (Supariasa, 2020). For instance, iron deficiency can lead to anemia, resulting in physical and mental fatigue, ultimately impairing students' ability to concentrate (Rosyidah et al., 2023).

Breakfast also positively influences students' emotional state and mood. According to a 2023 CDC study, students who eat breakfast regularly are less likely to experience emotional disturbances and are more mentally and physically prepared to engage in classroom learning (Centers for Disease Control and Prevention, 2023).

One of the strategies that can be implemented is integrating breakfast promotion into School Health Programs (UKS). Activities such as healthy breakfast competitions, group breakfast sessions, and parent education can be effective steps in raising awareness about the importance of breakfast in supporting children's learning processes.

Biochemically, glucose is the brain's primary energy substrate. A deficiency in glucose can impair the synthesis of neurotransmitters like acetylcholine and dopamine, both vital for memory and attention. Moreover, skipping breakfast can elevate cortisol levels, the stress

hormone that negatively affects the hippocampus—responsible for memory processing (Nguyen et al., 2022).

Overall, scientific and biological evidence strongly supports the role of a nutritious breakfast in enhancing cognitive functions. Policies that promote or facilitate access to healthy breakfasts are not merely nutritional interventions but are strategic investments in improving educational quality and human capital development.

CONCLUSION

Based on the results of the study, it can be concluded that there is a significant relationship between breakfast habits and students' learning concentration at SMP Negeri 9 Padangsidimpuan. Students who regularly eat breakfast tend to have better levels of learning concentration compared to those who skip breakfast. Breakfast plays a crucial role in supporting cognitive function by providing glucose as the primary energy source for the brain, particularly the prefrontal cortex, which is responsible for focus and attention. Therefore, breakfast is a healthy habit that should be instilled from an early age to support both academic performance and students' overall health.

REFERENCES

Amalia, R., Sari, N., & Hasibuan, D. (2024). Pengaruh sarapan terhadap prestasi akademik siswa di sekolah dasar. *Jurnal Gizi dan Pendidikan*, *12*(1), 22–30.

Badan Pangan Nasional. (2023). *Laporan Program GENIUS (Gerakan Nasional Edukasi Gizi dan Inovasi untuk Siswa)*. Jakarta: Badan Pangan Nasional Republik Indonesia.

Cereceda-Balic, F., Sánchez, M., & Díaz, E. (2021). The association between breakfast quality and cognitive performance in Chilean adolescents. *Nutrients, 13*(7), 2310. https://doi.org/10.3390/nu13072310

Firdaus, A., Mahmudah, L., Rahmat, A., & Pusparini, I. (2024). Pengaruh asupan zat besi terhadap konsentrasi belajar mahasiswa. *Jurnal Gizi dan Kesehatan Indonesia*, *14*(1), 12–20.

Harena, L., Simanjuntak, R., & Yusuf, H. (2024). Hubungan sarapan pagi dengan konsentrasi belajar siswa SMP di Indonesia. *Jurnal Ilmu Kesehatan Masyarakat*, *10*(2), 97–105.

Kawabata, M., Lee, K., Choo, H.-C., & Burns, S. F. (2021). Breakfast and exercise improve academic and cognitive performance in adolescents. *Nutrients, 13*(4), 1278. https://doi.org/10.3390/nu13041278

Kementerian Kesehatan RI. (2023). *Survei Diet Total (SDT) 2020–2023*. Jakarta: Badan Gizi Kemenkes RI.

Kemenkes RI. (2023). *Hasil Survei Kesehatan Indonesia Tahun 2023*. Jakarta: Kementerian Kesehatan Republik Indonesia.

Mergenthaler, P., Lindauer, U., Dienel, G. A., & Meisel, A. (2021). Sugar for the brain: The role of glucose in physiological and pathological brain function. *Trends in Neurosciences, 44*(6), 476–488. https://doi.org/10.1016/j.tins.2021.02.002

Nguyen, T., Kim, J. H., & Lee, S. (2022). *Effects of Breakfast Skipping on Cortisol Levels and Cognitive Function in Adolescents*. Nutrition & Health, 28(4), 239–247.

Potier, M., Amiri, M., & Moore, S. (2021). The impact of morning nutrition on cognitive performance in school-age children. *Current Developments in Nutrition, 5*(2), nzab012. https://doi.org/10.1093/cdn/nzab012

Putri, M. E., & Anasari, M. (2022). Hubungan sarapan pagi dengan konsentrasi belajar siswa sekolah dasar. *Jurnal Gizi dan Kesehatan, 10*(2), 135–142.

Rosyidah, F., Sari, P., & Wulandari, R. (2023). Sarapan pagi dan hubungannya dengan konsentrasi belajar siswa SMP. *Jurnal Kesehatan Masyarakat Indonesia, 18*(1), 55–64.

Saki, A., Khosravi-Boroujeni, H., & Esmaillzadeh, A. (2020). Breakfast skipping and cognitive function among Iranian children and adolescents. *European Journal of Clinical Nutrition, 74*, 1323–1330. https://doi.org/10.1038/s41430-020-0601-6

Schmidt, C. F., Loryman, B., & Keller, J. (2021). Circadian rhythm and morning meal timing: Their interaction in metabolism and brain function. *Chronobiology International, 38*(10), 1473–1481.

SKI. (2023). *Survei Kesehatan Indonesia Tahun 2023: Laporan Nasional*. Jakarta: Badan Kebijakan Pembangunan Kesehatan, Kemenkes RI.

Supariasa, I. D. N. (2020). *Penilaian status gizi*. Jakarta: EGC

Vereecken, C., Dupuy, M., Rasmussen, M., & Kelly, C. (2020). Breakfast consumption and its socio-demographic and lifestyle correlates in schoolchildren in 32 countries. *European Journal of Clinical Nutrition*, 74(1), 157–166. https://doi.org/10.1038/s41430-019-0509-0

Zhou, X., Zhang, Y., Chen, W., & Huang, R. (2023). Glucose Metabolism and Prefrontal Cortex Activation during Cognitive Tasks in Adolescents. Frontiers in Human Neuroscience, 17, 117905.