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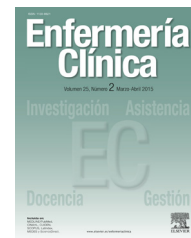
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Inadequate nutrients intake and wasting status among adolescent students in Small Island of Indonesia[☆]



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Abstract

Objective: The study aimed to explore nutrients intake and wasting among adolescent students in a small island of Makassar city, South Sulawesi Province, Indonesia.

Methods: The study involved 103 students grade 8th and 9th using cross sectional design. Nutrients (calorie, protein, and lipid) intake was collected within two consecutive days using food recall 24 h questionnaire. It was analyzed using Nutrisurvey and categorized based on Indonesian Recommended Dietary Allowance (RDA) for adolescents. Categorization of wasting was based on the WHO Reference 2007 BMI for age. Chi-square and T-test were performed to test the variables.

Results: Mean age of sample was 13.5 ± 0.6 years and mostly girls. Majority of fathers' occupation was fisherman and mothers as housewife which have monthly incomes less than minimum wages of city. Only 24.5% and 13.6% of adolescents consume adequate calorie and protein, respectively. Bivariate analysis showed that there the significant correlation between gender, have urticarial and nutrients intake ($P < 0.05$). However, diarrhea, mother educational level, monthly parents' wages and wasting were not correlate with nutrients intake ($P > 0.05$).

Conclusion: Adolescents living in small island are prone to inadequate nutrient intakes, particularly calorie and protein. Gender and urticarial are correlated significantly with nutrient intakes.

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Introduction

Adolescents' period is a time of major physical and cognitive change when health related behavior such as eating pattern may be adopted. Nutrient requirements increase from childhood because of physical growth, and behaviors acquired during this period persist into adulthood.¹

Levels of unhealthy eating pattern are rising in many countries. The Indonesia national data revealed that percentage of calorie intake less than 70% of Recommended Daily Allowances (RDA) among adolescents was 52.5%.² These unhealthy eating habits may lead to negative health consequences such wasting (thin).

Data from Indonesian Ministry of Health revealed that, in 2017 national prevalence of wasting among adolescents in aged 13–15 years old was 9.3%. South Sulawesi Province also showed the high prevalence of this nutritional problem among adolescents. Prevalence of wasting was 13.5%.³

Wasting children have bigger opportunity to consume fatter intake that lead to weight gain. A long time consequence of wasting and stunting children is calorie imbalance and increasing obesities risk in adults.⁴ Effect of malnutrition among adolescent students may prone in lower participation in school that affect in low human resources in the future.⁵

The availability of complete data on malnutrition among adolescents will give an opportunity on prevention effort of this problem. However, it is very rare of the study focused on exploration of nutritional status and nutrient intake among adolescents particularly in Small Island. Therefore, the study aimed to explore nutrients (calorie, protein and lipid) intake and nutritional status among adolescent students in Small Island of Makassar City.

Methods

Design, sample and study setting

The study used cross sectional design which was conducted in a Junior High School in Barrang Lompo Island, located in one district of Makassar City. Makassar City is a municipality of South Sulawesi Province, one of area located in middle part of Indonesia. Barrang Lompo is an island that nearest and its distance is around 13 kilometers from sea shore of Makassar City and can be reached by regular public ship in approximately two hours. The area is approximately 19 hectares with around four thousand inhabitants.

Using formula for survey design,⁶ the study involved 103 students which selected proportionally from grade 8th and 9th. Those who become sample study fulfill the inclusion criteria such as availability of approval from principal as well as parents, aged 12–14 years old, do not suffer from chronic illness at the time of the study (checked by the medical doctor), currently stay in the island, agreed and voluntary to participate in the study.

All selected adolescent attended the activity which carried out in school without disturbing their school hours. A team which consist of the field coordinator, two enumerators, and a teacher who approved by school principals conducted the study. Data collection conducted from January – February 2018.

Variables

Demographic data including adolescent's characteristics such as age, gender, frequency of urticarial and diarrhea suffered in the past one month. Frequently meant that samples have these diseases at least once per week. Parents' characteristics such as education level, occupation status, and amount of salary were collected by a specially designed questionnaire through self-reported. Short explanation was given by field staff before process of fill-in the questionnaire. This questionnaire was distributed to the respondents before conducting anthropometry measurement. Trained field staff member measured adolescents' anthropometry using standard procedures and calibrated instruments. Body weight was measured with portable scale (Seca, Model 876; Germany) to the nearest 0.1 kg, with shoes and heavy clothing removed. Standing height was measured to the nearest 0.1 cm using a Shorrboard.

Food consumption was collected through recall 24 h technique in order to obtain the quantity number of several nutrients such as calorie, protein, carbohydrate, and lipid. The recall was obtained for two days. One day was collected in school day and the other was in the weekend.

Nutritional status was determined from wasting. The diagnosis of wasting was determined using BMI z-score for age- and sex specific reference value as indicator. Then, the z-score value from this indicator was categorized based on WHO 2007 growth references.⁷ Stunting was defined as those who have z-score <-2 SD.

Field staff received two-day standardized training before data collection. Furthermore, during data collection, principal investigator and research assistant conducted monitoring of all measuring process in the schools during this process. Anthropometry equipment, weighing scale and shorrboard were checked and calibrated regularly to increase data collection accurately. All data recorded in standardized forms and double entered to computer database. This study was approved by research ethics committee of Medicine Faculty, Universitas Hasanuddin and informed consent was obtained before participation of adolescents in the study.

Data analysis

Anthropometric data was analyzed using "WHO Anthro Software" in categorizing of nutritional status. Z-scores values were compared using the "WHO 2007 reference" data for adolescent boys and girls. Food intake was analyzed by using Nutrisurvey software. The software of SPSS for windows performed to analyze all quantitative data. Data were presented as distribution of frequency, mean and standard deviation. Chi-square was performed to test the independent and dependent variables.

Results

Mean age of the subject was 13.5 ± 0.6 years and mostly girls. There were 82.5% and 86.4% of samples have urticarial and diarrhea in the last one month, respectively. Majority of fathers' occupation was fisherman and mothers as housewife. More than a half of mothers' educational level was low.

Table 1 Characteristics of respondents.

Characteristics	Frequency (n = 103)
Age (Mean ± SD)	13.5 ± 0.6
Gender (Girls), n (%)	55 (53.4)
Frequently of urticarial, n (%)	85 (82.5)
Frequently of diarrhea, n (%)	89 (86.4)
Fathers' occupation status, n (%)	
Office employee	22 (21.4)
Fisherman	81 (78.6)
Mothers' occupation status, n (%)	
Office employee	9 (8.7)
Housewife	81 (91.3)
Mothers' education level, n (%)	
Low	61 (59.2)
Middle high	42 (40.8)
Monthly parents' wages*, n (%)	
<CMW	87 (84.5)
≥CMW	16 (15.5)

* CMW = city minimum wages for Makassar City, 2018 (IDR 2,722,631).

Mostly of monthly parents' wages was less than minimum wages of Makassar City (Table 1).

More than a half respondent consumed calorie and protein less than 80% of RDA. Only 66% of adolescent consumed lipid adequately. A total of 14.6% was wasting adolescents. Bivariate analysis showed that there was not significant correlation between nutrients intake and nutritional status ($P > 0.05$) (Table 2).

Table 3 showed the significant correlation between gender and calorie and lipid intake ($P < 0.05$). Boys were more consume inadequate calorie and lipid compare than girls. Additionally, there were also significant correlation between urticarial and calorie and protein intake of samples. However, diarrhea, mother educational level and monthly parents' wages were not significant correlation with nutrients intake ($P > 0.05$).

Discussion

The interesting result found from this research is high proportion of adolescents consumed calorie and protein inadequately. Compare to national data, proportion of inadequate intake in this area was higher for aged 12–18 years old.² These results contrast with the assumption that coastal areas is producer of calorie and protein source such as seafood.

The result showed that there was significant correlation between gender and nutrients intake. Proportion of boys who consumed calorie and protein less than recommended was higher than girls. Age of 12–14 years old is known as periods of early adolescents, where individual begin to experience development of eating disturbances and dramatic biological changes related to puberty, which result in different body composition between boys and girls.⁸ Moreover, the lower rate of inadequate intake among adolescent girls in the current study can be attributed to their higher food intake as they grow up.

The other interesting result found from this study that, there was significant correlation between frequent of urticarial with calorie and protein intake. Those who more frequently has urticarial consume inadequate calorie and protein higher than those who rarely has urticarial. This found can explain why majority of samples in this study have inadequate calorie and protein intake. Adolescent might be uncomfortable in consuming seafood do to their allergic.

There were some limitation of the current study. Information of nutrient intake from this study only described of nutrient intake quantitatively but not collected frequency and types of protein sources. This information is important in mapping which kind of food that was refused consuming by adolescents. Information of characteristics were collected by self reported that could be potentially bias in collecting the data. However, in order to avoid bias in data collection, all participants received clearly instruction before they filled the questionnaire and they got supervision from trained enumerators. Aside the limitation, the study have some strength such as number of sample participation in the study, this is very important in conclusion decision as well as performance of quality control of the study.

Table 2 Correlation between nutrient intake and nutritional status.

Nutrients intake	Nutritional status (n = 103) (%)		Total	P-value ^a
	Wasting	Normal		
Calorie				
<80% RDA	15.4	84.6	75.7	0.676
≥80% RDA	12.0	88.0	24.5	
Protein				
<80% RDA	13.5	86.5	86.4	0.425
≥80% RDA	21.4	78.6	13.6	
Lipid				
<80% RDA	20.0	80.0	34.0	0.262
≥80% RDA	11.8	88.2	66.0	
Total	14.6	85.4		

^a Chi-Square Test.

Table 3 Correlation between sample characteristics and nutrients intake.

Characteristics	Nutrients intake (<80% RDA)					
	Calorie (%)	P-value ^a	Protein (%)	P-value ^a	Lipid (%)	P-value ^a
<i>Gender</i>						
Boys	91.7	0.001*	87.5	0.763	45.8	0.018*
Girls	61.8		85.5		23.6	
<i>Urticarial</i>						
Frequently	80.0	0.037*	91.8	0.003*	35.3	0.541
Rarely	55.6		61.1		27.8	
<i>Diarrhea</i>						
Frequently	78.7	0.098	87.6	0.401	36.0	0.372
Rarely	57.1		78.6		21.4	
<i>Mothers' education level</i>						
Low	75.4	0.928	91.8	0.054	32.8	0.758
Middle high	76.2		78.6		35.7	
<i>Monthly parents' wages</i>						
<CMW	73.6	0.345	88.5	0.225	31.0	0.141
≥CMW	87.5		75.0		50.0	

^a Chi-Square Test.

* Significant at $P < 0.05$.

Conclusions

Mostly adolescents consumed macro nutrients less than Recommended Daily Allowance (RDA) for Indonesian. Living in the area where protein sources are easily obtained, does not guarantee adolescents consume sufficient calories and protein. Having urticarial has significant correlation with nutrients intake. The next research needs to be more focused on determinant factor of urticarial and characteristics of types of protein that could influence the nutrient intake of adolescents.

Conflict of interest

The authors declare no conflict of interest.

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