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The Association of Clean and Healthy Lifestyle Behaviors and Nutrient Intake With The Nutritional Status of Adolescents

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ABSTRACT

Adolescents represent a population group that is particularly vulnerable to various nutritional issues, including both undernutrition and overnutrition. With the rising number of adolescents in Indonesia, adolescent nutrition has become a public health concern due to its significant implications for physical growth and development, as well as its long-term impact on nutritional status into adulthood and later life. This research explored the association between Clean and Healthy Lifestyle Behaviors (CHLB) and dietary intake, with a focus on their impact on the nutritional status of adolescents. Utilizing a cross-sectional design, the study was conducted at SMPN 18 Mataram and included 60 student participants. Data were analyzed through Spearman's rank-order correlation test. Findings indicated a significant correlation between CHLB and adolescents' nutritional status ($p=0.001$, $p<0.05$). Similarly, macronutrient intake, including carbohydrates, proteins, and fats, was significantly related to nutritional status, with p -values of 0.000, 0.005, and 0.001, respectively ($p<0.05$). In contrast, no significant relationship was found between micronutrient intake (vitamin C and iron) and nutritional status, with p -values of 0.315 and 0.352, respectively ($p>0.05$). These findings suggest the need to enhance adolescents' awareness and practices regarding clean and healthy lifestyle behaviors and to encourage the adequate consumption of both macro- and micronutrients in order to support optimal nutritional status.

Keywords: Clean and healthy lifestyle behaviors; nutrient intake; nutritional status; adolescents

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INTRODUCTION

Adolescence, typically encompassing individuals between the ages of 10 and 18 years, represents a critical transitional phase from childhood to adulthood.(1) During this period, there is a marked escalation in nutritional requirements due to rapid physical, cognitive, and emotional development.(2) Adequate nutrient intake during adolescence is crucial to prevent nutritional problems that may arise during this critical growth period. Nutrients play an essential role in supporting brain function, emotional stability, cognitive abilities, and bone health.(3–6) Data from the 2018 Basic Health Research (Riskesdas) report revealed several nutritional issues among Indonesian adolescents. Recent data reveal that 25.7% of adolescents aged 13–15 years and 26.9% of those aged 16–18 years were affected by stunting or severe stunting, indicating chronic undernutrition during critical growth periods. Additionally, 8.7% of adolescents in the 13–15 age group and 8.1% in the 16–18 age group were classified as thin or severely thin, reflecting acute undernutrition. In contrast, a notable proportion of adolescents, 16.0% in the younger age group and 13.5% in the older age group, were found to be overweight or obese. These findings highlight a double burden of malnutrition, where both undernutrition and overnutrition coexist, underscoring the urgent need for targeted nutrition interventions and comprehensive adolescent health strategies(7).

Nutritional problems during adolescence can have a significant impact on nutritional status and lead to various health issues. These problems may affect cognitive abilities, productivity, and overall performance. The consequences of nutritional disorders are closely related to nutritional status: undernutrition increases the risk of infectious diseases, while overnutrition and obesity are associated with a higher risk of degenerative diseases.(8) Optimal nutritional status during adolescence is contingent upon the fulfillment of energy and macronutrient requirements, with particular emphasis on adequate protein intake, given its fundamental role in supporting somatic growth and developmental processes. Empirical evidence from various studies has consistently demonstrated a significant positive association between nutrient intake levels and the nutritional status of adolescent females.(9–12)

Clean and Healthy Lifestyle Behavior (CHLB) is a public health strategy initiated by the Indonesian Ministry of Health, designed to promote the adoption of health-enhancing practices by replacing detrimental lifestyle habits with behaviors that support overall well-being. This program still requires effective dissemination across all levels of society. Promoting healthy behavior has become a key focus for the government, as CHLB serves as an important benchmark in improving health coverage within the framework of the Sustainable Development Goals (SDGs) 2015–2030. In the context of the SDGs, CHLB represents a preventive effort with short-term impacts on health improvements in three primary settings: within households, in the broader community, and in schools.(13)

Students at SMPN 18 Mataram have received education on Clean and Healthy Lifestyle Behavior (CHLB) and balanced nutrition; however, not all of them consistently practice clean and healthy lifestyle habits or maintain a balanced intake of macro and micronutrients. These findings underscore the necessity for more targeted and comprehensive educational and promotional efforts to enhance students' awareness regarding the critical role of personal hygiene, healthy lifestyle practices, and sufficient nutritional intake in maintaining optimal health outcomes. Adolescence is a pivotal developmental stage marked by rapid physical, cognitive, and emotional changes, during which nutritional demands increase significantly. In this context, the adoption of clean and healthy lifestyle behaviors becomes particularly vital, as it may directly influence dietary patterns, nutrient absorption, and overall health status.

Although several studies have demonstrated a significant positive association between clean and healthy lifestyle behaviors and nutritional status,(14–16) Other investigations, particularly those focusing on children under five years of age, have reported no statistically significant relationship between these variables(17–19). These inconsistencies suggest that the influence of lifestyle behaviors on nutritional outcomes may vary across age groups, developmental stages, and environmental contexts. Moreover, there remains a relative paucity of research specifically examining this relationship within the adolescent population, especially in the Indonesian setting, where cultural, socioeconomic, and educational factors may shape both health behaviors and nutrition-related outcomes.

In light of these considerations, the present study aims to analyze the relationship between clean and healthy lifestyle behaviors and nutrient intake in relation to the nutritional status of adolescents. By focusing on this age group, the study seeks to contribute to a more nuanced understanding of how lifestyle practices impact adolescent nutrition and to inform the development of context-specific interventions that promote healthier behaviors during this critical life stage.

METHOD

This research employed a quantitative approach with a cross-sectional design. Data collection was conducted in April 2023 at SMPN 18 Mataram. A total sampling technique was used, encompassing all students who met the specified inclusion and exclusion criteria, resulting in a final sample of 60 participants. Data on Clean and Healthy Lifestyle Behavior (CHLB) were collected using a validated attitude questionnaire, with responses categorized into three levels: poor (scores 0–6), moderate (scores 7–13), and good (scores 14–22)(20). Nutrient intake was evaluated through a semi-quantitative Food Frequency Questionnaire (FFQ). Body weight (BW) and body height (BH) were measured using a digital scale and a microtoise, respectively, to assess nutritional status based on the Body Mass Index-for-Age (BMI/A) classification. The relationships between CHLB, nutrient intake (including carbohydrates, protein, fat, vitamin C, and iron), and nutritional status were analyzed using Spearman's rank-order correlation test.

RESULTS

The findings of the study present the following description of the sample:

Table 1. Distribution of CHLB Among Students at SMPN 18 Mataram

Category	Frequency (n)	Percentage (%)
Poor	0	0
Moderate	20	33
Good	40	67
Total	60	100

As shown in the table above, the majority of students demonstrated a positive attitude toward Clean and Healthy Lifestyle Behaviors (CHLB), with 67% (n = 40) categorized as having a good attitude. The subsequent table presents data on the intake of macronutrients (carbohydrates, protein, and fat) as well as micronutrients (iron and vitamin C).

Table 2. Distribution of Macronutrient Intake Among Students at SMPN 18 Mataram

Category	Frequency (n)	Percentage (%)
Carbohydrate		
Severe deficiency	3	5
Moderate deficiency	2	3
Mild deficiency	9	15
Adequate intake	36	60
Excessive intake	10	17
Protein		
Severe deficiency	2	3
Moderate deficiency	2	3
Mild deficiency	8	14
Adequate intake	33	55
Excessive intake	15	25
Fat		
Severe deficiency	3	5
Moderate deficiency	3	5
Mild deficiency	7	12
Adequate intake	35	58
Excessive intake	12	20
Total	60	100

Based on the data presented in Table 2, the majority of students exhibited a normal level of carbohydrate intake, accounting for 60% of the total sample. Similarly, the majority of students demonstrated normal intake levels for protein and fat, with proportions of 55% and 58%, respectively. These findings suggest that most students had adequate macronutrient consumption according to recommended nutritional standards. The distribution of micronutrient intake is presented in the following table:

Table 3. Distribution of Micronutrient Intake Among Students at SMPN 18 Mataram

Category	Frequency (n)	Percentage (%)
Vitamin C		
Severe deficiency	2	3
Moderate deficiency	2	3
Mild deficiency	7	12
Adequate intake	27	45
Excessive intake	22	37
Iron		
Severe deficiency	3	5
Moderate deficiency	7	12
Mild deficiency	7	12
Adequate intake	25	41
Excessive intake	18	30
Total	60	100

As shown in Table 3, the highest proportion of vitamin C and iron intake among the sample falls within the normal category, accounting for 45% and 41%, respectively. The distribution of the nutritional status categories among the sample is presented in the following table:

Table 4. Distribution of Nutritional Status Categories Based on BMI-for-Age (BMI/A)

Category	Frequency (n)	Percentage (%)
Severely underweight	0	0
Underweight	2	3
Normal	45	75
Overweight	8	14
Obese	5	8
Total	60	100

As shown in Table 4, the majority of students (75%) were classified as having a normal nutritional status. To examine the relationships between variables, correlation analyses were conducted, and the results are presented in Tables 5-7.

Table 5. The Association Between Clean and Healthy Living Behavior (CHLB) and Nutritional Status

CHLB category	Nutritional Status (BMI/A)								p-value
	Underweight		Normal		Overweight		Obese		
	n	%	n	%	n	%	n	%	
Poor	0	0	0	0	0	0	0	0	0.001
Fair	2	3	11	18	5	8	2	3	
Good	0	0	34	57	3	5	3	5	
Total	2	3	45	75	8	13	5	8	

As shown in Table 5, the majority of students with good Clean and Healthy Living Behavior (CHLB) had a normal nutritional status (57%). The statistical test also indicated a significant relationship between CHLB and nutritional status (p -value = 0.001). The relationships between macronutrient and micronutrient intake and nutritional status are presented in Tables 6 and 7.

Table 6. The Association Between Macronutrient Intake and Nutritional Status

Macronutrient intake	Nutritional Status (BMI/A)								p-value
	Underweight		Normal		Overweight		Obese		
	n	%	n	%	n	%	n	%	
Carbohydrate									
Severe deficiency	2	3	1	2	0	0	0	0	0.000
Moderate deficiency	0	0	2	3	0	0	0	0	
Mild deficiency	0	0	6	10	3	5	0	0	
Adequate intake	0	0	31	51	3	5	2	3	
Excessive intake	0	0	5	8	2	3	3	5	
Protein									
Severe deficiency	1	2	1	2	0	0	0	0	0.005
Moderate deficiency	1	2	1	2	0	0	0	0	
Mild deficiency	0	0	7	12	1	2	0	0	
Adequate intake	0	0	26	43	4	6	3	5	
Excessive intake	0	0	10	16	3	5	2	3	
Fat									
Severe deficiency	1	2	2	3	0	0	0	0	0.000
Moderate deficiency	1	2	2	3	0	0	0	0	
Mild deficiency	0	0	4	7	3	5	0	0	
Adequate intake	0	0	32	53	3	5	0	0	
Excessive intake	0	0	5	8	2	3	5	8	
Total	2	4	45	74	8	13	5	8	

The table above shows that for all three macronutrient intakes (carbohydrates, protein, and fat), the majority of the sample had a normal intake level and normal nutritional status. The percentage of students with normal intake for carbohydrates was 51%, for protein 43%, and for fat 53%. The statistical test results indicate a significant relationship between macronutrient intake and nutritional status, with p-values for each variable being <0.05.

Table 7. The Association Between Micronutrient Intake and Nutritional Status

Micronutrient intake	Nutritional Status (BMI/A)								p-value
	Underweight		Normal		Overweight		Obese		
	n	%	n	%	n	%	n	%	
Vitamin C									
Severe deficiency	2	3	0	0	0	0	0	0	0.315
Moderate deficiency	0	0	2	3	0	0	0	0	
Mild deficiency	0	0	5	9	2	3	0	0	
Adequate intake	0	0	21	35	3	5	3	5	
Excessive intake	0	0	17	29	3	5	2	3	
Iron									
Severe deficiency	1	2	1	2	1	2	0	0	0.532
Moderate deficiency	1	2	3	5	2	3	1	2	
Mild deficiency	0	0	5	8	0	0	2	3	
Adequate intake	0	0	22	36	1	2	2	3	
Excessive intake	0	0	14	23	4	7	0	0	
Total	2	4	45	74	8	14	5	8	

The table above shows that the highest intake levels for both micronutrients, vitamin C and iron, fall within the normal category (35% and 36%, respectively). The statistical analysis reveals no significant association between micronutrient intake and nutritional status.

DISCUSSION

1. The Association Between Clean and Healthy Lifestyle Behavior (CHLB) and Nutritional Status Among Students at SMPN 18 Mataram

At the educational institution level, several indicators are used to assess Clean and Healthy Living Behavior (CHLB), including hand washing with soap, consumption of snacks from school vendors, use of clean and sanitary toilets, regular and measured physical exercise, mosquito larvae eradication, no smoking in school, and regular weighing and measuring of height. The results of this study indicate that 67% of students exhibit good CHLB behavior. This is likely due to the location of the study, which is one of the schools actively promoting CHLB education, both from the local health center and surrounding educational institutions. Furthermore, handwashing facilities and waste bins are available at the school, making it easier for students to implement CHLB practices within the school environment. This finding is consistent with previous research, which identified that the most dominant factor influencing students' CHLB is the availability of facilities.(21)

Based on the data analysis, a significant relationship between CHLB and nutritional status was found, with a p-value of 0.001 ($p < 0.05$). Several studies have reported similar findings.(15,16,21) CHLB is closely associated with the incidence of infections, which is a key factor directly affecting adolescent nutritional status. Individuals suffering from infectious diseases often experience a loss of appetite, which in turn affects the quantity and quality of nutrients entering the body. This condition can directly influence nutritional status. The results of this study suggest that the good implementation of CHLB indicators by students in the school environment may contribute to their nutritional status.

2. The Association Between Nutrient Intake and Nutritional Status Among Students at SMPN 18 Mataram

Food intake is a direct factor influencing nutritional status. As shown in Table 6, there is a significant association between macronutrient intake (carbohydrates, protein, and fat) and nutritional status. In terms of carbohydrate intake, the majority of students were in the normal intake category. Based on the semi-quantitative Food Frequency Questionnaire (semi-FFQ), the primary sources of carbohydrate intake among students were rice, potatoes, noodles, and corn. Carbohydrates consumed are converted into glucose, which serves as an energy reserve in the body. An imbalance between carbohydrate requirements and intake may lead to nutritional problems.(22) Therefore, adequate carbohydrate intake among students has a direct impact on their nutritional status. This finding is consistent with results from previous studies(9,23).

Regarding protein intake, the majority of students fell into the normal and above-normal intake categories. This may be attributed to the school's location and the students' residences being situated

near the coast. According to the semi-quantitative Food Frequency Questionnaire (semi-FFQ) data, students' primary source of protein was marine fish. Additionally, many of the students' parents work as fishermen. Protein consumption is particularly important during adolescence, a period marked by rapid physical growth and development(24). The findings of this study indicate a significant association between protein intake and nutritional status, consistent with those of previous studies(25,26). Fat intake was also found to be significantly associated with nutritional status. The semi-FFQ data revealed that most students frequently consumed fried snacks and fast food. While these types of food can provide certain nutritional benefits, excessive consumption may lead to an excess caloric intake and pose health risks. Therefore, special attention should be given to fat intake among adolescents. These findings are also in line with several previous studies(23,24,27).

The results of this study indicate that there is no significant association between micronutrient intake—specifically vitamin C and iron—and nutritional status. Vitamin C plays a key role in hydroxylation during collagen synthesis in fibrous tissues, iron absorption, and immune function. Meanwhile, iron is primarily involved in the formation of hemoglobin in red blood cells. These findings are consistent with those of previous studies(28–30). Vitamin C and iron are essential micronutrients that contribute significantly to metabolic function, erythropoiesis, and immune system performance. However, they do not directly influence body weight or height in a measurable way over the short term. As such, individuals may experience deficiencies in vitamin C or iron without displaying significant changes in Body Mass Index (BMI).

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study indicate a significant association between clean and healthy lifestyle behavior (CHLB) and nutritional status. A significant association was also observed between macronutrient intake, including the consumption levels of carbohydrates, proteins, and fats, and nutritional status. However, no significant association was found between micronutrient intake (vitamin C and iron) and nutritional status. In light of these findings, it is recommended that adolescents pay greater attention to practicing clean and healthy lifestyle behaviors and maintaining adequate intake of both macronutrients and micronutrients to support optimal health and nutritional status.

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