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FAMILY AND PEER SUPPORT ARE RELATED TO THE PERCENTAGE OF MACRONUTRIENT INTAKE IN OVERWEIGHT ADOLESCENTS

Dukungan Keluarga dan Teman Sebaya Berhubungan dengan Persentase Asupan Makronutrien pada Remaja Overweight

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ABSTRAK

Overweight pada remaja merupakan permasalahan kesehatan yang dipengaruhi oleh berbagai faktor, termasuk dukungan sosial dari keluarga dan teman sebaya. Pola konsumsi makronutrien seperti karbohidrat, lemak, dan protein memiliki peran penting dalam kejadian overweight. Namun, pengaruh dukungan sosial terhadap asupan makronutrien masih belum banyak diteliti. Penelitian ini bertujuan untuk menganalisis hubungan antara dukungan keluarga dan teman sebaya dengan asupan makronutrien pada remaja overweight. Penelitian ini menggunakan desain cross-sectional dan dilakukan pada bulan Januari hingga Februari 2025 di Kota Surabaya. Sampel diambil di wilayah puskesmas dengan prevalensi overweight remaja tertinggi berdasarkan data Dinas Kesehatan Kota Surabaya. Pemilihan sampel dilakukan secara acak sesuai kriteria inklusi dan eksklusi hingga mencapai 110 remaja overweight berusia 13-15 tahun. Data dikumpulkan melalui kuesioner dukungan sosial dan formulir Semi Quantitative-Food Frequency Questionainnaire (SQ-FFQ) untuk mengukur jumlah asupan makronutrien. Analisis hubungan dilakukan menggunakan uji korelasi Pearson. Hasil analisis menunjukkan bahwa dukungan keluarga memiliki hubungan negatif signifikan dengan asupan karbohidrat (r = -0,208; p = 0,030), tetapi tidak berhubungan secara signifikan dengan asupan lemak (p = 0,059) dan protein (p = 0,327). Sementara itu, dukungan teman sebaya memiliki korelasi negatif signifikan dengan asupan karbohidrat (r = -0,616; p = 0,023), lemak (r = -0,79; p = 0,042), dan protein (r = -0,216; p = 0,023). Simpulan dari penelitian ini adalah dukungan teman sebaya memiliki pengaruh yang lebih kuat terhadap pola konsumsi makronutrien dibandingkan dukungan keluarga. Oleh karena itu, intervensi gizi untuk remaja overweight sebaiknya mempertimbangkan lingkungan sosial, terutama dengan melibatkan teman sebaya dalam pembentukan kebiasaan makan yang lebih sehat.

Kata kunci: *asupan makronutrien, dukungan keluarga, overweight, remaja, teman sebaya*

ABSTRACT

Overweight in adolescents is a health issue influenced by various factors, including social support from family and peers. The consumption patterns of macronutrients such as carbohydrates, fats, and proteins play a crucial role in the occurrence of overweight. However, the impact of social support on macronutrient intake has not been widely studied. This study aimed to analyze the relationship between family and peer support and macronutrient intake in overweight adolescents. This cross-sectional study was conducted from January to February 2025 in Surabaya. Samples were taken from areas

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with the highest prevalence of overweight adolescents based on data from the Surabaya Health Office. Participants were randomly selected based on inclusion and exclusion criteria until reaching 110 overweight adolescents aged 13–15 years. Data were collected using a social support questionnaire and Semi Quantitative-Food Frequency Questionainnaire (SQ-FFQ) to measure macronutrient intake. The relationship analysis was conducted using Pearson correlation tests. The results showed hat family support has a significant negative relationship with carbohydrate intake (r= -0.208; p= 0.030) but is not significantly related to fat intake (p= 0.059) or protein intake (p= 0.327). Meanwhile, peer support has a significantly negative correlation with carbohydrate intake (r= -0.616; p= 0.023), fat intake (r= -0.79; p= 0.042), and protein intake (r= -0.216; p= 0.023). The study concluded that peer support has a stronger influence on macronutrient consumption patterns than family support. Therefore, nutritional interventions for overweight adolescents should consider the social environment, particularly by involving peers in fostering healthier eating habits.

Keywords: adolescents, family support, macronutrient intake, overweight, peer support

INTRODUCTION

Overweight is an important issue related to future health. It serves as a reflection for individuals and policymakers in addressing the problem of overweight in Indonesia. Currently, overweight and obesity have become global health issues [1], and have become one of the leading causes of death worldwide since overweight has developed into an epidemic with complex links to various aspects [2]. This condition can occur across multiple groups, particularly among adolescents [3]. The prevalence of overweight and obesity among adolescents in Indonesia has increased steadily each year [4]. Data from the 2023 Indonesian Health Survey (IHS) showed a rise in the prevalence of overweight and obesity among adolescents aged 13 – 18, with 12.1% classified as overweight and 4.1% as obese [5]. Interventions are currently needed to control the increasing prevalence of overweight and obesity among adolescents, which is driven by unbalanced eating patterns and increasingly sedentary lifestyles. Social and environmental factors, including family and peer support, play a crucial role in shaping eating habits that can influence the balance of macronutrient intake in overweight adolescents.

Proper macronutrient intake plays a vital role in adolescent growth and development. Carbohydrates, proteins, and fats, which are the main macronutrients, should be consumed in balanced proportions to maintain health and prevent excessive weight gain. An imbalance in macronutrient intake, such as consuming too much fat and carbohydrates while lacking sufficient protein, may lead to weight gain and increase the risk of metabolic disorders later in life [6]. The dietary habits established during adolescence can have long-term effects on health in adulthood [7]. Ludwig et al. (2018) explained that a diet high in refined carbohydrates and saturated fats is associated with increased insulin resistance, chronic inflammation, and metabolic dysfunction, which can trigger obesity and other metabolic diseases, such as type 2 diabetes and cardiovascular disease [8]. Dietary patterns are one of the factors that affect body weight. A healthy diet is correlated with good nutritional intake and quality.

Adolescents' lifestyles are also influenced by their social environment, particularly by their peers. Peers play a crucial role in shaping adolescent eating habits, especially in influencing the selection of unhealthy foods that can lead to disrupted eating patterns and an increased risk of overweight and obesity. Adolescents tend to adopt eating habits from their friends, both in terms of food preferences and daily consumption patterns. If their peers frequently consume fast food or sugary drinks, they are likely to follow the same pattern [9]. Additionally, family support plays a crucial role in shaping healthy lifestyle habits among adolescents. Families that provide emotional support and accurate

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information can help adolescents manage their weight more effectively. Moreover, families play a significant role in establishing adolescents eating habits [10].

Surabaya, as one of the major cities in Indonesia, also faces the issue of adolescent overweight. According to data from the Central Statistics Agency in 2023, the adolescent population in Surabaya reached 600,000 people [11]. Meanwhile, data from the Indonesian Ministry of Health (2023) showed that the prevalence of overweight and obesity among adolescents aged 13–15 in Surabaya increased from 13.35% in 2018 to 23.4% in 2023 [5]. Excessive energy intake in adolescents increases the risk of obesity by 2.97 times compared to those with adequate energy consumption. Additionally, frequent fast food consumption has been found to raise the risk of obesity by 4.412 times [12]. The modern urban lifestyle is often associated with increased fast food consumption, low levels of physical activity, and unhealthy eating habits [13].

Based on the explanation above, this study is essential to understand the relationship between family and peer support towards macronutrient intake in overweight adolescents in Surabaya. The findings of this study are expected to provide a foundation for more effective prevention and intervention efforts in addressing overweight issues among adolescents. This will not only help improve the quality of life for overweight adolescents but also reduce the risk of non-communicable diseases in the future.

METHODS

This study used an observational analytical design with a cross-sectional approach. It was conducted at public junior high schools in Surabaya from January to February 2025. The study population consisted of all adolescents in Surabaya. The schools selected as research sites were chosen based on data from community health centers with the highest prevalence of overweight adolescents, as reported by the Surabaya Health Office, with a total of three selected schools. Samples were randomly selected based on inclusion and exclusion criteria until a total of 110 overweight adolescents was reached. Based on the stratified proportion formula, the sample sizes for each of the three junior high schools are 47 students, 38 students, and 25 students [14]. The inclusion criteria included adolescents who were not following a diet or a weight gain/loss program, lived with their families, resided in Surabaya; were between 13 and 15 years old, and had a BMI-for-age (IMT/U) greater than +1SD. The exclusion criteria were adolescents with chronic diseases that could affect food consumption and those who smoked or consumed alcoholic beverages.

The researcher conducted the informed consent process orally with respondents who met the inclusion criteria. Before signing the consent form, the researcher ensured that the information was delivered comprehensively and in language that was easily understood by adolescents. To confirm their understanding, the researcher implemented an evaluation through a brief question-and-answer session before the respondents provided their consent. Formal parental or guardian approval was not required, as the study subjects were 13–15 years old, in good health, and able to communicate effectively. Additionally, school teachers acted as witnesses during the informed consent process to ensure that the procedure was carried out in accordance with the applicable regulations

The sampling technique used was purposive sampling. Anthropometric measurements for weight were taken using a digital scale, while height was measured using a stadiometer. Body Mass Index-for-age (BMI/U) was calculated and entered into the WHO AnthroPlus program to obtain z-scores. The z-scores value for the variable of overweight nutritional status is categorized based on the Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2020 on Child Anthropometric Standards [15]

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The measurement of macronutrient intake over the past month was conducted using the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ). Interviews were carried out with the aid of a food photo book to obtain information on portion sizes consumed during the last month. The NutriSurvey 2007 program was used to process the interview data to determine the amount of macronutrient intake, which was then compared to the Recommended Dietary Allowance (RDA) to calculate the percentage of macronutrient intake [16].

The family and peer support questionnaires were adopted from studies by Heratama et al. (2020) and Wiguna et al. (2022) [17] [18]. Each questionnaire statement had five response options with the following criteria: 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Very Often. Before being used in the study, the questionnaire underwent validity and reliability testing with 40 respondents. The validity test showed a high level of validity (r table > r calculated) [14], while the reliability test, conducted using Cronbach's Alpha, resulted in Alpha values of 0.935 and 0.972, respectively.

The research data were analyzed using SPSS 27. After data collection, data processing was conducted in the form of scoring and analyzed to examine the relationship between the discussed variables using Pearson correlation tests. This study received ethical approval from the Faculty of Medicine, Universitas Sebelas Maret, with approval number 03/UN27.06.11/KEP/EC/2025.

RESULT

Table 1. Respondents' Characteristics

Respondents' Characteristics	n	%
Gender		
Male	53	48.2
Female	57	51.8
Nutritional Status		
Overweight	49	44.5
Obesity	61	55.5
Age		
13 years old	40	36.4
14 years old	55	50.0
15 years old	15	13.6
Mother's Education Level		
Elementary (Elementary School, Junior High School)	11	10.0
Middle (Senior High School/ Vocational High School)	61	55.5
High (Collage)	38	34.5
Father's Education Level		
Elementary (Elementary School, Junior High School)	14	12.7
Middle (Senior High School/ Vocational High School)	60	54.5
High (Collage)	36	32.7
Parents' Income		
< Regional Minimum Wage	39	35.5
≥ Regional Minimum Wage	71	64.5
Family Support		
Low (x < mean)	62	56.4
High (x ≥ Mean)	48	43.6
Peer Support		
Low (x < mean)	60	54.5
High (x ≥ mean)	50	45.5

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Table 1 presents the characteristics of the 110 respondents studied, with an almost balanced gender distribution: 53 male respondents (48.2%) and 57 female respondents (51.8%). Based on nutritional status, 49 respondents (44.5%) were classified as overweight, while the majority, 61 respondents (55.5%), fell into the obesity category. In terms of age, most respondents were 14 years old (50.0%), followed by 13 years old (36.4%) and 15 years old (13.6%). Regarding parental education levels, the majority of mothers (55.5%) and fathers (54.5%) had secondary education (high school/vocational school), while 34.5% of mothers and 32.7% of fathers had higher education. Meanwhile, a small portion of parents had only primary education, with 10.0% of mothers and 12.7% of fathers in this category. Economically, 71 respondents (64.5%) came from families with incomes above the Regional Minimum Wage (RMW), while 39 respondents (35.5%) had incomes below the RMW.

In the social aspect, family and peer support indicate that more than half of the respondents (56.4%) received poor family support, while 43.6% had good family support. A similar trend was observed in peer support, where 54.5% of respondents experienced poor support, while 45.5% received good support. The majority of respondents faced limitations in obtaining positive social support, both from family and peers, which could potentially influence their macronutrient intake patterns.

Table 2. Descriptive Analysis of Variables

Variables	n	Mean ± SD	Min	Max
Family Support	110	54.9 ± 10,8	36	81
Peer Support	110	49.8 ± 9,9	30	69
% Carbohydrate Intake	110	116.2 ± 15,9	78.9	149.4
% Fat Intake	110	118.2 ± 18,3	72.5	169.0
% Protein Intake	110	92.6 ± 18,7	58.6	129.2

Table 2 presents the results of the descriptive analysis of the independent and dependent variables. The descriptive analysis of this study shows that the average score of family support received by respondents was 54.9 ± 10.8, with a score range between 36 and 81. Meanwhile, peer support had an average score of 49.8 ± 9.9, with a minimum score of 30 and a maximum of 69. These results indicate that the level of family support tends to be higher than peer support among overweight adolescents.

Regarding macronutrient intake, the average percentage of carbohydrate intake was 116.2 ± 15.9, ranging from 78.9% to 149.4%. Fat intake showed the highest average value, at 118.2 ± 18.3, with a range of 72.5% to 169.0%. Meanwhile, protein intake had an average of 92.6 ± 18.7, with a range of 58.6% to 129.2%. Overall, the percentage of macronutrient intake tends to exceed the recommended nutritional adequacy, particularly in fat and carbohydrate intake.

Table 3. Bivariate Test of Family and Peer Support with the Percentage of Macronutrient Intake in Overweight Adolescents

Variables	% Carbohydrate Intake		% Fat Intake		% Protein Intake	
	r	p-value	r	p-value	r	p-value
Family Support	-0.208	0.030	-0.381	0.059	-0.184	0.327
Peer Support	-0.616	0.023	-0.79	0.042	-0.216	0.023

The study results show that the most frequently consumed carbohydrate sources among adolescents in Surabaya include white rice, instant noodles, plain bread, and flour-based snacks such as biscuits and chips. The consumption of high-sugar foods, such as packaged sweet drinks and sweetened tea, is also relatively high among respondents. Meanwhile, the most commonly consumed fat sources come from fried foods and fast food, such as fried chicken and French fries. Additionally, the intake of processed foods high in saturated fat, such as sausages and nuggets, is also considerably high among adolescents

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Table 3 presents the results of the bivariate correlation test, showing that family support has a significant negative relationship with the percentage of carbohydrate intake in overweight adolescents (r = -0.208, p = 0.030). This indicates that lower family support is associated with higher carbohydrate intake. However, the relationship between family support and fat or protein intake was not significant. The correlation between family support and fat intake had an r-value of -0.381 with p = 0.059, while for protein intake, the r-value was -0.184 with p = 0.327.

Peer support showed a stronger negative correlation with macronutrient intake compared to family support. Peer support had a significant negative relationship with carbohydrate intake (r = -0.616, p = 0.023), meaning that adolescents with higher peer support tended to consume fewer carbohydrates. Additionally, peer support also had a significant negative relationship with fat intake (r = -0.79, p = 0.042) and protein intake (r = -0.216, p = 0.023).

DISCUSSION

The study results indicate that the majority of respondents were female (51.8%), with obesity being more dominant than overweight. Most respondents came from families with a middle education level, both mothers (55.5%) and fathers (54.5%). Economically, the majority of families had an income above the regional minimum wage (64.5%). These characteristics align with previous research, which suggests that adolescents from higher socioeconomic backgrounds tend to have greater access to high-calorie foods and engage in less physical activity, contributing to overweight and obesity [19]. Additionally, females are more likely to have overweight/obesity status due to their higher body fat proportion compared to males. This is influenced by biological factors and the role of estrogen in fat storage, particularly in the hip and thigh areas [20]. This hormone increases the activity of lipoprotein lipase (LPL) in subcutaneous adipose tissue, which is responsible for facilitating the uptake of free fatty acids and storing them as triacylglycerol (TG) in fat cells. The increased LPL activity leads to greater fat accumulation in these areas, contributing to obesity with a female-specific fat distribution pattern [21].

Family support had an average score of 54.9 ± 10.8, while peer support was slightly lower, with an average of 49.8 ± 9.9. The average macronutrient intake showed that carbohydrate, fat, and protein consumption exceeded the recommended levels. This condition reflects the dietary patterns of overweight adolescents, which tend to be high in energy, particularly from carbohydrate and fat sources such as instant noodles, flour-based snacks (biscuits and chips), fried foods, fast food, packaged sweet drinks and sweetened tea. A healthy diet is correlated with good nutrient intake and quality. Proper dietary habits that meet adolescents' nutritional needs can help protect them from chronic diseases in the future [22]. Conversely, poor eating habits can lead to nutritional problems due to an imbalance between nutrient intake and adolescents' nutritional needs, especially excessive consumption of high-calorie, fatty, and sugary foods combined with inadequate fiber intake. In the modern era, adolescent eating patterns are often influenced by factors such as the availability of fast food, frequent dining out, and exposure to unhealthy food advertisements [23].

Family support is an external factor that can influence the percentage of macronutrient intake, which in turn affects the nutritional status of adolescents. Bivariate analysis results indicate a significant negative relationship between family support and carbohydrate intake, suggesting that inadequate family support tends to result in excessive carbohydrate consumption. This finding relates to the role of families in regulating adolescents' food intake. Research by Herlina (2022) [24] also highlights that family involvement in meal planning can help reduce the consumption of fast food and high-sugar foods. Strong family support can encourage adolescents to adopt healthy

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eating patterns, such as consuming more fruits and vegetables while avoiding high-calorie, low-nutrient foods [25]. Conversely, inadequate family support or the presence of unhealthy eating habits within the family can negatively impact adolescents' dietary patterns. Additionally, parents play a crucial role as role models influencing adolescents' food choices, shaping their perceptions and eating habits. They attended school from morning until late afternoon, Monday to Friday. On certain days, extracurricular activities extended their time outside until the evening. This reduced family interactions and led adolescents to rely on their pocket money to independently access food [26].

Meanwhile, peer support exhibits a significant negative relationship with all types of macronutrient intake. The stronger negative correlation compared to family support suggests that peers have a greater influence on the eating patterns of overweight adolescents. These findings align with the study by Erni Nomate et al. (2017), which states that peers play a role in shaping social norms related to food consumption, as adolescents tend to adjust their eating habits based on their social environment [9]. Beyond food choices, adolescents are also highly susceptible to peer influence in terms of physical activity levels. A social environment that does not encourage exercise or physical activities may lead adolescents to spend more time on sedentary activities, such as using gadgets or watching television [27].

One of the changes that occur during adolescence is that teenagers spend more time outside the home with their peers. One of the activities they engage in with their peers is eating together. This activity often takes place at school or other locations with friends. Eating together with peers can influence unhealthy food choices, which in turn affects weight gain [28]. Peers have a strong influence on adolescents, as they can shape both positive and negative behaviors and habits related to dietary patterns. They can influence snack consumption as well as the intake of high-calorie and high-fat foods, which may contribute to excessive carbohydrate and fat intake [29].

This study has several limitations, including its cross-sectional design, which does not allow for a direct determination of causal relationships. Additionally, the sample is limited to a single city, making it difficult to generalize the findings to a broader population. Furthermore, other potential factors influencing adolescents' dietary patterns, such as psychological aspects, school environment, and physical habits, have not been fully explored in this study. Nevertheless, this research offers valuable insights by providing a specific analysis of the influence of social support on macronutrient consumption patterns among overweight adolescents. The findings have important implications for obesity prevention and intervention efforts, particularly those utilizing a social environment-based approach. The significant relationship between peer support and macronutrient intake suggests that nutrition education strategies should incorporate peer groups to foster healthier eating habits.

CONCLUSION

This study shows that family support has a negative relationship with carbohydrate intake in overweight adolescents but does not significantly affect fat and protein intake. On the other hand, peer support has a stronger and more significant negative correlation with all types of macronutrient intake. This indicates that peers have a greater influence in shaping eating patterns, particularly in the percentage of macronutrient intake in overweight adolescents, compared to family support. Therefore, nutritional interventions should involve the role of peers to encourage healthier eating habits.

Future research is recommended to adopt a longitudinal design to more accurately identify the causal relationship between social support and macronutrient intake patterns among overweight adolescents. Additionally, the study scope can be expanded by involving samples from various regions to enhance the generalizability of the findings to a broader population. Other factors that may influence adolescent eating habits, such as

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psychological aspects, physical activity, social media influence, and school and family environments, should also be examined in greater depth. The use of qualitative methods, such as in-depth interviews or focus group discussions, could complement quantitative data by providing deeper insights into adolescents' perspectives on their eating patterns and the social support they receive. Furthermore, future studies could develop peer-based interventions combined with nutrition education to assess the effectiveness of social approaches in fostering healthier eating habits among overweight adolescents.

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