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Analysis of Determinant Factors in Stunting Children Aged 12 to 60 Months

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Abstract

Stunting is a chronic nutritional problems which caused by the low intake of nutrients in long term, resulting in unfulfilled demand for nutrients. Indonesia has the highest incidence of stunting compared to other Southeast Asian countries. The prevalence of stunting in Indonesia tends to increase. Basic medical research showed prevalence of stunting were 35.6% in 2010 and 37.2% in 2013.This study aimed to analyze determinant factors in the incidence of stunting in children aged 12 to 60 months. The method that used in this study was analytic survey with sample size as many as 155 stunting children. The data was collection through questionnaire, food recall and anthropometry.

Determinant factors in the incidence of stunting in children aged 12 to 60 months were intake of energy ($p < 0.001$) and other macro-nutrients such as carbohydrate ($p < 0.001$), protein ($p < 0.001$) as well as fat ($p < 0.008$). While the intake of micronutrients that contributed to the incidence of stunting were the intake of vitamin A ($p < 0.036$) and zinc ($p < 0.050$). Beside the intakes, feeding practices such as consistency ($p < 0.001$), frequency ($p < 0.001$) and habit of having breakfast ($p < 0.001$) were also determining factors in the incidence of stunting. Maternal knowledge concerning to nutrition, exclusive breastfeeding and complementary foods were not determining factor in the incidence of stunting but were the protective one.

Keywords: Feeding practices; Nutritional intake; Nutritional knowledge; Stunting

Introduction

Stunting is a form of linear growth disorder, particularly in children. Stunting is currently a nutritional problem that is being concerned both in national and international level. According to WHO, 178 million children under five years were stunting [1].

Basic Health Research of Indonesia that conducted in 2013 reported the prevalence of stunting in national level reached 37.2%. Incidence of stunting increased compared to 2010 (35.6%) and 2007 (36.8%). The prevalence of stunting in Indonesia was higher than other countries in Southeast Asia such as Myanmar (35%), Vietnam (23%) and Thailand (16%) [1].

Stunting is a linear growth disorders. In the Millennium Development Goals (MDGs) 2015, Indonesia decided to lower nutritional problems including stunting in children that reached 17.8%. Five years Development Plans aimed to lower the number of stunting in children under 5 years old for up to 32% in 2015 [2].

Indonesian Health Profiles in 2011 reported that the prevalence of stunting in children using height-for-age index in South Sulawesi was still high compared to the national level, i.e., 38.8%. This nutritional problem should be put to concern in South Sulawesi. Various attempts have been made to overcome the problem, through feeding complementary foods program, free high-dose vitamin A and regular monitoring of growth at neighborhood health center. However, stunting was still a major nutritional problem at national level that needs a particular concern [3].

Growth disorders that include stunting are influenced by various factors, such as both genetic and environmental. Environmental factors are dominant and affect linear growth in children aged 12 to 60 months, which at such age children have more contact with their environment, including the diet [4]. Diet at this age is commonly being attached with adulthood diet for most families in Indonesia despite of such practice have many disadvantages [5].

While many factors affect the incidence of stunting in children, the needs for studying determining factors can be used as a reference to address the problem. Thus the subject of this study was to know determinant factors that affected the incidence of stunting in children aged 12 to 60 months.

Methods

Study design and population

This study was an analytic survey with cross sectional study design. This study was conducted in 15 villages in two sub districts, Soppeng Riaja and Mallusetase in Barru Regency, South Sulawesi. The study was conducted in October 2014 to February 2015.Sample size was determined using purposive sampling of all children aged 12 to 60 months that underwent stunting and obtained 155 children.

Data collection

Data concerning to nutritional knowledge included knowledge of exclusive breastfeeding and complementary foods measured with questionnaires. Data regarding to feeding practices included consistency in feeding, frequency of feeding and breakfast, which all done with questionnaires too.

Anthopometric assessment

Measurement of body height was done using microtoise with 0.1

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cm accuracy and body weight was done using SECA scales with 0.1 kg accuracy. Determination in age used calculation of full month. Stunting status was determined by the use of height-for-age index, comparative nutritional status or current nutritional status according to weight-for-age index.

Dietetic assessment

Primary data were collected, which constituted variables under study were energy intake, intake of macronutrients which include protein, fat and carbohydrate as well as vitamins such as vitamin C and vitamin A. The intake of mineral was zinc (Zn). Overall energy and nutrients intake consumed were measured by food recall 3 x 24 hours.

Statistical analysis

Processing began with categorization, tabulation and analysis. In order to analyze the determining factors in stunting, simple linear regression statistical test was used with 95% significance level.

Results

155 children aged 12 to 60 months that underwent stunting were obtained. Characteristics of the subjects are male 57.9% and female 42.1%. Farm worker was a dominant occupation of the father with 31.6%, while the occupation of the mothers was housewives in entirety. Both of the fathers and mothers were of secondary graduates of education in majority. Samples were mostly located in fishing area with inadequate sanitation or highland with unproductive soil. In order to address the problem of stunting, the government launched sanitary and hygiene interventions. This program had been successful in reducing diarrhea as much as 30% which then reduced stunting by 2.4% [1].

Macronutrients and micronutrients intake

Table 1 illustrates that there were 60 children that fell to category of stunted children (38.6%) and 95 remaining fell to shortness (61.4%). The results of simple linear regression statistical tests showed that the intake of energy and macro-nutrients were determinant factors of stunting in children aged 12 to 60 months.

Energy intake: Majority of respondents in stunting group (36.7%) has low energy intake then majority in shortness group (39.5%) has good energy intake. The result of statistical test showed that energy intake is determinant factor in the incidence of stunting ($p < 0.001$) (Table 1).

Protein intake: Majority of respondents in stunting group (33.5%) has low protein intake but otherwise majority in shortness group (45.2%) has good protein intake. Statistical result indicated that protein intake is one of determinant factors in the incidence of stunting ($p < 0.001$) (Table 1).

Fat intake: Majority of respondents in stunting (28.3%) and shortness group (32.4%) has low fat intake. The result of statistical test indicates that fat intake is one of determinant factors in the incidence of stunting ($p < 0.008$) (Table 1).

Carbohydrates intake: Statistical result showed that carbohydrates intake is one of determinant factors of stunting incidence ($p < 0.001$) (Table 1). Based on the data, it is known that majority of respondents in stunting group (36.7%) has low carbohydrates intake then majority in shortness group (38.6%) has good carbohydrates intake.

Vitamin A intake: Majority of respondents in both groups has low vitamin A intake. Statistic result indicates that vitamin A intake is one of determinant factors in the incidence of stunting ($p < 0.036$) (Table 1).

Zinc intake: The result statistical test showed that zinc intake is one of determinant factors of stunting incidence ($p < 0.201$) (Table 3). Based on the data, it is known that majority of respondents in both group has low zinc intake.

Nutritional knowledge

Besides measuring nutritional intake, this study measured level of mother nutritional knowledge. The measurements included knowledge regarding to exclusive breastfeeding and complementary foods. The results were shown on Table 2.

Table 2 shows that 35.6% of mothers with shortness children status possessed less knowledge regarding exclusive breastfeeding. Likewise as much as 41.4% of mothers with shortness children status possessed less knowledge concerning to complementary foods while breastfeeding. From statistical test using simple linear regression statistical test showed that nutritional knowledge regarding exclusive breastfeeding ($p < 0.384$) and complementary foods ($p < 0.447$) are not determinant factors in the incidence of stunting.

Feeding practice

Feeding practice in this study is broken down into variables, such as consistency, frequency and breakfast habit (Table 3).

Intake	Stunting Status				p-value
	Stunting		Shortness		
	n	%	n	%	
Energy					
Good	3	1.9	61	39.5	0.001
Low	57	36.7	34	21.9	
Protein					
Good	8	5.1	70	45.2	0.001
Low	52	33.5	25	16.2	
Fats					
Good	16	10.3	45	29	0.008
Low	44	28.3	50	32.4	
Carbohydrate					
Good	3	1.9	60	38.6	0.001
Low	57	36.7	35	22.8	
Vitamin A					
Good	25	16.1	31	20	0.036
Low	35	22.5	64	41.4	
Zinc					
Good	22	14.1	35	22.8	0.05
Low	38	24.5	60	38.6	

Table 1: Distribution of samples according to macronutrients and micronutrients intake.

Nutritional Knowledge	Stunting Status				p-value
	Stunting		Shortness		
	n	%	n	%	
Exclusive Breastfeeding					
Good	23	15.3	40	25.8	0.384
Low	37	23.3	55	35.6	
Complementary Foods					
Good	21	13.5	31	20	0.447
Low	39	25.1	64	41.4	

Table 2: Distribution of samples according to nutritional knowledge.

Feeding practice	Status Stunting				p-value
	Stunting		Shortness		
	n	%	n	%	
Consistency					
Good	3	1.9	60	38.6	0.001
Low	57	36.7	35	22.8	
Frequency					
Good	4	2.5	60	38.6	0.001
Low	56	36.1	35	22.8	
Breakfast					
Good	2	1.2	41	26.4	0.001
Low	58	37.4	54	35	

Table 3: Distribution of samples according to feeding practice.

This study obtained striking problems on feeding practices, where 59.5% of mothers with children aged 12 to 60 months performed inconsistency feeding. Likewise, the low frequency of feeding was at 58.9%. In that case the frequency of feeding tended to be so less that it would not fulfilled nutritional needs of children.

From statistical test using simple linear regression statistical test indicated that consistency ($p < 0.001$) and frequency ($p < 0.001$) of feeding practice are determinant factors in the incidence of stunting. Breakfast habit is one of determinant factors of stunting incidence too ($p < 0.001$) (Table 3).

Discussion

WHO revealed that children that experience growth disorders were basically due to the lack of adequate food intake and suffering repeated infectious disease [6]. In children aged 12 to 60 months, there are increasing needs of energy and nutrients in response to metabolic increase due to the growth process [4,7,8].

Most studies revealed that stunted children consumed foods under nutritional recommendation. This condition is due to poverty, large number of family members, or living in a rural and suburban area. These conditions made the growth disorders difficult to cope, which eventually lead to stunting [9]. These characteristics were in accordance to location of study; rural areas with long distance to sources of foods thus leading to low accessibility of foods at household level.

Macronutrients provide energy for human body and support for growth, which include the carbohydrates, proteins and fats while the micronutrients are necessary for the functioning of the body, for instance in assisting the process of metabolism of nutrients and growth of various cells [10]. Grober [11] stated that micronutrients that are supposed to be determinant factors in the incidence of stunting due to growth disorders are vitamin A, vitamin C, iron, zinc and calcium.

One of the causes of stunting in children is impaired bone growth. Provision of vitamin A in high dosage is to help the growth as well as preventing xerophthalmia. Another role of vitamin A is to help accelerate bone growth [12,13]. Samples had a lower intake of vitamin A compared to the amount needed, due to low food accessibility of the households [14].

In supporting bone growth, high-dose vitamin A requires micro-nutrients such as zinc. In this study, the intake of zinc on the samples had not been fulfilled, since the diet were predominantly consumption of vegetables containing low of zinc and have a low bioavailability as a source of zinc [14]. Zinc is one micro- mineral that has roles in protein synthesis and function of cellular enzymes, thus the role of zinc in bone growth is enormous. Currently, about 20% of world population aged less than five years are at risk of zinc deficiency from their daily diet. UNICEF, USAID and WHO concluded that that there is a need for zinc supplementation in several countries, including Indonesia which the intake that reached only 51.6% from Recommended Dietary Allowance (RDA) [14,15].

The role of zinc as micro-minerals is to mediate the transport of vitamin A through Retinol Binding Protein (RBP). Zinc deficiency can lead to decreasing of RBP synthesis in the liver that leads to decrease concentration of RBP in plasma. Zinc and vitamin A are two micro-nutrients that support the process of bone growth in stunting children so their linear growth can be corrected [16].

Stunting is a chronic malnutrition problem which caused by poor nutritional intake over a period of time [4]. Nutritional knowledge has a considerable role in the fulfillment of nutritional needs, particularly in children under five. Improper feeding during this period can lead to nutritional deficiency in children, frequent sickness and growth and development disorders [10].

This study discovered that 72.4% of children did not eat breakfast. All practices of feeding as measured in this study that were determinant factors in stunting which were consistency of feeding, frequency of feeding and breakfast.

UNICEF revealed that stunting is not caused by only single factor but rather caused by many, which are related one to another. There are three major factors that causing stunting, i.e. unbalanced diet, nutritional contents of food such as carbohydrate, protein, fat, mineral, vitamin and history of low birth weight as well as history of the suffering diseases [17]. Broadly speaking, determinant factors of stunting in this study could be grouped into three levels which are nutritional intakes both from macro and micro-nutrients, mother knowledge level concerning to nutrition and feeding practices which still wrong, especially breakfast habits that still low.

Conclusion

Result of this study show that determinant factors of stunting in children aged 12 to 60 months were the intake of energy and other macro-nutrients such as carbohydrate, protein and fat. While the intake of micro-nutrients that affect stunting were vitamin A and zinc. Besides, feeding practices such as consistency and frequency of feeding and breakfast habits were also determinant factors in the incidence of stunting. Mother's nutritional knowledge concerning exclusive breastfeeding and complementary feeding at breastfeeding period, though were not determinant factors, but that were protective factors in the incidence of stunting in children aged 12 to 60 months.

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