



The Relationship Between Fat and Carbohydrates Intake Related to Nutritional Status Among High School Adolescents (A Study at SMAN 1 Babelan, Bekasi Regency)

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ABSTRACT

Background: Adolescence is a vulnerable period for nutritional problems due to biological changes, eating habits, and lifestyle. Inadequate nutritional intake believed to have an impact on adolescent's nutritional status. This research seeks to examine the association between fat and carbohydrate consumption and the nutritional status of adolescents at SMAN 1 Babelan, Bekasi Regency.

Research Methods: This research adopts a quantitative strategy implemented through a cross-sectional design. The sample included 101 students selected proportionally from three grades at SMAN 1 Babelan. The instruments used included questionnaires and anthropometric measurement. Data analysis involved the application of univariate and bivariate statistical tests, including Pearson correlation and Spearman correlation.

Research Result: The study found significant relationships between fat intake ($p = 0.025$; $r = 0.223$) and carbohydrates intake ($p = 0.021$; $r = 0.229$) with adolescent's nutritional status.

Conclusion: Fat and carbohydrate intake significantly influence adolescent's nutritional status, a higher intake of fat and carbohydrates is associated with a higher nutritional status.

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1. INTRODUCTION

Adolescence is an important period marked by biological and social changes that make adolescents vulnerable to nutritional problems (Yuliati, 2022; Saputri et al., 2021). During this stage, frequent changes in eating patterns and lifestyle behaviors may affect nutritional adequacy (Rares et al., 2022).

According to the 2023 Indonesian Health Survey among adolescents aged 16–18 years, the prevalence of undernutrition remains notable, with 1.7% classified as thin and 6.6% as severely thin. On the other hand, overweight is also a concern, with 8.8% classified as overweight and 3.3% as obese. In West Java, the prevalence of thinness is 1.9% (an increase of 0.2%) and severe thinness 6.3%. The prevalence of overweight is 8.9% (an increase of 0.1%) and obesity 4.2% (an increase of 0.9%), which is higher than the national average (Kementerian Kesehatan RI, 2023).

Adolescent nutritional problems in Indonesia include both undernutrition and overweight, largely influenced by inadequate dietary intake. These conditions may hinder optimal growth and development (Hartanti et al., 2024). Many adolescents tend to choose nutritionally poor food options, including deep-fried snacks, artificially colored drinks, carbonated beverages, and fast food, with the belief that consuming large amounts is sufficient to meet nutritional needs (Alwi et al., 2024). Poor eating habits are when someone regularly eats food that doesn't provide all the essential nutrients like carbohydrates, fats, and proteins that the body needs for proper metabolism. Poor eating habits affect the intake and output of food, leading to a lack of necessary nutrients for the body's needs (Aiman et al., 2025). These unhealthy eating habits may lead to imbalances in macronutrient intake, which play a crucial role in determining nutritional status.

Macronutrients are essential for energy provision and metabolic balance, with carbohydrates and fats playing the most direct roles in energy supply and storage that influence body weight regulation. Imbalances in their intake may contribute to undernutrition and overnutrition, making these nutrients important to examine in understanding adolescent nutritional status (Rahmiwati et al., 2025).

A preliminary study at SMAN 1 Babelan showed variation in nutritional status among five respondents, with two mildly thin, one obese, and two normal. Breakfast habits and consumption of balanced nutritious food were still uneven, only one respondent routinely ate breakfast daily, while others ate only when hungry. Most respondents liked to consume snacks, and only two consistently consumed balanced nutritious meals including vegetables and fruits at every meal. These patterns suggest dietary inconsistencies that may affect macronutrient intake and contribute to nutritional differences among adolescents.

Despite growing concern regarding adolescent nutritional problems, research specifically examining fat and carbohydrate intake in relation to nutritional status at the local level, particularly in Bekasi Regency, remains limited. This gap restricts the availability of context-specific evidence needed to design targeted adolescent nutrition interventions.

Accordingly, this study was conducted to examine the association between fat and carbohydrate intake and adolescent nutritional status, with the aim of generating localized evidence to support more targeted nutritional interventions and health policies.

2. METHODS

This research adopts a quantitative strategy implemented through a cross-sectional design. The independent variables in this study are fat intake and carbohydrate intake. The dependent variable is nutritional status. The research was conducted at SMAN 1 Babelan, Bekasi Regency, covering all stages from proposal preparation, data collection, to final reporting. The entire research process took place from November 2024 to August 2025.

This study involved a population of male and female students at SMAN 1 Babelan, with 101 participants selected as the sample. All samples met the inclusion criteria, namely aged 16–18 years, no physical disabilities or movement limitations, not currently ill, not undergoing a special diet, and voluntarily participated after signing the informed consent. The exclusion criteria comprised students absent at the time of data collection.

Data were collected through structured interviews using questionnaires and anthropometric assessments. Prior to participation, respondents provided informed consent. Dietary intake was measured using a 2×24-hour recall questionnaire to estimate fat and carbohydrate consumption. This method is widely used in nutritional surveys and has been systematically applied in large-scale studies such as the National Health and Nutrition Examination Survey, supporting its acceptance as a standardized dietary assessment approach. Although dietary assessment methods inherently contain measurement error, the 24-hour recall demonstrates acceptable validity when conducted using standardized procedures, with efforts to identify and minimize potential bias. Nutritional status was determined through anthropometric measurements using a calibrated scale and microtoise.

Data were analyzed using Microsoft Excel 2010 and IBM SPSS version 21. Univariate analysis described the variables of fat intake, carbohydrates intake, and nutritional status among adolescents. Bivariate analysis was conducted to examine the relationship between the independent variables, fat intake and carbohydrate intake, with the dependent variable, nutritional status, using a significance level of 0.05. The selection of the correlation test type was based on the results of the data normality test. The results of the normality test showed that the carbohydrate intake data were normally distributed ($p = 0.200$), so the analysis of the relationship with nutritional status used the Pearson correlation test. Conversely, the fat intake data were not normally distributed ($p = 0.000$), so the analysis was conducted using the Spearman correlation test. The selection of this method aims to ensure the suitability between the data characteristics and the analysis technique so that the results obtained are more accurate and can be interpreted correctly. This study received ethical approval from Respati Indonesia University (URINDO) with certificate number 112/SK.KEPK/UNR/II/2025.

3. RESULTS AND DISCUSSION

3.1. Respondents Characteristics

This study involved students from three grade levels (10, 11, and 12) at SMAN 1 Babelan. The characteristics of the respondents involved in this study are presented in Table 1 below.

Tabel 1. Respondents Characteristics

Characteristics	f (n=101)	Percentage (%)
Gender		
Male	30	29,7
Female	71	70,3
Age		
16	61	60,4
17	19	18,8
18	21	20,8
Class		
10	38	37,6
11	32	31,7
12	31	30,7

According to the data in Table 1, the predominant portion of participants in this study were females, accounting for 70.3%. Most respondents were 16 years old (60.4%) and came from grade 10 (37.6%).

3.2. Overview of Fat and Carbohydrates Intake

The intake of fat and carbohydrates was determined through interviews using a two-day, 24-hour recall questionnaire. The frequency distribution of fat and carbohydrates intake among the respondents is presented in Table 2 below.

Tabel 2. Overview of Nutrient Intake

Characteristics	f (n=101)	Percentage (%)
Fat Intake		
Insufficient	84	83,2
Adequate	10	9,9
Excess	7	6,9
Carbohydrates Intake		
Insufficient	94	93,1
Adequate	7	6,9

Based on the classification proposed by the Widyakarya Nasional Pangan dan Gizi (WNPG, 2004), energy intake is categorized as insufficient when it is <80% of the Recommended Dietary Allowance (RDA), adequate at 80–110%, and excessive when it exceeds 110%. According to the data in Table 2, most respondents had fat and carbohydrate intakes below 80% of the RDA, with 84% classified as having insufficient fat intake and 94% experiencing carbohydrate deficiency. This pattern indicates that the majority of respondents fall into the insufficient intake category, reflecting a tendency toward macronutrient inadequacy.

3.3. Overview of Nutritional Status

Nutritional status was assessed through anthropometric measurements of height and weight, referring to the [Peraturan Kementerian Kesehatan RI \(2020\)](#) standards for nutritional status assessment. The frequency distribution of nutritional status among the respondents is presented in Table 3 below.

Tabel 3. Overview of Nutritional Status

Characteristics	f (n=101)	Percentage (%)
Nutritional Status		
Malnutrition	4	4
Nutritional deficiency	1	1
Adequate nutrition	80	79,2
Excess nutrition	11	10,9
Obesity	5	5

According to the data in Table 3, an adequate nutritional status was observed in 79.2% of respondents, as indicated by their BMI-for-Age Z-scores. This outcome demonstrates that most adolescents in the study achieved an optimal level of nutritional status.

3.4. Relationship Between Fat Intake with Nutritional Status

Presented in Table 4 are the results of the Spearman correlation bivariate analysis investigating the relationship between fat intake and nutritional status among students at SMAN 1 Babelan.

Tabel 4. Relationship Between Fat Intake with Nutritional Status

Variable	R	p-value
Fat Intake	0,223	0,025^{b*}

*a Pearson; b Spearman; * p < 0.05 indicates a significant correlation*

The study revealed a significant association between fat intake and nutritional status in adolescents at SMAN 1 Babelan ($p=0.025$; $r=0.223$). Higher fat consumption was associated with better nutritional status. This finding aligns with Afifah et al. (2024), who reported similar results among students at SMA Kesatrian 1 Semarang ($p=0.001$) (Afifah et al., 2024). However, the observed correlation was weak ($r < 0.3$), suggesting that fat intake contributes only minimally to the variation in nutritional status. Although the association reached statistical significance, nutritional status is shaped by many interacting factors, meaning it cannot be explained by fat intake alone.

Respondents with malnutrition tended to have low fat intake, although most individuals with low fat intake still had normal nutritional status. This pattern indicates that the risk of malnutrition increases in individuals with inadequate fat intake. The statistical significance suggests that insufficient fat intake may increase vulnerability to nutritional problems, even if this is not immediately apparent in all individuals.

The study also found that respondents frequently consumed fried foods, especially fried snacks. Habitual consumption of fried foods high in saturated fat can reduce the quality of fat intake and negatively affect nutritional status. High intake of saturated fat can potentially elevate the risk of cardiovascular disease (Wiyono et al., 2020).

Balanced fat intake is important to maintain optimal nutritional status. Fat deficiency causes the body to use fat reserves as an energy source, which, if prolonged, can lead to weight loss (Sadik et al., 2025). In contrast, excessive fat consumption heightens the risk of obesity and high cholesterol levels in the blood, which may cause health complications (Sadik et al., 2025).

Nutritional status is not determined by dietary intake alone. It is also influenced by an individual's physical condition, the presence of infections, and stress levels, which can affect metabolism, appetite, and nutrient utilization, thereby contributing to changes in nutritional status (Kusumaatmaja et al., 2025).

3.5. Relationship Between Carbohydrates Intake with Nutritional Status

Presented in Table 4 are the results of the Pearson correlation bivariate analysis investigating the relationship between carbohydrates intake and nutritional status among students at SMAN 1 Babelan.

Tabel 5. Relationship Between Carbohydrates Intake with Nutritional Status

Variable	r	p-value
Carbohydrates Intake	0,229	0,021^{a*}

a Pearson; *b* Spearman; * $p < 0.05$ indicates a significant correlation

The study revealed a significant association between carbohydrates intake and nutritional status in adolescents at SMAN 1 Babelan ($p=0.021$; $r=0.229$). As carbohydrates intake increases, nutritional status tends to improve. Consistent with Rorimpandei et al. (2020), this study observed similar nutritional status trends among female adolescents in Kawangkoan Barat ($p=0.000$; $r=0.552$) (Rorimpandei et al., 2020). However, the correlation strength in this study was weak ($r < 0.3$), indicating that carbohydrate intake explains only a small proportion of the variation in nutritional status. This suggests that although the relationship is statistically significant, nutritional status is still influenced by multiple interacting factors.

Respondents with malnutrition tended to have low carbohydrate intake, although most individuals with low intake still had normal nutritional status. This pattern indicates that the risk of malnutrition increases in individuals with inadequate carbohydrate intake. The statistical significance obtained from the test shows that insufficient carbohydrate intake can increase vulnerability to nutritional problems, although this may not be immediately

apparent in all individuals.

The findings also show that the majority of carbohydrates consumed by respondents were simple carbohydrates such as white rice, instant noodles, white bread, and sweet snacks. Additionally, some respondents had the habit of eating large dinners close to bedtime. High intake of simple carbohydrates without fiber can cause fluctuations in blood sugar levels and affect energy metabolism (Widiastuti et al., 2024). Meanwhile, eating large and late dinners also increases fat accumulation and cardiometabolic risks, including obesity (Sandy et al., 2024).

Adequate carbohydrate intake is important to maintain nutritional status because carbohydrates are the main energy source needed for activity and growth (Rarastiti, 2023). Carbohydrate deficiency can reduce energy needs and body weight (Erniati et al., 2024), while excessive carbohydrate consumption can lead to fat accumulation and raise the risk of metabolic disorders like diabetes and obesity (Febriana et al., 2025).

Nutritional status is also affected by dietary patterns, physical activity, and the social environment, including support from family and peers (Shi et al., 2024). In addition, nutritional knowledge, attitudes, and balanced nutrition practices contribute to nutritional status, as adequate nutrition knowledge can shape positive attitudes toward food choices and encourage healthy dietary behaviors (Rukmana et al., 2023).

3.6. Research Limitations

This study was limited by its cross-sectional design, which restricts the ability to assess temporal changes or infer causal relationships. Several potential confounders affecting nutritional status, including physical health conditions, infections, sleep patterns, and social or family environment, were not controlled and may influence the interpretation of the findings.

The use of a 2×24-hour dietary recall may introduce recall bias due to reliance on participant's memory. Nutritional status assessment based on BMI-for-age has inherent limitations in representing overall body composition. Furthermore, staggered data collection resulting from limited enumerators may have introduced temporal variability that affected data consistency.

4. CONCLUSION

The results of the analysis showed that fat and carbohydrate consumption were significantly associated with nutritional status among adolescents at SMAN 1 Babelan. Both variables demonstrated a weak but positive correlation, indicating that higher fat and carbohydrate intake was related to better nutritional status.

These findings highlight the importance of promoting balanced fat and carbohydrate intake to support healthy nutritional status among adolescents. Students are encouraged to improve their dietary choices, while schools and health authorities should strengthen nutrition education and school-based programs that emphasize appropriate macronutrient intake. Future research is recommended to further explore dietary patterns and their relationship with adolescent nutritional status using broader samples and study designs.

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