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RESEARCH ARTICLE

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Various Factors in Stunting Children Aged 12 to 60 Months

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ABSTRACT

Stunting is a chronic nutritional problems 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 determining factors in the incidence of stunting in children aged 12 to 60 months. The method used in this study was analytic survey with sample size as many as 155 stunting children. Determining factors in the incidence of stunting in children aged 12 to 60 months were intake of energy and macro-nutrients such as carbohydrates, proteins as well as fats. While the intake of micronutrients that contributed to the incidence of stunting were the intake of vitamin A and zinc. Beside the intakes, feeding practices such as consistency, frequency and habit of having breakfast 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

Background

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 conducted in 2013 reported the prevalence of stunting in national level reached 37.2%.⁽²⁾ Incidence of stunting increased when compared to 2010 (35.6%) and 2007 (36.8%).⁽³⁾ The prevalence of stunting in Indonesia was higher than other countries in Southeast Asia: 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.⁽³⁾

Indonesian Health Profiles in 2011 reported that the prevalence stunting in children using height/ age index in South Sulawesi was still high compared to the national level; 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-dosage of vitamin A and regular monitoring of growth at neighborhood health centers. However, stunting was still a major nutritional problem at national level that needs a particular concern.⁽⁴⁾

Growth disorders that include stunting is 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 (Almatsier, 2011). Diet at this the age is commonly being attached with adulthood diet for most families in Indonesia despite of such practice has many disadvantages.⁽⁵⁾

Purpose

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

METHODS

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

Primary data were collected, which constituted variables under study were energy intake, intake of macro-nutrients which include proteins, fats and carbohydrates as well as vitamins such as vitamin C and vitamin A. The intake of minerals were iron (Fe), Zinc (Zn) and Calcium (Ca). Overall energy and nutrients intake consumed were measured by food recall 3 x 24 hours. Data concerning to nutritional knowledge included knowledge of exclusive breastfeeding and complementary foods and was measured with the use of questionnaires. Data regarding to feeding practices included consistency in feeding, frequency of feeding and breakfast, which all done with the use of questionnaires.

Measurement of body height was done using microtoise with 0.1 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/age index, comparative nutritional status or current nutritional status according to weight/age index.

Processing began with categorization, tabulation and analysis. In order to analyze the determining factors in stunting, simple linear regression tests was used with 95% significance level ($\alpha = 0.05$).

RESULTS

As many as 155 children aged 12 to 60 months that underwent stunting were obtained. Characteristics of the subjects included sex: male 57.9%, female 42.1%. Farm worker was a dominant occupation of the father with 31.6%, while the occupation of the mothers were housewives in entirety. Both of the fathers and mothers were of secondary graduates of education in majority. Samples were mostly located 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% (MAC-Indonesia,2014).

The results concerning to energy and nutrient intakes in the study shown at Table 1.

Table 1. Distribution of samples according to energy and macro nutrients intakes

| Intake | Stunting status | | | | P-value |
|----------------|-----------------|------------|-----------|------------|---------|
| | Stunting | | Shortness | | |
| | Frequency | Percentage | Frequency | Percentage | |
| Energy | | | | | |
| Good | 3 | 1.9 | 61 | 39.5 | 0.001 |
| Low | 57 | 36.7 | 34 | 21.9 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Protein | | | | | |
| Good | 8 | 5.1 | 70 | 45.2 | 0.001 |
| Low | 52 | 33.5 | 25 | 16.2 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Fats | | | | | |
| Good | 16 | 10.3 | 45 | 29.0 | 0.008 |
| Low | 44 | 28.3 | 50 | 32.4 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| CHO | | | | | |
| Good | 3 | 1.9 | 60 | 38.6 | 0.001 |
| Low | 57 | 36.7 | 35 | 22.8 | |
| Total | 60 | 38.6 | 95 | 61.4 | |

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 determining factors of stunting in children aged 12 to 60 months.

Table 2. Distribution of samples according to micro nutrients intake

| Intake | Stunting status | | | | P-value |
|------------------|-----------------|------------|-----------|------------|---------|
| | Stunting | | Shortness | | |
| | Frequency | Percentage | Frequency | Percentage | |
| Vitamin C | | | | | |
| Good | 23 | 14.8 | 39 | 25.1 | 0.434 |
| Low | 37 | 23.8 | 56 | 36.3 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Vitamin A | | | | | |
| Good | 25 | 16.1 | 31 | 20.0 | 0.036 |
| Low | 35 | 22.5 | 64 | 41.4 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Iron | | | | | |
| Good | 28 | 18.0 | 47 | 30.3 | 0.430 |
| Low | 32 | 20.6 | 48 | 31.1 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Zinc | | | | | |
| Good | 22 | 14.1 | 35 | 22.8 | 0.05 |
| Low | 38 | 24.5 | 60 | 38.6 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Calcium | | | | | |
| Good | 24 | 15.4 | 38 | 24.5 | 0.566 |
| Low | 36 | 23.2 | 57 | 36.9 | |
| Total | 60 | 38.6 | 95 | 61.4 | |

As shown in Table 2, intake of micronutrients that became determining factors in the incidence of stunting in this study were the intake of vitamin A (0,036) as well as zinc (0.05). However, considering the distribution of intakes, it can be concluded that most of the fulfilment of the intake of vitamin c, vitamin a, iron, zinc and calcium were not optimum.

Table 3. Distribution of nutritional knowledge

| Knowledge | Stunting status | | | | p-value |
|--------------------------------|-----------------|------------|-----------|------------|---------|
| | Stunting | | Shortness | | |
| | Frequency | Percentage | Frequency | Percentage | |
| Exclusive Breastfeeding | | | | | |
| Good | 23 | 15.3 | 40 | 25.8 | 0.384 |
| Low | 37 | 23.3 | 55 | 35.6 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Complementary Foods | | | | | |
| Good | 21 | 13.5 | 31 | 20.0 | 0.447 |
| Low | 39 | 25.1 | 64 | 41.4 | |
| Total | 60 | 38.6 | 95 | 61.4 | |

Table 3 shows that 35.6% of mothers with stunting children status possessed less knowledge regarding exclusive breastfeeding. Likewise as much as 41.4% of mothers with stunting children status possessed less knowledge concerning to complementary foods while breastfeeding.

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 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. The study also discovered that 72.4% of children did not eat breakfast. All practices of feeding as measured in this study that were determining factors in stunting were the consistency of feeding, the frequency of feeding and breakfast.

Table 4. Distribution of feeding practice

| Feeding practice | Status stunting | | | | P-value |
|------------------|-----------------|------------|-----------|------------|---------|
| | Stunting | | Shortness | | |
| | Frequency | Percentage | Frequency | Percentage | |
| Consistency | | | | | |
| Good | 3 | 1.9 | 60 | 38.6 | 0.001 |
| Low | 57 | 36.7 | 35 | 22.8 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Frequency | | | | | |
| Good | 4 | 2.5 | 60 | 38.6 | 0.001 |
| Low | 56 | 36.1 | 35 | 22.8 | |
| Total | 60 | 38.6 | 95 | 61.4 | |
| Breakfast | | | | | |
| Good | 2 | 1.2 | 41 | 26.4 | 0.001 |
| Low | 58 | 37.4 | 54 | 35.0 | |
| Total | 60 | 38.6 | 95 | 61.4 | |

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 is increasing needs of energy and nutrients in response to metabolic increase due to the growth process.⁽⁷⁻⁹⁾

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.⁽¹⁰⁾ These characteristics were in accordance to location under study; rural areas with long distance to sources of foods thus leading to low accessibility of foods at household level.

Macro-nutrients provide energy for human body and support for growth, which include the carbohydrates, proteins and fats while the micro-nutrients are necessary for the functioning of the body, for instance in assisting the process of metabolism of nutrients and growth of various cell.⁽¹¹⁾ Micronutrients that are supposed to be the determining factors in the incidence of stunting due to growth disorders are vitamin A, vitamin C, iron, zinc and calcium.⁽¹²⁾

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.^(13,14) Samples had a lower intake of vitamin A compared to the amount needed, due to low food accessibility of the households.⁽¹⁵⁾

In supporting bone growth, vitamin A in high dosage 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.⁽¹⁵⁾

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, for about 20% of world population aged under five years are at risk of zinc deficiency from their daily diet. UNICEF, USAID and WHO concluded that there is a need for

zinc supplementation in several countries, including Indonesia⁽¹⁶⁾, that the intake that reached only 51.6% from recommended dietary allowance (RDA).⁽¹⁵⁾

The role of zinc as micro minerals is to mediate transport of vitamin A through Retinol Binding Protein (RBP). Zinc deficiency can lead to decreasing of RBP synthesis in the liver that lead to decrease in the concentration of RBP in plasma. Zinc and vitamin A are two micronutrients that support the process of bone growth in stunting children thus correcting the linear growth⁽¹⁷⁾.

Besides measuring nutritional intake, this study measured level of nutritional knowledge of mother. The measurements included knowledge regarding to exclusive breastfeeding and complementary foods.

Stunting is a chronic malnutrition problem caused by poor nutritional intake over a period of time⁽⁸⁾.

Nutritional knowledge has a considerable role in the fulfilment 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.⁽¹¹⁾

UNICEF revealed that stunting is not caused by only single factor but rather is caused by many, which are related one to another. There are three major factors causing stunting, namely unbalanced diet, nutritional contents of food such as carbohydrates, proteins, fats, minerals, vitamins, and history of low birth weight as well as history of the suffering diseases.⁽⁶⁾

Broadly speaking, determining factors of stunting in this study could be grouped into three levels; nutritional intakes both macro and micro nutrients, level of knowledge of mother concerning to nutrition and erroneous feeding practices in particular the seldom habits to have breakfast.

CONCLUSION

Multiple determining factors of the incidence of stunting in children aged 12 to 60 months were the intake of energy and macro-nutrients such as carbohydrates, proteins and fats. While the intake of micronutrients that affect the incidence were that vitamin A and zinc. Besides, feeding practices such as consistency and frequency of feeding and habits in eating breakfast were also determining factors in the incidence of stunting.

Mother's nutritional knowledge concerning exclusive breastfeeding and complementary feeding at the time of breastfeeding though were not determining factors, but were protective factors in the incidence of stunting in children aged 12 to 60 months.

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