JURNAL ILMU DAN TEKNOLOGI KESEHATAN
Vol 11, No 2, Maret 2024,
ISSN: 2338-9095 (Print)
ISSN: 2338-9109 (online)

The Relationship of Breakfast and Nutritional Status of High School Students in Palembang City

Afriyana Siregar[1]*, Yuli Hartati[1], Imelda Telisa[1], Arie Krisnasary[2]
[1] Jurusan Gizi, Poltekkes Kemenkes Palembang, Indonesia
[2] Jurusan Gizi, Poltekkes Kemenkes Bengkulu, Indonesia
**email:* afriyana@poltekkespalembang.ac.id

Article history
Posted, Okt 10th, 2023
Reviewed, Feb 24th, 2024
Received, March 13th, 2024

ABSTRACT
This study was conducted in Palembang from June to August 2023, using descriptive analysis methods and a cross-sectional design. The research subjects were high school students from 3 schools, selected using a simple random sampling technique with a sample size of 50 students. Data about breakfast patterns in the form of breakfast habits, energy intake, and breakfast macronutrients were collected using questionnaires and 3 x 24-hour recall forms. Nutritional status was measured by measuring body weight and height to find nutritional status based on BMI/U and categorized based on the Minister of Health's Regulation on Children's Anthropometric Standards 2020. Data were analyzed using the chi-square statistical test. The research results showed that almost half of the students' breakfast energy intake was in the normal category (48%). Nearly half of the students' breakfast protein intake was in the more category (42%). Almost half of the students' breakfast fat intake was in the normal category (48%). Most students' breakfast carbohydrate intake was deficient (52%), and most students' nutritional status was normal (60%). A relationship exists between energy and fat intake at breakfast and students' nutritional status. Although protein and carbohydrate intake varies, this research provides critical insight into the factors that influence the well-being of high school students. Suggestions from this research can be used as a reference for developing more efficient nutrition intervention programs in schools to improve the health and welfare of adolescent students.
***Keywords**: Breakfast, Senior High School students, Nutritional status*

ABSTRAK
Studi ini dilaksanakan di Palembang pada bulan Juni sampai Agustus 2023, melalui metode analisis deskriptif dan rancangan *cross-sectional.* Subjek penelitian adalah pelajar SMA yang berasal dari 3 sekolah, yang dipilih dengan teknik *simple random sampling* dengan jumlah sampel sebanyak 50 siswa. Data tentang pola sarapan berupa kebiasaan sarapan dan asupan energi dan zat gizi makro sarapan yang dikumpulkan dengan kuesioner dan *form recall* 3 x 24 jam. Status gizi diukur dengan pengukuran berat badan dan tinggi badan untuk mencari status gizi berdasarkan IMT/U dan dikategorikan berdasarkan Peraturan Menteri Kesehatan tentang Standar antropometri anak tahun 2020. Data dianalisa mengunakan uji chi square. Hasil penelitian menunjukkan hampir sebagian asupan energi sarapan siswa pada kategori normal (48%). Hampir sebagian asupan protein sarapan siswa pada kategori lebih (42%). Hampir sebagian asupan lemak

DOI: 10.32668/jitek.v11i2.1442

sarapan siswa pada kategori normal (48%). Sebagian besar asupan karbohidrat sarapan siswa pada kategori kurang (52%) dan sebagian besar status gizi siswa normal (60%). Ada hubungan antara asupan energi dan lemak sarapan dengan status gizi siswa. Walaupun asupan protein dan karbohidrat bervariasi, penelitian ini memberikan pemahaman penting mengenai faktor-faktor yang berpengaruh terhadap kesejahteraan pelajar SMA. Saran dari penelitian ini dapat dijadikan acuan untuk menyusun program intervensi gizi yang lebih efisien di sekolah, dengan tujuan meningkatkan kesehatan dan kesejahteraan pelajar remaja.

Kata Kunci: Sarapan, Status Gizi, Siswa SMA

INTRODUCTION

Breakfast is important for students who want to do various activities. This is because the brain and red blood cells need glucose as an energy source. If breakfast is missed, the glucose available during the day decreases, so the brain lacks the energy to focus. Eating in the morning can provide the nutrients the body needs, including macronutrients such as carbohydrates, protein, and fat. These nutrients function as an energy source, accelerate growth and play a role in metabolic processes. These nutrients are also important for brain function, as they regulate blood sugar levels and active transport in the brain (Barasi, 2007). Various research results regarding breakfast from 2002 to 2011 in Indonesia show that around 16.9-59% of school children in different big cities do not eat breakfast due to other causal factors. Research in developed countries also states that the prevalence of children and adolescents who skip breakfast ranges from 12 to 34% (Niswah, 2014). Research about breakfast habits in students of SMPN 1 Tuban showed that almost half of the respondents had breakfast in the category consistently (7x /week), which is 46.8% (Damara and Muniroh, 2021). Research conducted at SMAN 1 Tampaksiring, Gianyar Regency, Bali, regarding breakfast habits, which includes attitudes and food choices, showed that 46.2% of students had good breakfast habits (Komang *et al.*, 2021).

According to the National Riskesdas (Kemenkes, 2018), the prevalence of nutritional status (BMI/U Z-score) in adolescents aged 16-18 years in Indonesia was 1.4 very thin, 6.7% underweight, 78,3% normal, 9,5% overweight and 4,0% obesity. The lifestyle of today's teenagers tends to be less healthy, with much free time spent on passive activities, consuming snacks and processed foods that are high in calories, and the habit of eating cakes, bread, fried foods and crackers. Teenagers also access the internet more often and make decisions without guidance. This can have a negative

impact on their nutritional health (Hardinsyah, 2012).

Breakfast has an important role in supporting the health and development of high school students. As a dynamic educational environment, Palembang City requires further understanding of the relationship between breakfast intake and students' nutritional status. This study aims to explore the impact of breakfast intake on the nutritional status of high school students in Palembang City, with the hope of providing valuable insights for improving health and education policies at the local level (Kral *et al.*, 2017).

Breakfast is often described as the most important meal of the day. Several studies have focused on whether breakfast habits influence school attendance, academic achievement, and general health in children and adolescents. Despite this, young people often skip breakfast, and this prevalence is increasing (Lundqvist, 2019). Breakfast is considered the most important meal of the day because it reduces the risk of overeating or eating between meals, reducing the possibility of obesity. This meets the body's nutritional needs and builds additional body energy reserves (Haldar, James and Negi, 2023).

This research is relevant considering the role of health and nutrition in improving the quality of education. A deeper understanding of breakfast habits and their impact on nutritional status can provide the basis for more effective preventive and intervention efforts. Thus, it is hoped that this research can positively contribute to efforts to improve the welfare of high school students in Palembang City.

METHOD

This research used a cross-sectional design and was carried out from June to August 2023. The research subjects were Palembang Senior High School students from three Schools, aged 16-18 and still attending school in grades X-XI. The sampling technique was simple random sampling with a sample size of 50 students. The independent variable in this research was students' breakfast patterns (breakfast habits, energy and macronutrient intake), and the dependent variable was students' nutritional status. Confounding variables are family income, pocket money, availability of breakfast foods, and nutrition knowledge.

Data on breakfast patterns in the form of breakfast habits for one week were collected using a questionnaire, and energy and macronutrient intake for breakfast were collected using the 3 x 24-hour recall

DOI: 10.32668/jitek.v11i2.1442

method. Energy, protein, carbohydrate and fat intake data is calculated based on the Recommended Dietary Allowances (AKG) by the Regulation of the Minister of Health of the Republic of Indonesia No. 28 of 2019. The adequacy level of energy, protein, fat and carbohydrates is according to the Widyakarya National for Food and Nutrition X (WNPG) 2014 recommendations. It is divided into three categories, namely 1) Poor: below 80% of nutritional needs per day; 2) Good: meets 80-110% of nutritional needs per day; 3) Excess: above 110% of nutritional needs per day. Nutritional status was obtained by measuring body weight using a digital weight scale, and height was measured using a microtome to determine nutritional status based on BMI/U and categorized based on the Minister of Health's Regulation on Children's Anthropometric Standards in 2020. Data were analyzed using the chi-square statistical test.

RESULTS AND DISCUSSION

Univariate Analysis

Table 1. Respondent Caracteristic

Variable		Frequency	
		N	**%**
Age (years)	15	28	56.0
	16	18	36.0
	17	4	8.0
Gender	Man	15	30.0
	Woman	35	70.0

From Table 1, it can be seen that the majority of the sample is 15 years old (56.0%).

Table 2. Frequency Distribution of Nutritional Status

Nutritional status	Frequency	
	N	**%**
Underweight	8	16.0
Normal	30	60.0
Overweight	12	24.0
Total	50	100

Based on Table 2, it is known that the majority of respondents had normal nutritional status as many as 30 people (60%), overweight as many as 12 people

(24%) and underweight as many as eight people (16%).

Table 3. Description of Students' Energy Intake from Breakfast

Breakfast Energy	Frequency	
	N	%
Less	15	30.0
Adequate	24	48.0
Excess	11	22.0
Total	50	100

The average daily energy intake of students was 2000 kilocalories. Based on Table 3, almost half of the students had adequate energy intake, as many as 24 people (48%). Students with excess energy intake numbered 11 people (22%) and 15 in the less intake category (30%).

Students' breakfast energy intake is critical to understanding the relationship between breakfast and the nutritional status of high school students in Palembang City. Breakfast energy intake data analysis can provide in-depth information about students' eating patterns, including whether they are getting enough nutrients to meet daily needs.

Table 4. Description of Students' Protein Intake from Breakfast

Breakfast Protein	Frequency	
	N	%
Less	12	24.0
Adequate	17	34.0
Excess	21	42.0
Total	50	100

The average daily protein intake of students was 20 grams. Based on Table 4, the level of protein intake of students was at a higher level of 21 people (42%), the intake in the less category was 12 people (24%), while the intake of the adequate category was 17 people (34%). This was because some students understood how important breakfast is in maintaining a normal nutritional status and improving concentration at school. Other research also shows that breakfast affects students' concentration and academic achievement at

DOI: 10.32668/jitek.v11i2.1442

school (Firdaus, Ermawati and Rondli, 2023)

Table 5. Description of Students' Fat Intake from Breakfast

Breakfast Fat	Frequency	
	N	%
Less	10	20.0
Adequate	24	48.0
Excess	16	32.0
Total	50	100

The average daily fat intake of students was 20 grams. Table 5 shows that almost half of the students had an adequate fat intake level, namely 24 people (48%), while 10 respondents had an insufficient intake category (20%). On the other hand, 16 respondents were in the excessive intake category (32%).

Table 6. Description of respondents' breakfast carbohydrate intake

Breakfast Carbohydrates	Frequency	
	N	%
Less	26	52.0
Adequate	11	22.0
Excess	13	26.0
Total	50	100

The average daily carbohydrate intake of students was 20 grams. Table 6 shows that more than half of the respondents had a low intake level, namely 26 people (52%), while 13 were in the excessive intake category (26%). On the other hand, there were 11 respondents with the adequate intake category (22%).

Bivariate Analysis

Table 7. Relationship between Breakfast Energy Intake and Adolescents' Nutritional Status

Breakfast energy intake	Nutritional status						P-value
	Underweight		Normal		Overweight		
	N	%	N	%	N	%	
Less	5	10.0	9	18.0	1	2.0	
Adequate	2	4.0	18	36.0	4	8.0	0.002*
Excess	1	2.0	3	6.0	7	14.0	

Total	8	16.0	30	60.0	12	24.0

**chi-square test*

Based on Table 7, it can be seen that energy intake is less than underweight (10%), normal (18%), and overweight (2%). who have adequate energy intake with nutritional status underweight (4%), normal (36%) and overweight (8%). Meanwhile, students with excessive energy intake had underweight (2%), normal (6%) and overweight (14%) nutritional status. Based on the p-value < 0,05 showed that there was a relationship between energy intake from breakfast and nutritional status.

Table 8. Relationship between Breakfast Protein Intake and Adolescents' Nutritional Status

Breakfast protein intake	**Nutritional status**						**P-value**
	Underweight		**Normal**		**Overweight**		
	N	**%**	**N**	**%**	**N**	**%**	
Less	4	8.0	8	16.0	0	0	0.126
Adequate	2	4.0	9	18.0	6	12.0	
Excess	2	4.0	13	26.0	6	12.0	
Total	8	16.0	30	60.0	12	24.0	

Based on Table 8, students with less protein intake and underweight were 8%, and those with normal nutritional status were 16%. Adequate protein intake with underweight was 4%, normal 18% and overweight (12%). Meanwhile, excessive protein intake among those underweight was 4%, normal 26%, and overweight 12%. Based on the p-value> 0,05, there was no relationship between protein intake from breakfast and nutritional status.

Table 9. Relationship between Breakfast Fat Intake and Adolescents' Nutritional Status

Breakfast fat intake	**Nutritional status**						**P-value**
	Underweight		**Normal**		**Overweight**		
	N	**%**	**n**	**%**	**N**	**%**	
Less	4	8.0	6	12.0	0	0.0	0.010*
Adequate	3	6.0	17	34.0	4	8.0	
Excess	1	2.0	7	14.0	8	16.0	
Total	8	16.0	30	60.0	12	24.0	

**chi-square test*

DOI: 10.32668/jitek.v11i2.1442

Table 9 shows that less fat intake was achieved by those with an underweight nutritional status of 8% and those with a normal nutrition status of 12%. Students with adequate fat intake and underweight were 6%, normal 34% and overweight 8%. Meanwhile, excessive fat intake is associated with the nutritional status of being underweight, which is 2%, normal 14%, and overweight 16%. Based on a p-value < 0.05, it shows that there was a relationship between fat intake from breakfast and nutritional status.

Table 10. Relationship between Breakfast Carbohydrate Intake and Adolescents' Nutritional Status

Breakfast carbohydrate intake	**Nutritional status**						p-value
	underweight		**normal**		**overweight**		
	n	**%**	**n**	**%**	**N**	**%**	
Less	6	12.0	15	30.0	5	10.0	0.474
Adequate	0	0.0	8	16.0	3	6.0	
Excess	2	4.0	7	14.0	4	8.0	
Total	8	16.0	30	60.0	12	24.0	

Table 10 shows that the lowest carbohydrate intake of those underweight was 12%, the normal intake was 30%, and the overweight 10%. Adequate carbohydrate intake with normal nutritional status was 16%, and overweight was 6%. Meanwhile, students with excessive carbohydrate intake had an underweight nutritional status of 4%, normal 14% and overweight 8%. The statistical test results showed a p-value> 0.05, meaning there was no relationship between carbohydrate intake from breakfast and nutritional status.

According to (Almatsier.S, 2011), "a lack of carbohydrates can cause reduced energy needs". Next, the body looks for elective nutritional supplements that replace carbohydrates with certain fats and proteins. Assuming that it will make the body slimmer and experience the adverse effects of protein-energy deficiency, considering that excessive use of carbohydrates causes excessive energy supply, the abundant energy is mixed into fat. In contrast, fat is available in the body. The body is not used for energy. Thus, fat accumulation results in excess body weight or obesity.

The new lifestyle has resulted in changes in eating patterns, which impact breakfast habits: people now eat light breakfasts or

DOI: 10.32668/jitek.v11i2.1442

even skip them. Eating breakfast daily and regularly is associated with better physical and intellectual performance. Calorie intake is also closely related to the prevalence of obesity (Gotthelfa and Tempesttia, 2017).

Kurniyanti's research on 121 students from the Faculty of Medicine, Riau University, showed that none of the respondents who had breakfast daily had the nutritional status of obese I and obese II. Respondents who eat breakfast sometimes have a nutritional status of obese I of as much as 10% and obese II of as much as 13.3%. Respondents who never had breakfast had a nutritional status of obese I of 16.3% and obese II of as much as 8.1% (Kurniyanti, Christianto.

Ningrum research revealed from 83 nursing students in Sumedang that most respondents have good calorie intake (53.0%) and have regular breakfast habits (54.2%); it was concluded that there was a significant relationship between calorie intake and nutritional status and breakfast habits and nutritional status (Ningrum *et al.*, 2019). Amalia's research on 37 grade 7 students at SMP Negeri 5 Banyuwangi. The results showed that most students had good breakfast habits (91.9%) and normal nutritional status (72.9%). The regression test results show a relationship between breakfast habits and nutritional status (p=0.049) (Amalia and Adriani, 2019).

Teenagers who eat breakfast regularly will not lose weight and become obese. This shows that teenagers can control their weight by eating breakfast. So, breakfast inhibits changes in glucose levels and helps control appetite (Lakmali *et al.*, 2022).

Studies show that balanced energy and fat intake can maintain energy levels and prevent overweight or obesity in teenagers. On the other hand, insufficient or excessive consumption can affect body weight and trigger health problems. Therefore, an in-depth understanding of this relationship can help develop nutrition education strategies and interventions to improve the quality of carbohydrate intake at breakfast, which can positively impact adolescents' nutritional status.

Research Limitations

The limitations of this research are 1) the sample used in this research only came from high school students, specifically from 3 schools, so the sample needed to be expanded in scope to be more varied in population and demographics, 2) the variables used in this research are limited, namely two variables, so further research is required to test other variables or factors

DOI: 10.32668/jitek.v11i2.1442

influencing adolescents' breakfast habits and nutritional status.

CONCLUSION

This research provides an essential picture of the relationship between breakfast and the nutritional status of adolescent students. The habit of skipping breakfast can significantly impact students' motivation, concentration, and learning abilities. Students who don't eat breakfast tend to be less enthusiastic, less curious and have difficulty concentrating because their brains lack energy from glucose.

This research highlights the importance of breakfast habits in supporting the health and development of adolescent students. Although protein and carbohydrate intake results do not always significantly impact nutritional status, energy and fat intake at breakfast play an important role. Therefore, promoting healthy breakfast habits can be an effective strategy for improving the well-being of adolescent students.

ACKNOWLEDGEMENT

We want to thank 1) Poltekkes Kemenkes Kupang, 2) Puskesmas Kota Ende, 3) All communities in the Central Ende District area, especially those involved as respondents in this study and colleagues who have provided support so that this research can be carried out correctly.

REFERENCES

Almatsier.S (2011) *Basic Principles of Nutrition Science*. PT. Gramedia Pustaka Utama.

Amalia, S.M.K. and Adriani, M. (2019) 'Hubungan antara Kebiasaan sarapan dengan Status Gizi pada siswa SMP Negeri 5 Banyuwangi', *Amerta Nutrition*, 3(4), p. 212. Available at: https://doi.org/10.20473/amnt.v3i4.2019.212-217.

Barasi, M.E.A. a G. (2007) *Nutrition Science*.

Damara, C.D. and Muniroh, L. (2021) 'Breakfast Habits and Nutrient Adequacy Level of Snacks Is Correlated With Nutrition Status Among Adolescent in Smpn 1 Tuban', *Media Gizi Indonesia*, 16(1), p. 10. Available at: https://doi.org/10.20473/mgi.v16i1.10-16.

Firdaus, M.N., Ermawati, D. and Rondli, W.S. (2023) 'Faktor Sarapan Pagi yang Memengaruhi Konsentrasi Belajar Siswa dan Hasil Belajar Siswa', *JLEB: Journal of Law, Education and Business*, 1(2), pp. 147–153. Available at: https://doi.org/10.57235/jleb.v1i2.1191.

Gotthelfa, S.J. and Tempesttia, C.P. (2017)

'Breakfast, nutritional status, and socioeconomic outcome measures among primary school students from the City of Salta. A cross-sectional study, *Archivos Argentinos de Pediatria*, 115(5), pp. 424–431. Available at: https://doi.org/10.5546/aap.2017.424.

Haldar, P., James, A. and Negi, U. (2023) 'Breakfast Eating Habits and Its Influence on Nutritional Status', *Journal of Health and Allied Sciences NU*, pp. 0–3. Available at: https://doi.org/10.1055/s-0043-1777021.

Hardinsyah, H. and Aries, M. (2012) 'Jenis Pangan Sarapan Dan Perannya Dalam Asupan Gizi Harian Anak Usia 6—12 Tahun Di Indonesia', *Jurnal Gizi dan Pangan*, 7(2), p. 89. Available at: https://doi.org/10.25182/jgp.2012.7.2.89-96.

Kemenkes, R. (2018) 'Laporan Riskesdas 2018 Nasional', *Lembaga Penerbit Balitbangkes*, p. hal 156.

Komang, I. *et al.* (2021) 'Hubungan Kebiasaan Sarapan, Pola Konsumsi Fast Food Dengan Status Gizi Remaja Sman 1 Tampaksiring', *Journal of Nutrition Science*, 10(2), pp. 120–127.

Kral, T.V.E. *et al.* (2017) 'Effects of eating breakfast compared with skipping breakfast on ratings of appetite and intake at subsequent meals in 8- To 10-y-old children', *American Journal of Clinical Nutrition*, 93(2), pp. 284–291. Available at: https://doi.org/10.3945/ajcn.110.000505.

Kurniyanti, I., Christianto, E. and Ismawati, I. (2018) 'Gambaran Sarapan dan Status Gizi Pada Mahasiswa Fakultas Kedokteran Universitas Riau Angkatan 2017', *Jurnal Ilmu Kedokteran*, 12(2), p. 108. Available at: https://doi.org/10.26891/jik.v12i2.2018.108-112.

Lakmali, S.S. *et al.* (2022) 'Importance of breakfast in teenagers', *International Journal of Health Sciences*, 6(May), pp. 4709–4726. Available at: https://doi.org/10.53730/ijhs.v6ns3.6938.

Lundqvist, M. and Vogel, N.E. (2019) 'Effects of eating breakfast on children and adolescents: A systematic review', *Department of Medical and Health Sciences*, 1, pp. 1–15.

Ningrum, D. *et al.* (2019) 'The Relationship among Breakfast Habits, Calorie Intake and Nutritional Status of Sumedang Government's Nursing Academy Students', *KnE Life Sciences*, 2019, pp. 824–836. Available at: https://doi.org/10.18502/kls.v4i13.5342.

Niswah, I., Damanik, M.R.M. and Ekawidyani, K.R. (2014) 'Kebiasaan Sarapan, Status Gizi, dan Kualitas Hidup Remaja SMP Bosowa Bina Insani Bogor', *Jurnal Gizi dan Pangan*, 9(10), pp. 97–102.

Widyakarya Nasional Pangan dan Gizi X (2014). LIPI Press.

DOI: 10.32668/jitek.v11i2.1442