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Unhealthy Food Consumption Pattern and Nutritional Status among Adolescents: A Cross-sectional Study

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Abstract

AIM: Nutritional balance is needed during adolescence for health and optimal growth. The aim of the study is to analyze the nutritional status and food consumption patterns of adolescents in Luwuk.

METHODS: This study was conducted with a cross-sectional design involving 385 adolescents at four high schools (Grade 10–12). The sample was divided into four schools and selected by convenience sampling method. Food consumption patterns were assessed using a World Health Organization-designed Global School-based Student Health Survey questionnaire (modified for Indonesia). Nutritional status is based on the results of anthropometric. Data were analyzed using frequency distribution and inferential analysis.

RESULTS: Of the total 385 adolescents studied, there were 4.7% adolescents overweight and 2.3% were obese. On the other hand, there are also 10.6% thin adolescents and 4.4% with very thinness. About 49.9% of adolescents do not consume fruit, 22.3% do not eat vegetables, 23.5% drink soft drinks with carbonated >1 time per day, 54.8% eat fast food >1 day a week, 66.5% rarely or never breakfast, 58.2% never bring lunch, and 18.7% usually eat street snacks.

CONCLUSION: Some adolescents in Luwuk City had nutritional problems and unhealthy food consumption patterns. A nutritional surveillance program is needed for adolescents which includes monitoring nutritional status, consumption patterns, and risk factors related to nutrition.

Introduction

Adolescents are residents ranged from 10 to 19 years old [1], [2]. The proportion of adolescent age groups is 18% in the composition of the population. This means that around one-fifth percent of Indonesia's population is teenagers, and this is a challenge especially in terms of health. Nowadays, the population of adolescents in the world continues to increase and is the largest in the history of the generation. About 90% of this population lives in developing countries with the majority of the population being a low- and middle-income [3], [4].

Adolescence is characterized by a process of growth and development that quickly occurs both physically, psychologically, and intellectually. Therefore, adequate and balanced nutrition is needed, including calories, protein, and various micronutrient substances. Various health problems in adolescents are related to the fulfillment of balanced nutritional needs. For both boys and girls, nutritional problems often occur including teens, thin, overweight/obese, and anemia. The high prevalence of overweight and obesity among adolescents has consistently been shown by several research results [5], [6], [7]. Adolescents who experience overweight and become obese have a chance twice as much to experience obesity in adulthood. This poses a significant risk to long-term health effects such as Type II diabetes, polycystic ovary syndrome, cardiovascular disorders, hypertension, and coronary artery disease [8]. The consumption of high-calorie foods will also result in iron deficiency (anemia) in obese adolescents. Anemia is also caused by menstrual processes in young women and also associated with low consumption of iron sources such as meat and a strict vegetarian diet [9].

In Indonesia, the nutritional status of adolescents is still a problem. Based on Indonesia's baseline health research 2018, the proportion of thinness and severe thinness adolescents was 6.7% and 1.4%. This is decreased compared to the 2013 basic health research data, which were 7.5% and 1.9%. On the other hand, there was an increase in the incidence of obesity, which was 7.5% in 2013 to 13.5% in 2018 [10], [11]. These problems are also still found

in Luwuk City. The prevalence of obesity is an increase between 2016 and 2017, from 22.9% to 34.3%. In men, the prevalence of obesity became 30.4% and in women 37.0% [12], [13].

Nutritional problems in adolescents mentioned above are strongly related to psychosocial factors. Adolescent groups often use lifestyle or environmental influences considerations in every decision-making, one of which is in choosing food. Health factors are not the main consideration for this group to determine what they will eat or in terms of other behaviors. Some adolescents have different perceptions in assessing and addressing their weight problems, so that bodyweight is not considered as a health problem until obesity or malnutrition (thin). Social norms also play a role in influencing health and adolescents' prosperity [3]. The tendency of sedentary lifestyles that are influenced by the environment, especially the social environment, is a major factor in the formation of these deviant behaviors.

At present, there are not many studies that specifically identify and compare the consumption of unhealthy foods in adolescents both in general and by gender, which will contribute to certain prevention efforts. Therefore, this research is aimed to identify the nutrition status and food consumption pattern of adolescents. Thus, it can be the basis for further analyzing nutritional problems in adolescents and formulating appropriate interventions.

Methods

Study design

The research identifies the nutritional status and food consumption pattern among boys and girls with a cross-sectional design. Food consumption patterns including consuming fruit and vegetables, fast food, drinking a carbonated drink, having breakfast routinely, bringing a lunch box to school, and a habit to consume street food on the sideway stall. The sample calculation used a proportion of 50% (p = 0.5) and obtained 385 adolescents aged 15–18 years. The sampling technique was done by the convenience sampling method. That is, all students meet and are willing to take part.

Study measures

This research is a part of an adolescent health survey done by the Public Health Faculty of Tompotika Luwuk Banggai University. This has been done from May to June 2018, to four public high schools in Luwuk involving 20 students from the university as surveyors. The research is started by respondents to fulfill and sign informed consent. It is continued with anthropometric measurements and a fulfilling questionnaire by respondents. After all, the questionnaires were collected by the surveyor and entered into sealed envelopes.

Nutritional status is assessed with the anthropometric method. Anthropometric measurements using weight scales, microtoise, and abdominal circumference measuring instruments. For assessing food consumption patterns, we used a "World Health Organization-designed Global School-based Student Health Survey questionnaire" (modified for Indonesia) [14], [15]. This has been standardized [10]. The questionnaire is started with questions about the general characteristic of respondents. On the second page and onward, it is contained closed research questions with a different choice of answers to each item question. The questions about the routine of consuming fruit, vegetables, and soft drink with seven answer choices starting from never, less than once, once, twice, three times, four times, and more than or equal to five times consumptions. The questions about fast food consuming habits with eight options of answer choices are started from 0, 1, 2, and onward to 7 times in the past 7 days. Having breakfast habits, bringing the lunch box, and consuming street food are questioned with five different answers, such as never, rarely sometimes, often, and always. The questionnaire was filled out by the subject (adolescent) for 25–30 min.

Definition used

Fruit consuming habit is defined in the past 30 days of consuming for fruits such as banana, orange, watermelon, pineapple, or other fruits; vegetables consuming habit is defined in the past 30 days of consuming for vegetables such as carrot, spinach, caulis flower, water spinach, or other vegetables; soft drink consuming habit in this research is consuming carbonated drinks such as Coca-Cola, Sprite, Fanta, and Big Cola (diet coke is not included); fast food consuming habit such as fried chicken (KFC, Texas Fried chicken, CFC, Mc Donald, Burger King, A&W, pizza, and the other which consumed in the past 30 days; and street food consuming habit is defined as the habit of consuming food from the sideways food stalls near the respondents' school.

Nutritional status is determined based on results of body mass index (BMI) analysis according to the age which is calculated using the Z-score table. BMI is classified into five categories of nutritional status, namely, severe thinness, thinness, normal, overweight, and obesity.

Analysis

Data processing is done first before doing analysis, which is started by coding, entering, and cleaning the data phase. It continues with data analysis descriptively (univariate). Variable with continuous data types is analyzed by calculating mean value and standard deviation. While variables with categorical

data types are percentage calculation accompanied by 95% confidence interval. Chi-square analysis is used to test the proportion difference of food consumption patterns on gender groups. All statistical tests used SPSS v.20 with a significant level of $p < 0.05$.

Ethical clearance

The Institute for Research and Community Service at Tompotika Luwuk Banggai University provides an exception for ethical studies in this study which is stated in letter number 055/LP2M-UNTIKA/A/II/2018. To guarantee the rights and obligations of respondents, we offer informed consent to respondents who agree to participate and entrust their information to us. An explanation of the research was described before the consent form was signed.

Results

Three hundred and eighty-five students' data are obtained as research respondents which distributed into 85 students of SMAN 1 LUWUK, 98 students of SMAN 2 Luwuk, 102 students of SMAN 3 Luwuk, and 100 students of SMKN Luwuk.

Sociodemographic

The average age of adolescents involved in this study is 16.5 (SD = 0.9). There is no difference in the average age between the two groups. It is seen that the average family income for adolescent boys is higher than for adolescent girls (IDR 2,550,000 and IDR 1,970,000). The average size weight and height of adolescent girls (48.3 kg and 155.5 cm) is smaller than boys (51.9 kg and 163.4 cm). The most of the adolescents between the two groups measured their height and weight in the past 12 months (73.5%). On average, girls feel hungry more often than boys (Table 1).

Table 1: Characteristics and nutrition status of adolescents

Variables	Mean (SD) or n (%)			p-value*
	Male (n = 139)	Female (n = 246)	Total (385)	
Age (years)	16.3 (0.9)	16.1 (0.8)	16.5 (0.9)	0.418
Family income (IDR)	2,550,000 (2,930,000)	1,970,000 (1,710,000)	2,180,000 (2,240,000)	0.637
Habit of measuring height and weight (**)				
Yes	86 (61.9)	197 (80.1)	283 (73.5)	0.680
No	53 (38.1)	49 (19.9)	102 (26.5)	
Feel Hungry (**)				
Never	59 (42.4)	101 (41.4)	160 (41.6)	0.658
Rarely	13 (9.4)	26 (10.6)	39 (10.1)	
Sometimes	55 (39.6)	99 (40.2)	154 (40.0)	
Often	6 (4.3)	15 (6.1)	21 (5.5)	
Always	6 (4.3)	5 (2.0)	11 (2.9)	
Anthropometric measurements				
Weight (kg)	51.0 (9.5)	48.3 (20.9)	49.2 (17.7)	
Height (cm)	163.4 (9.2)	155.5 (7.8)	158.6 (9.1)	
BMI (kg/m^2)	19.2 (3.7)	19.4 (3.3)	19.33 (3.4)	

*Correlation with nutritional status (ANOVA one-way for age and family income; Chi-square for Habit of measuring and Feel hungry and). **Proportion (n(%)).

Nutritional status

There is a similar pattern of the nutritional status between boys and girls as well as in total (Figure 1). However, the difference is seen in the proportion. Overall, there are 10.6% of thinness adolescents and 4.4% are severe thinness. Based on gender, the proportion of thinness in boys is higher than girls, respectively, at 13.7% and 8.9%. Likewise, on severe thinness proportion are more in boys compared to girls are 6.5% and 3.3%. Obesity is also more likely to occur in boys with a proportion of 3.6% compared to 1.6% in girls. Although being overweight is more common in girls (5.3% vs. 3.6%). This study did not analyze the statistical significance of these differences. Overall, there was no significant difference in age and income level based on the nutritional status of adolescents. The results of this study also showed that the nutritional status of adolescents was not related to the habit of measuring height and weight and feel hungry (Table 1).

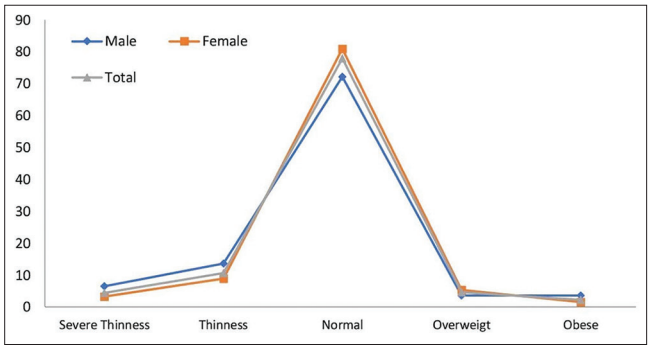

*Figure 1: Nutritional Status of Adolescents by Gender. **Nutritional Status measured based on Body Mass Index. Severe Thinness: <-3SD; Thinness: <-2SD; Normal: -2SD - <+1 SD; Overweight: +1SD - +2SD; Obes: >+2SD*

Food consumption pattern in adolescents

This study identifies the pattern of food consumption among adolescents. Table 2 shows that girls are better than boys in the proportion of consuming fruit, vegetables, carbonates drinks, breakfast, and bringing lunch habits. The proportion of boys who consumes fruits and vegetables less than once a day is 53.2% and 25.9% higher than a girls which is 48% and 20.3%. However, this difference was not statistically significant ($p > 0.05$). The habit of drinking carbonated soft drinks is also seen more frequently in boys (one or more times a week) with a proportion of 27.3% compared to a woman with a proportion of 21.1%. This difference in proportion is also not statistically significant ($p > 0.05$). The habit of eating fast food also shows the same. There is no difference between boys and girls ($p > 0.05$). Eating fast food 2 days or more in a week is more by men with a proportion of 30.2% compared to a woman with a proportion of 28.5%. Boys are less or never had breakfast in the past 30 days (69.1% vs. 65.0%), and this is no different statistically with girls ($p > 0.05$). The significant difference ($p < 0.05$) only in habits

Table 2: Unhealthy food consumption pattern by gender

Food Consumption Pattern	Total % (95% CI)	Girls (n = 139) % (95% CI)	Boys (n = 246) % (95% CI)	p-value*
Consume fruits less than once per day	49.9 (44.9–54.9)	53.2 (44.9–61.5)	48.0 (41.8-54.2)	0.375
Ate vegetables less than one time per day	22.3 (18.1–26.5)	25.9 (18.6–33.2)	20.3 (15.3–25.3)	0.257
Drank carbonated soft drinks one or more times per day	23.4 (19.2–27.6)	27.3 (19.9–34.7)	21.1 (16.0–26.2)	0.209
Ate fast food two or more days in a week	29.1 (24.6–33.6)	30.2 (22.6–37.8)	28.5 (22.9–34.1)	0.804
Rarely or even never eat breakfast	66.5 (61.8–71.2)	69.1 (61.4–76.8)	65.0 (59.0–71.0)	0.490
Never bring lunch	65.2 (60.4–70.0)	83.5 (77.3–89.7)	54.9 (48.7–61.1)	0.001
Have a street food habit	18.7 (14.8–22.6)	18.7 (12.2–25.2)	18.7 (13.8–23.6)	1.000

*Analyze using Chi-square test

of not bringing food to school is higher in boys with a proportion of 83.5% compared to the girls at 54.9% ($p < 0.05$). The snacks on the sideway only show a small proportion of 18.7% and do not differ between boys and girls (Table 2).

Discussion

Nutrition problems in boys are higher than girls. Adolescent boys have a higher incidence of obesity than women (Figure 1). These results are consistent with research conducted by Aryati *et al*. (2017) where the proportion of obesity is higher in boys than females both in urban and rural areas [16]. However, there are also other studies with conflicting results. Possible explanations are differences in determining the age limit of research subjects or adjustments to other demographic characteristics. The high incidence of obesity in the adolescent boy's group is in line with the unhealthy diet in the group. The majority of unhealthy dietary behaviors, mostly among boys including low consumption of fruits and vegetables, have a habit of consuming soft drinks on average once or more a day and eating fast food in 2 days or more a week. On the other hand, there is still a low habit of eating fruits and vegetables in adolescents. Several studies have shown that the prevention of excess weight is associated with the habit of consuming fruits and vegetables [17], [18]. Fruit contains fiber, various vitamins, and antioxidants play a role in the prevention and reduction of the risk of various diseases such as cardiovascular, diabetes, and obesity. Consumption of fruits and vegetables creates a feeling of satiety and thus lowers calorie intake. This is associated with fiber content in the fruit [19]. However, the combination of fruit and sugar, for example, in serving juice drinks will still have a negative effect, namely, increasing the sugar content in the body [20]. To grow the habit of eating fruits and vegetables especially in urban areas, one of which is determined by the availability of these foods [21]. In addition, the pattern of fruits and vegetable consumption also involves the participation of the family in the form of eating habits in the family and parenting since childhood [22].

Unhealthy dietary habits cause problems in body metabolism, psychologically can also affect the individual to change by consuming healthy and nutritious foods and drinks such as milk, vegetables, and fruits. Consumption of carbonated soda drinks contributes to various health problems. Sugar-sweetened beverages (SSBs), especially higher carbonated soft drinks, are related to weight raising and obesity [23]. SSBs increase postprandial glucose levels and decrease insulin sensitivity. In addition, it causes a decrease in satiety and overeating. These low-energy drinks stimulate a delayed hunger process so that they can push the frequency increase and food portions. The incidence of obesity is more common in people with the high levels of food consumption, especially in urban communities [24], [25]. Luwuk is one of the urban areas in Indonesia. The population growth rate reaches 1.73% per year (this figure exceeds the Indonesian population rate of 1.49% per year). Luwuk city's economic level has increased in the past 10 years. This is also possible because of the presence of a foreign company in the oil and gas sector located in Luwuk City. There are also many shopping center and fast-food restaurants in Luwuk City.

Breakfast is related to the greater nutritional intake needed throughout the day. The body will be protected from various risks of disease, especially cardiometabolic. Fiber consumed at breakfast will bind to bad cholesterol in the body and get rid of it. Breakfast also plays a role in weight control. People who are used to breakfast will have a healthy and balanced diet. Breakfast will prevent excessive hunger during the day and night. A healthy and fiber-rich breakfast (composition: Fruits, vegetables, cereals, grains, etc.) can prevent abdominal obesity. Cognitive function was also associated with breakfast habits. Breakfast is the first intake after the body has fasted all night. At breakfast, the brain again gets the nutrients that it needs. Based on gender, women pay more attention to breakfast habits, both menu and frequency [26], [27], [28].

In this study, adolescent boys have lower breakfast habits and bring food to schools. So that the intake of calories, protein, etc., which is needed by the body every day is less than in adolescent girls. Adolescent girls tend to pay more attention to body posture and appearance so they can maintain their weight more. It is also known that the proportion of adolescents whose height and weight were measured in the past 12 months was higher in girls than boys.

The problem of adolescent behavior that is at risk of the occurrence of various nutritional problems needs attention. Especially, for adolescents who go to school, prevention and resolution efforts can be carried out by the need for subjects that contain health, especially adolescent health, in this case, knowledge

of healthy eating patterns and how to fulfill balanced nutrition in adolescents can be included; application of regulations regarding restrictions on food providers in the school environment. The canteen that provides various food choices must be controlled and swept so it would not sell non-nutritious foods; and monitoring nutritional problems by supervising and evaluating the health of school residents, especially students through nutrition surveillance in schools.

In addition to the efforts made in schools, efforts to strengthen education in the health sector can also be done through the provision of persuasive health messages by utilizing electronic media which is currently widely accessed mainly by teenagers. Thus, it is expected that nutritional problems in adolescents can be reduced. As a suggestion in further research, it is necessary to carry out similar research by taking into account the distortion effects of smoking behavior, physical activities, and other individual characteristics.

Some limitations occur in this study. This study is cross-sectional so that unhealthy consumption patterns cannot be justified as a cause of obesity or thinness in adolescents. Assessment of consumption patterns using a questionnaire is faced with the problem of recall bias. Lack of quantitative food measurements can lead to information bias.

Conclusion

Some adolescents in Luwuk City had nutritional problems (thinness and obesity) and unhealthy food consumption patterns. About 49.9% of adolescents do not consume fruit, 22.3% do not eat vegetables, 23.5% drink soft drinks with carbonated >1 time per day, 54.8% eat fast food >1 day a week, 66.5% rarely or never breakfast, 58.2% never bring lunch, and 18.7% usually eat street snacks. Conversely, consumption of fast food and carbonated drinks is still high. This habit is more common in boy's adolescents than girls. A nutritional surveillance program is needed for adolescents which includes monitoring nutritional status, consumption patterns, and risk factors related to nutrition. Persuasive health education is needed by utilizing electronic media which is currently widely accessed, especially by teenagers.

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