

Original Research Article

Descriptive study: anemia and concentration levels in elementary school students receiving free nutritional meals

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ABSTRACT

Background: Elementary school is a crucial period in a child's growth and development, both physically, cognitively, and psychosocially. During this phase, children are developing basic learning skills, which are greatly influenced by their health and nutritional status. Breakfast plays a strategic role in meeting a child's daily energy and nutrient needs. Morning food intake contributes to stable blood glucose levels, which the brain needs for cognitive functions such as attention and concentration. In addition to breakfast habits, anemia is still common among school-age children. Anemia, particularly iron deficiency anemia, can disrupt oxygen transport to body tissues, including the brain, potentially reducing children's concentration, physical endurance, and learning ability.

Methods: This was a descriptive study, with 82 students receiving MBG as respondents. Data collection was carried out 03 April 2025-03 September 2025. Active 5th grade elementary school students and who were able to read, willing to participate as research subjects and sign the informed consent were included. Statistics using descriptive methods. Statistical tests described the nutritional status, anemia, and concentration levels of the students.

Results: Students received MBG for three months. 35.4% were anemic and 64.6% were non-anemic. Meanwhile, concentration levels were categorized as poor (50%), and very good (2.4%).

Conclusions: The results of this study are expected to provide basic information for schools, health workers, and parents in designing promotive and preventive efforts to support children's health and learning abilities from an early age.

Keywords: Anemia, Breakfast, Concentration, Nutrition, Students

INTRODUCTION

Proper nutrition is a crucial factor in human resource development and crucial for the success of national development. Suboptimal nutritional status, whether undernutrition or overnutrition, can affect a child's physical and cognitive function. At elementary school age, nutritional status plays a role in supporting brain growth, the development of thinking skills, and a child's readiness to receive and process information during the learning process.

Learning concentration is one of the main cognitive aspects that determines the effectiveness of the learning process in elementary school students. Good concentration levels enable children to pay attention to lessons, understand the material, and follow teacher instructions optimally. Various internal factors, such as nutritional status, anemia status, and breakfast habits, are suspected to contribute to variations in concentration levels in elementary school students. However, a comprehensive overview of these conditions in elementary school students at the elementary school level is lacking. Local research is still limited.

Elementary school is a crucial period in a child's growth and development, both physically, cognitively, and psychosocially. During this phase, children are developing basic learning abilities, which are greatly influenced by their health and nutritional status.¹ Various nutritional problems in school-age children, such as irregular breakfast habits, suboptimal nutritional status, and anemia, remain public health challenges in many developing countries, including Indonesia.²

Breakfast plays a strategic role in meeting children's daily energy and nutrient needs.² Morning food intake contributes to stable blood glucose levels, which the brain needs for cognitive functions, such as attention and concentration. In addition to breakfast habits, anemia is still common among school-age children. Anemia, especially iron deficiency anemia, can disrupt oxygen transport to body tissues, including the brain, potentially reducing children's concentration, physical endurance, and learning ability.

Learning concentration is a key cognitive aspect that determines the effectiveness of the learning process in elementary school students.³ Good concentration levels enable children to pay attention to lessons, understand the material, and follow teacher instructions optimally. Various internal factors, such as anemia status and breakfast habits, are thought to contribute to variations in concentration levels in elementary school students.⁴ However, a comprehensive overview of these conditions in elementary school students at the local level is still limited.

This study aimed to provide an overview of breakfast habits, anemia status, and concentration levels in elementary school students. The results are expected to provide basic information for schools, health workers, and parents in designing promotive and preventive efforts to support children's health and learning abilities from an early age.

METHODS

This study used a descriptive design with a quantitative approach. Data collection was carried out on 03 April 2025 - 03 September 2025 in Kalibaru 01 Elementary School, North Jakarta. Tools used in study using a grid-based concentration instrument, and hemoglobin measuring device.

Criteria inclusion

Active 5th grade elementary school students and who are able to read, willing to participate as research subjects and sign the informed consent. The aim was to describe the characteristics of hemoglobin (Hb) levels, nutritional status, and concentration levels observed in the study subjects without intervention or causal analysis. The sample size for this study was 82 students. The sample size was determined using a sampling technique adapted

to the established inclusion and exclusion criteria. The respondents were active fifth-grade students who met the inclusion criteria. Variables included Hb levels, nutritional status, and concentration levels, measured using a grid concentration scale. The results are presented in a frequency distribution.

RESULTS

The study results showed that 29 students (35,4%) were anemic, while 53 students (64.6%) were not. Based on these results, most fifth-grade students are healthy, but some are anemic and potentially have other health problems.

Table 1: Demographic distribution frequency.

Socio demographics		N	%
Sex	Male	49	
	Female	33	
Hb	Anemia	29	35.4
	Not anemic	53	64.6
Nutritional Status	Normal	26	31.7
	Undernourished	43	52.4
	Overnourished	13	15.9
Tingkat Konsentrasi	Good	9	10.9
	Sufficient	18	22
	Deficient	55	67.1

DISCUSSION

Physiologically, hemoglobin plays a crucial role in transporting oxygen to all body tissues, including the brain. The impacts of anemia on adolescents and schoolchildren include: decreased productivity, stunted growth, increased susceptibility to infection, reduced fitness, and decreased enthusiasm for learning.⁵⁻⁸ Therefore, low Hb levels can impact cognitive function and concentration.^{9,10}

Looking at these results, most of the fifth grade students are in good health, but some are still anemic and have the potential for other health problems.⁵ Anemia can hinder a child's growth and development, resulting in serious long-term consequences because anemia disrupts oxygen supply throughout the body. Impaired oxygen supply leads to neurological problems and behavioral problems, such as impaired physical motor activity, social interaction, and concentration. This condition can result in children having lower IQ scores (10-15 points) and reduced learning ability compared to healthy or normal children.¹¹

Meanwhile, regarding concentration levels, the majority of students had poor concentration (67.1%), adequate concentration (22%), and good concentration (10.97%). In terms of concentration levels, the majority of students fell into the moderate category, followed by high and low categories. This indicates that the majority of students do

not yet have optimal concentration during the learning process, which in the literature is linked to health conditions and nutritional intake.⁶

Meanwhile, based on nutritional status, the majority of students fall into the normal nutritional category. However, there are still students with undernutrition and overnutrition. This distribution illustrates an imbalance in consumption patterns and nutritional intake among some respondents. The nutritional status of most of the respondents in the normal category indicates that students' nutritional needs are generally met. However, the presence of undernourished students indicates a possible energy and essential nutrient deficit, which can impact growth and development, including cognitive function.^{12,13} On the other hand, students with overnutrition also require attention because it can increase the risk of health problems that can occur.

This study has some limitations. Breakfast time that is quite close to the concentration test. The classroom was quite crowded and had an open layout, allowing students to see teachers and staff passing by; this environment made it difficult for students to maintain the concentration needed to complete the grid test within the short timeframe.

CONCLUSION

Research on students who received free nutritious meals (MBG) for three months revealed variations in hemoglobin levels, concentration levels, and nutritional status. This indicates that biological and nutritional factors still play a significant role in supporting students' cognitive function and learning abilities. Further attention is needed through promotive and preventive measures, in addition to increasing balanced nutritional intake, regular hemoglobin monitoring, and supporting a conducive learning environment.

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REFERENCES

1. Noviyanti RD, Kusudaryati DP. The relationship between breakfast habits and academic achievement among students at the Muhammadiyah Elementary School Special Program in Surakarta. *Profesi*

- (Profesional Islam): Media Publikasi Penelitian. 2018 Nov 9;16(1):72-7.
2. Apriani DG. The relationship between breakfast and learning concentration levels among 4th-6th grade students at State Elementary School 1 Tyinggading. *J Med Usada*. 2022;5(1):16-21.
3. Keats EC, Akseer N, Thurairajah P, Cousens S, Bhutta ZA, Huybregts L, et al. Multiple-micronutrient supplementation in pregnant adolescents in low- and middle-income countries : a systematic review and a meta-analysis of individual participant data. *Nutr Rev*. 2021;80(2):141-56
4. Nikalansooriya A, Waidyarathna GRNN, Kaththiriarachchi LS. Role of Nutrition in Cognitive Development and Academic Performance During Adolescence: A Comprehensive Review. *Cureus*. 2025;17(11):e96189.
5. Stevens GA, Finucane MM, De-Regil LM, Paciorek CJ, Flaxman SR, Branca F, et al. Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: a systematic analysis of population-representative data. *Lancet Glob Health*. 2013;1(1):e16-25.
6. Pada B, Kelas A, Ibtidaiyah M, Fajar N. 2024;11(2):287-92.
7. Setiawati OR. Differences in concentration levels and academic achievement between students attending and not attending academic tutoring at SMP Negeri 2 Bandar Lampung in 2015. *J Med Malah*. 2015;2(1):53-8.
8. The relationship between anemia and concentration and academic achievement among adolescent girls. *SIMFISIS J Kebidanan Indonesia*. 2024;3(4).
9. World Health Organization. Guideline on the prevention and management of anemia. Geneva: WHO; 2023.
10. Suchdev PS, Williams AM, Mei Z, Flores-Ayala R, Pasricha SR, Rogers LM, et al. Assessment of iron status in settings of inflammation: challenges and potential approaches. *Am J Clin Nutr*. 2017;106(suppl_6):1626S-33S.
11. Hermawan D, Apriyana K. The relationship between anemia and the learning achievement of elementary school children at Sdn 3 Segalamider, Bandar Lampung City. *Malahayati Nurs J*. 2020;2(2):383-92.
12. Ministry of Health of the Republic of Indonesia. Indonesia Health Profile 2022. Jakarta: Ministry of Health of the Republic of Indonesia. 2022.
13. UNICEF. Child Nutrition Report 2023. New York: UNICEF. 2023.

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