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The Prevalence and Associated Factors of Stunting Children in Rural Area, Yogyakarta, Indonesia

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Abstract*—The case of stunting in Indonesia was higher and still becomes an important issue in poor rural areas. Research objective is to examine the prevalence rate and associated factors with stunting in children aged 6-59 months in rural areas of Bantul, Yogyakarta, Indonesia. This study applied a case-control design. The cases group were stunted children and the control group was not stunted children from October to December 2018. The data was collected by interviewing selected mothers of 6–59 months children and measuring the length/height of 23 children as a case group and 91 children as a control group. Research location used two rural areas in Bantul Yogyakarta. This study used logistic regression analysis to identify the best model of factors leading to stunting in rural areas. Analysis to measure of association used 95% CIs and "Adjusted" ORs. The prevalence of stunting was 20.8% out of which 52.2% were mild, 4.3% were moderate and 43.5% were severe. The mean of children age in the case and control group were 31.78± 16.8 and 29.92± 15.96 months with the mean of height for age Z score were -3.23± 1.03 and -0.14 ± 1.22 respectively. Diarrhea was found significantly as the determinant factor of stunted children in rural areas (AOR=7.79, 95% CI 2.59 – 23.33, p = 0.001). The results showed diarrhea as determinants factor of stunting in children under five in rural areas, it is important to assist the Indonesian government to develop a program to address the problem of stunting associated with the environment

Keywords: Stunting, rural area, children, risk factors, case-control study

I. INTRODUCTION

Stunting in children is one of the most serious chronic distresses worldwide and it was high in a remote area [1]. In 2017, the number of stunted children in the world were 151 million [2] and about half of them live in Asia [3,4]. In 2013, Indonesian National Survey reported that the stunting prevalence in children was 37.2% [5,6] which is still higher than the expected national goal of 32%. The previous study showed the prevalence of stunting in Indonesia was 28.4 % and severe stunting was 6.7 % [7]. Children with stunting majority live in rural areas than urban areas [8] [5].

The living environment has a very strong influence in fulfilling the nutrition of 6-59 months children [8]. Social-economic differences between urban and rural areas lie behind the differences in getting quality of health services [9]. This is one of the indirect causes of high stunting rates in rural areas. Prior research mentioned that the determinants of stunting in children are low socioeconomic status [3,4]. The social environment can act as a factor affecting the incidence of stunting in children.

The previous studies mentioned that risk factors for stunting can be divided into two categories, children and family characteristics. Children characteristic is low birth weight [4,6]. Family characteristics are big family size and field waste disposal [1], having a mother or father with short stature [6,10], illiterate mother [3,6], lower socioeconomic status and living in nuclear family [3,4]. Both characteristics are similar to the framework of malnutrition etiology in children 6-59 years old.

In Indonesia, there are no research has reported the tendencies in the prevalence of stunting in children under five, along with the related factors in rural areas. There is a need for a better understanding of this problem in Indonesia, especially in early childhood, which may likely facilitate potential strategies to solve the problem. Therefore, the purpose of this study was to determine the prevalence and factors related to stunting in children aged 6-59 months in rural areas in the Bantul, Yogyakarta province in Indonesia.

II. METHODS

This research design was a case-control conducted among 6-59 months children who live in two rural areas in Bantul Regency, Yogyakarta Special Region Province. The sample was all children who lived in the study area during the period of research. The formula for the estimation of a single population proportion was used to calculated sample size, and It is based on the following criteria: 95% confidence interval, $p<0.05$, and 37% prevalence of stunted children - taken from

Indonesian National Survey. Sampling technique for selecting the participants of the study was used purposive sampling. Exclusion criteria were children suffering from disease and having psychological problems. The data was collected by interviewing selected mothers of 6–59 months children about the demographic data and characteristics of children. The length/height of children measured by anthropometric measurement. Anthropometric measurements used length measuring tool and microtoise stature meter by measuring the capacity of 2 meters and 0,1 cm accuracy. The nutritional status was calculated by the WHO Anthro to measure the indicator of height for age.This research used two statistical software for data analysis. The Anthro software from WHO was used to calculate the stunting indicators and SPSS to calculate descriptive statistics and logistic regression. Tendency central were used to describe the characteristics of children. Logistic regression analysis was used to determine the factors most associated with the incidence of stunting among children under five. From the simple regression models, the predictor variables which were associated with the outcome at p-value less than 0.25 were selected for inclusion in the multiple logistic regression models. The parameters of statistical significance was set at p <0.005 and the 95% confidence interval.

The operational definition for stunting is: mild stunting interpreted as the height for age below minus two (<-2) Z scores of the recommendation population, moderate stunting interpreted as height/length for age Z-scores (standard deviation) below minus two (<-2) Z scores and > or = to -3 Z score) of the recommendation population and severe stunting is interpreted as height/length for age Z-scores (standard deviation) below minus three (<-3) Z score of the recommendation population.

III. RESULT

The total number of children who participated in this study was 114, whereas 23 children were stunted children and 91 children were normal and had no stunting problem. Based on gender and age, the characteristics of the two groups are similar, whereas more than 50% were male and more than two years old. The majority of maternal employment between the case and control group is housewife, 78.3% and 70.3% respectively. The characteristics of the education level showed a difference in the case group, 65.2% had low education. However, in the control group, there 59.3% of the mothers are highly educated. Regarding infectious diseases, there was a difference between the incidence of diarrhea and acute respiratory infection, while in the case group, the incidence of acute respiratory infection was higher at 69.6% and the control group was only 18.7%. This is different from the incidence of diarrhea, in which the incidence of diarrhea in the case group has almost the same percentage of those who suffer and do not suffer from diarrhea. On the other hand, in the control group, most of them (81.9%) were without diarrhea. The results of the analysis with chi-square showed that there were differences in the characteristics of the variable levels of maternal education, diarrhea and acute respiratory infection (Table 1).

TABLE 1. CHARACTERISTICS OF STUNTED AND NOT STUNTED CHILDREN FROM RURAL AREAS (N=114)

Variables	Cases (stunted children) n=23 F (%)	Controls (not stunted children) n=91 F (%)	P*
Sex			
Male	13 (56.5)	52([57.1)	0.957
Female	10 (43.5)	39 (42.9)	
Age			
≤2 years old	9 (39.1)	37 (40.7)	0.894
> 2 years old	14 (60.9)	54 (59.3)	
Mother's educational level			
Low (under junior high school)	15 (65.2)	24 (26.4)	0.001
High (Senior high school above)	8 (34.8)	67 (73.6)	
Mother's job			
Employed mother	18 (78.3)	64 (70.3)	0.449
Housewife	5 (21.7)	27 (29.7)	
Diarrhea			
Yes	11 (47.8)	11 (12.1)	0.001
No	12 (52.2)	80 (81.9)	
Acute Respiratory Infection			
Yes	16 (69.6)	17 (18.7)	0.001
No	7 (30.4)	74 (81.3)	

Source: Author, 2018, p*<0,05 based on chi-square test

The Anthropometric data showed that the average age in the case group was 31.78 months and 29.92 in the control group. The height variable shows the similarity between the case group and the control group with an average of 81.22 cm and 83.69 cm respectively. On the anthropometric indicator, a striking difference was seen in the height for age indicator wherein the case group the average z score was -3.23, while in the control group, the z score value was -0.14. The results of different tests showed that there were differences in the anthropometric indicator variables with p-value<0.001 (Table 2).

TABLE 2. ANTHROPOMETRIC DATA AMONG STUNTED AND NOT STUNTED CHILDREN FROM RURAL AREAS

Variables	Cases (stunted children) n=23 Mean ± SD	Controls (not stunted children) n=91 Mean ± SD	P*
Age [months]	31.78 ± 16.8	29.92 ± 15.96	0.622
Height [cm]	81.22 ± 13.79	83.69 ± 16.15	0.502
Height for Age Z-Score [HAZ]	-3.23 ± 1.03	-0.14 ± 1.22	0,001

Source: Author, 2018, p*<0,05 based on independent t-test

Table 3 shows the prevalence of stunting was 20.8% out of which 52.2% were mild stunted, 4.3% were moderate stunted and 43.5% were severe stunted (Table 3).

TABLE 3. PREVALENCE OF STUNTED CHILDREN FROM RURAL AREAS

Variables	F	%
Mild stunted	12	52.2
Moderate stunted	1	4.3
Severe stunted	10	43.5

The result from logistic regression analysis showed diarrhea as the determinant for stunting among under five years old children in a rural area with Adjusted Odds Ratio (AOR) is 7.79 with 95% CI (2.59-23.33). The interpretation of the AOR value was that stunted children have a higher risk of 7.79 for diarrhea from not stunted children (Table 4).

TABLE 4. LOGISTIC REGRESSION ANALYSIS FOR SELECTED RISK FACTORS FOR STUNTED CHILDREN IN A RURAL AREA IN YOGYAKARTA

Variables	Univariable analysis OR (95% CI)	p
Sex		0.481
Male	0.69 (0.24-1.95)	
Female	1	
Age		0.570
≤2 years old	0.74 (0.26-2.08)	
> 2 years old	1	
Mother's educational level		0.851
Low (under middle school)	0.89 (0.28-2.83)	
High (high school above)	1	
Mother's job		0.429
Employed mother	1.60 (0.49-5.17)	
Housewife	1	
Diarrhea		0.001
Yes	7.79 (2.59-23.33)	
No	1	
Acute Respiratory Infection		0.644
Yes	1.29 (0.43-3.89)	
No	1	

Source: Author, 2018, OR: Odds Ratio, CI: Confidence Interval

IV. DISCUSSION

In Table 3, reported that the prevalence of stunting was 20.8% out of which 52.2% were stunted. Previous study showed the prevalence of stunting in Nepal was 38% [10], 57% (3.5% severe stunted, 27.3% moderate stunted and 26.4% mild stunted) in Southern Ethiopia [1], 43% in Bureau [3], 15% in Srilanka [4], 23.3% in Vietnam [11]. Stunting was more prevalent in children under five whom living in rural areas than in those in urban areas [12]. The prevalence of stunted children in the rural area of Indonesia was 18% [13].

The high incidence of stunting in rural areas is influenced by various factors. Previous research stated that the high incidence of stunting in rural areas is due to the low socio-economic status and unhealthy environmental conditions [9]. Low socio-economic conditions make it difficult to get qualified health services [9]. In rural areas, people lack access to safe, clean drinking water and basic sanitation. Moreover, in developing countries, 1.1 billion people still defecate in the open, and handwashing with soap is practiced, on average, only after 17% of toilet usage. These two factors caused a high incidence of stunting in rural areas.

A recent study showed that diarrhea was the determinant variable for incidence of stunting children in rural areas. The occurrence of diarrhea is majorly due to the transmission of pathogenic bacteria from feces that are not properly disposed of or from the lack of environmental hygiene. For more than 50 years, the relationship between malnutrition and infectious diseases is bidirectional, where malnutrition is the cause of infectious diseases and infectious diseases cause malnutrition. Two infectious diseases that are contribute to growth disorders in children are diarrhea and lower respiratory tract infections. Besides the effects of specific organs due to infection (e.g., loss of nutrients to the intestine during diarrhea), there is a metabolic cost to activate the immune system which results in the infected child experiencing a lack of energy [14]. Prior research that examined the relationship between malnutrition and diarrhea states that control is needed for various aspects of social demography and the environment aspects in rural areas.

Diarrhea contributes to children malnutrition by a short and long impact. First, diarrhea reduces weight in a short time and in a long time the weight will drop significantly [15]. Recurrent episodes of diarrhea cause failure of linear growth [15]. However, in rural areas of Indonesia, where food intake that does not meet the requirements and high incidence of infectious diseases, the process of handling stunting in infants may never be possible resulting in a high level of growth [16].

Second, diarrhea impairs growth, remaining as the main etiology of mortality and frequently reoccur in children 6-59 months. Persistent diarrhea in children can preside to permanent growth disorder. The studies showed that height deficits are proportional to incidence of diarrhea [17]. Severe diarrhea leads to fluid loss, and it can cause an electrolyte imbalance that leads to mortality risk. On the other hand in terms of morbidity, there is growing evidence that in a long period, malnutrition impaired growth and cognitive function [18].

Diarrhea remains a main etiology of children mortality in the world. Diarrhea contributes to nutritional deficiencies, reduces resistance to infections and impairs growth and development. The community must be aware of children under five years of age because this age is the golden age period by paying attention to the fulfillment of good nutrition, especially in the first 1000 days of a child's life.

V. CONCLUSION

The prevalence of stunting was 20.8% out of which 52.2% were stunted, 4.3% were moderately stunted and 43.5% were severely stunted. Diarrhea was found significantly as the determinant factor of stunted children in rural areas (AOR=7.79, 95% CI 2.59 – 23.33, p = 0.001). The understanding of the risk factors for stunting among children under five years in a rural area is important to guide Indonesian government public health planners to develop nutrition programs and interventions for stunting. Besides developing nutrition programs, prevention programs for infectious diseases, especially diarrhea, it is also important to reduce the incidence of stunting in children under five years

old due to malnutrition and infectious diseases considered as vicious circles that are related to one another.

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