



FACTORS AFFECTING SHORT STATURE AMONG CHILDREN AGED 24-59 MONTHS IN SINGKUANG VILLAGE, MANDAILING NATAL DISTRICT, NORTH SUMATERA, INDONESIA

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ABSTRACT

Background: Short stature is still one of the health issues across the globe right now especially throughout developing countries. In attempt to minimize the number of short stature, it is necessary to find out some of the factors which affect this case therefore it can be prevented as early as possible.

Objective: To assess factors associated with short stature among children aged 24-59 months.

Methods: A case-control study was conducted in Singkuang village. The samples were chosen randomly and divided into two groups; Cases were children with short stature while controls were children with normal stature. Univariate and bivariate analysis were conducted with 95% confidence interval (CI) and p-value <0.05 was stated statistically significant.

Result: A total of 38 cases and 42 controls were studied. There was no significant association found to short stature among these variables such as mother's education, mother's occupation, exclusive breastfeeding, duration of breastfeeding, number of family members and number of children aged under five in the household (p-value >0.05).

Conclusion: Mother's education, mother's occupation, number of family members, number of children aged under five in the household, exclusive breastfeeding and duration of breastfeeding were not the factors that affecting short stature among children aged 24-59 months.

KEYWORDS : Short stature, factor, children, Mandailing Natal

INTRODUCTION

Short stature is one of the clinical problems of children and adolescents' growth that are often encountered and sometimes concerning their parents about the height of their children once they reached adulthood (Naiki et al., 2013). In 2017, one in four children suffered from stunting with a global prevalence of 22.2% or estimated 151 million children across the world. This number is expected to increase especially in developing countries (WHO, 2018).

Short stature can be a normal variation or a growth disorder. Short stature is defined as a condition in which an individual has a height that is more than two standard deviation below the average height for a given age and sex in a reference population. (Strufaldi et al., 2005). Short stature can be caused by multifactorial. One of the most common causes of short stature found in developing countries is malnutrition (Cakan et al., 2007). In addition to that, other causes of short stature are also caused by genetic factors, endocrine factors where there is a lack of growth hormone and also the presence of chronic diseases (Batubara et al., 2010).

There are several research that are looking the relationship of risk factors affecting the condition of short stature. This is an effort to reduce the number of stunting by identifying the risk factors (Correia et al., 2014). The purpose of this study was to determine the factors that affect short stature in children aged 24-59 months in the village of Singkuang, Mandailing Natal district, North Sumatra. By doing so, it is expected that short stature can be detected earlier and can be prevented so that it does not interfere with growth and the children's cognition level further.

MATERIAL AND METHODS

This research is a case-control study conducted in February 2017 with accessible population which the population target were children aged 24-59 months who lived in Singkuang

Village. Samples are accessible population that meet the inclusion and exclusion criteria which were selected by consecutive sampling. Exclusion criteria are children who are chronically ill or currently in the treatment of chronic diseases such as tuberculosis, HIV-AIDS or malignancy; and severe malnutrition.

Data collection and technique

The demographic data of this study subject was collected through direct interviews with the parents of the subject using a questionnaire about personal data, parental data, recording the weight and height of the subject and biological parents, the number of family members, the number of children under five living in the household, mother's occupation, mother's education, exclusive breastfeeding and duration of the breastfeeding. Genetic height potential can be estimated by calculating the midparental height.

Based on anthropometry of height, samples that met the criteria were categorized as short stature (Z score < -2 SD) as a case group and normal stature (-2 SD < Z score < 2 SD) as a control group. Subjects who met the inclusion criteria were assessed for these factors which were carried out directly by the researcher. The outputs are factors that affecting short stature. This study was conducted after obtaining approval from the Research Ethics Committee of the Faculty of Medicine, University of North Sumatra.

Data management and analysis

The collected data was processed, analyzed and presented using SPSS version 22 software with a significance level of P <0.05 and 95% confidence interval. Univariate analysis was carried out to determine the characteristics of the sample data and bivariate analysis was conducted to determine the relationship of the factors that affecting short stature. The statistical test used for categorical variables in this study is *Chi square*, if the test requirements are met, while those that

do not will be tested using the *Fischer exact*. For numerical variable data will be processed using *Mann-Whitney* test.

RESULTS

The number of children aged 24 - 59 months who met the

inclusion criteria were 83. Of this population, three children were excluded from the study because they were receiving TB treatment and experiencing severe malnutrition. In this study, there were 38 children (47.5%) who had short stature and 42 children (52.5%) had normal stature.

Table 1. Distribution of sample characteristic

Variable	Case control	
	Short stature (n=38)	Normal stature (n=42)
Subject's height, cm, mean (SD)	82.47 (5.93)	97.92 (6.23)
Father's height, cm, mean (SD)	161.57 (5.21)	162.89 (3.53)
Mother's height, cm, mean (SD)	151.71 (5.72)	151.65 (6.15)
Age, years, mean (SD)	3.1 (0.97)	3.4 (0.77)
Number of family members, person, mean (SD)	5.6 (1.73)	5.1 (1.55)
Number of children aged under five, person, mean (SD)	1.5 (0.69)	1.6 (0.70)
Duration of breastfeeding, months, mean (SD)	13.2 (7.27)	11.7 (7.44)
Gender, n (%)		
Male	20 (52.6)	22 (52.4)
Female	18 (47.4)	20 (47.6)
Mother's occupation, n (%)		
Farmer	0 (0.0)	1 (2.4)
Civil servant	3 (7.9)	6 (14.3)
Laborer	0 (0.0)	1 (2.4)
Merchant	5 (13.2)	7 (16.7)
House wife	30 (78.9)	27 (64.3)
Mother's education, n (%)		
Primary school	26 (68.4)	24 (57.1)
Junior high school	6 (15.8)	8 (19.0)
Senior high school	4 (10.5)	7 (16.7)
University	2 (5.3)	3 (7.1)
Exclusive breastfeeding, n (%)		
No	17 (44.7)	17 (40.5)
Yes	21 (55.3)	25 (59.5)
Genetic height potential		
Not match	7 (18.4)	0 (0.0)
Match	31 (81.6)	42 (100.0)

Distribution of sample characteristics in the study can be seen in table 1.1. The sample in this study had a mean height of 82.47 (SD 5.93) cm and a mean age of 3.1 years in the short stature group, whereas in the normal stature group had a mean height of 97.92 (SD 6.23) cm and an average age of 3.4 years. The proportion of mothers who worked was obtained as many as 23 people (29.7%). Most mothers only attend primary school on average in both groups and there are still very few sample of mother who completed their education to university. Exclusive breastfeeding in both groups had an almost equal distribution, although there were still many children who did not get exclusive breastfeeding until the age of six months, which amounted to 44.7% in the short stature group and 40.5% in the normal stature. The mean duration of breastfeeding in the two groups was almost the same, namely 13.2 months in short stature and 11.7 months in normal stature. As many as 81.6% of short stature children have genetic height potential according to their parents' height, while 18.4% have genetic height potential that does not match their parents' height,

where the child's height is below his genetic height potential.

Bivariate analysis

Several factors influence short stature, namely education and occupation of the mothers, the number of children aged under 5 years old in the household with the research sample, the number of family members, exclusive breastfeeding and the duration of breastfeeding analysis statistical tests were done according to the measured variable. In table 2 it was found that there was no correlation between maternal occupation, maternal education and exclusive breastfeeding with short stature, where the value of $P > 0.05$. Even so, working mothers who have more children and get exclusive breastfeeding are less likely to have short stature. In table 3 it was found that there was no correlation between the number of family members and children under five who lived in the household and the duration of breastfeeding with the condition of short stature statistically ($P = 0.258$, $P = 0.634$ and $P = 0.450$, respectively).

Table 2. Relationship between mother's occupation, education and exclusive breastfeeding with short stature

	Short stature n (%)	Normal stature n (%)	P	OR	95%CI
Mother's occupation					
Working	8 (34.8)	15 (65.2)	0.148 α	0.48	0.176-1.309
Not working (ref.)	30 (52.6)	27 (47.4)			-
Mother's education					
Pimary school	26 (52.0)	24 (48.0)	0.482b	1.62	0.250-10.578
Junior high school	6 (42.9)	8 (57.1)	0.664b	1.12	0.141-8.995
Senior high school	4 (36.4)	7 (63.6)	0.654b	0.86	0.098-7.510
University (ref.)	2 (40.0)	3 (60.0)			-
Exclusive breastfeeding					
No	17 (50.0)	17 (50.0)	0.700 α	1.19	0.490-2.893
Yes (ref.)	21 (45.7)	25 (54.3)			-

a Chi square test
 b Fisher's exact test
 (ref.) – reference category

Table 3. Relationship between the number of family members, the number of children under the age of five in the household and the duration of breastfeeding with short stature

	Short stature	Normal stature	P*
Median number of family members, person (min-max)	5.5 (3.0-9.0)	5.0 (3.0-9.0)	0.258
Median number of children aged under five, person (min-max)	1.0 (1.0-3.0)	1.0 (1.0-3.0)	0.634
Median duration of breastfeeding, months (min-max)	12.0 (2.0-24.0)	12.0 (1.0-26.0)	0.450

* Mann-Whitney test

DISCUSSION

Short stature is still considered to be a health problem throughout the world and can result in disruption of child growth and reduced cognitive function in children. One of the most common causes of short stature in developing countries is the result of malnutrition. Reducing the number of malnutrition is the key to improving children's health (WHO, 2018). The target of the World health organization (WHO) in the SDGs program (Sustainable development goals) by 2030 is to stop all forms of malnutrition both dietary deficiency and stunting in children under the age of five and also reduce infant mortality (WHO, 2015).

The WHO has made a conceptual framework to explain the factors associated with stunting, which can later be used by every policy makers to initiate improvements in order to reduce the numbers of stunting (Stewart et al., 2013). Several research has been conducted throughout the world to find out various factors that can affect stunting that are according to the conditions of each region (El Taguri et al., 2008).

There is a correlation between the occupation of the mother and the condition of stunting; whereas working mothers are more at risk of having short children. This can be seen from the study conducted by Fikadu, et al (2014). Meanwhile in this study there was no correlation between maternal occupation and short stature. Although no significant correlation was found, it can be seen from this study that working mothers had more normal stature children. Working mothers can increase the total family income so that the family's economic status will also increase (Senbanjo et al., 2011). Low family economic status can affect the quality and quantity of food consumed by the family. The food that is usually obtained will be less varied and less in number, thus increasing the risk of malnutrition (Nasikhah et al., 2012).

In this study it was also found that there was no correlation between maternal education and the condition of short stature. This result is not in line with several other research which said parents' educational background has a direct effect on the pattern of child care, where the pattern of poor parenting will cause the food intake obtained by children to be less likely nutritious and resulted in stunting (Astari et al., 2015). Most sample in this study shows mother's educational background who only completed education until elementary school and there were still very few who completed the compulsory education until the age of nine which had been initiated by the government.

The correlation between the number of family members living in one house, the number of children under the age of five in the household and the condition of stunting is regarding to the amount of food supply and family economic status. The number of family members will compete with each other to fulfill their basic needs (Fikadu et al., 2014). In this study, there was no correlation between the number of family members regarding to short stature. This can be looked at from the amount of small number of families who have many family members living in the household, with an average of five people in one house. From this study we also found that there was no correlation between the number of children under the

age of five who live in the household with short stature. Nevertheless, the condition of short stature can be a result of multifactorial, where these factors often interact and overlap in influencing the growth and development of a child. The competition in fulfilling daily needs for food among the family members can be avoided by providing and serving adequate food in terms of the quantity and the quality of it (Ajao et al., 2010).

Exclusive breastfeeding and the duration of it are closely related to the condition of stunting (Marquis et al., 2000). Children who are breastfed exclusively get nutritional intake that is in accordance with their growth so that the risk for stunting decreases (Krebs, 2014). In this study there is no correlation between exclusive breastfeeding and the duration of it with the condition of stunting. These results are the same as those found in the study in West Nusa Tenggara (Mardani et al., 2015). However, short stature children who are living in the Singkuang village may be influenced by other factor such as the role of genetic, where the height of a group of children with short stature has genetic height potential that matches the height of their parents up to 81.6%.

Apart from the results above, this research still has its own imperfection. First, height measurement was done one time only. It is better to evaluate growth velocity by measuring at least within the course of six months to get more accurate results in evaluating short stature. Second, there are factors that affect short stature that were not assessed in this study such as the role of genetics in short stature due to the unavailability of bone age examination facility. In addition, there is need for an assessment of environmental policy and infrastructure in the form of sanitation and clean water facility, health service, education and adequate food, both in terms of the quantity and the quality of food supply. Finally, the sample in this study was not enough so that this might provide several different results from the previous study.

CONCLUSION

Short stature is still considered to be a health problem throughout the world, especially in developing countries. This study shows there was no correlation between the occupation and education of the mother, the number of family members, the number of children under the age of five live in the household, the given of exclusive breastfeeding and the duration of breastfeeding and the condition of short stature. Interaction of several other factors is needed to be able to find out the cause of short stature. Nonetheless, it is strongly needed for education to the public and health care workers to measure height on a regular basis to be able to detect as early as possible and evaluate the causes of short stature.

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