

Original Research Article

Role of specific interventions to prevent stunting in children under five years in the first thousand days of life

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ABSTRACT

Background: Indonesia faces the problem of stunting in children under five years by 24.4%. Boys aged 3 years with severe stunting have 15.0 points lower reading ability and girls have 11.0 points compared to mild stunting, resulting in a decrease in intelligence (IQ), so that learning achievement becomes low. Objective was to obtain information on the role of specific interventions to prevent stunting in children under five years in the first thousand days of life.

Methods: Case-control design analytical research, in the stunted locus area, Jagakarsa Subdistrict, South Jakarta, Special area of the capital Jakarta Indonesia from 1 to 30 September 2021. Case samples of all stunting in children under five years and controls were normal height children who were matched for age and sex with 28 children each. The inclusion criteria in this research were ages 6-59 while the exclusion criteria in this research were toddler who had physical disabilities.

Results: Variables that showed a significant relationship with stunting in children under five years ($p < 0.05$) were the length of a baby at birth ($p = 0.005$) OR 4.958 (95%CI: 1.529-15.987), maternal height (0.002) OR 5.727 (95%CI: 1.765-18.507), father's education $p = 0.006$ OR 5.169 (95%CI: 1.520-17.580, and family income ($p = 0.012$) OR 9.800 (95%CI: 1.116-86.041).

Conclusions: Babies born < 48.0 cm are at risk of 12.306 times of becoming stunting after controlling for variables such as maternal height, father's education, energy intake, protein, iron, colds, exclusive breastfeeding, supplementary feeding for pregnant women and children and early initiation of breastfeeding.

Keywords: Baby birth length, Cold, Maternal height, Nutrient intake, Stunting

INTRODUCTION

Based on the results of basic health research (Riskesdas, 2021) Indonesia has stunting in children under five years of age problems (HA) including very short ($< -3SD$) of 5.4% and short toddlers ($> -SD$ to $-2SD$) of 19.0%, a total of 24.4%.¹ Children under five years of age are the biggest threat to the quality of human life in the future. It is important to eradicate stunting related to decrease in brain growth in children, hindered learning, decreased productivity in adults, and the increasing threat of non-communicable diseases such as obesity, high blood pressure and diabetes.² Research on stunting found

several indicators related to the habits of washing hands, toilet care, brushing teeth, environmental hygiene indicators. Health service indicators include clean water access, availability of village integrated health post for child health, and infectious diseases indicators, namely pneumonia, diarrhea in children, and upper respiratory tract infections.³

The government is very concerned about stunting in children under five years of age by implementing specific and sensitive interventions. The study explains that the occurrence of stunting has been since from the time the fetus is in the womb, nutritional status of pregnant

women, even before pregnancy, it greatly determines the growth of the fetus. Pregnant women who are malnourished are at risk of giving birth to low-birth-weight babies which is the main cause of stunting. Socio-economic welfare, food security, availability of clean water and access to basic service facilities have an effect on the high prevalence of stunting. Stunting occurs prenatally and postnatally, particularly in the first two years of life. Up to 12 months of age nutritional status and linear growth is a reflection of the environment. After birth, babies who are not exclusively breastfed will suffer from infectious diseases, due to inadequate dietary habit, lack of nutritional intake and low personal hygiene. Children aged 3 years with severe stunting (-3.0 SD $<$ Z-Score -2.0 SD) in boys had 15.0 points lower reading ability and girls had 11.0 points compared to mild stunting (Z-Score $>$ -2.0 SD). This results in a decrease in intelligence (IQ), so that learning achievement becomes low. Stunting in children have an impact not only on a shorter physique, but also on intelligence, productivity and achievement after adulthood, thereby increasing the burden on the state.³

Several effects of stunting. First, the decrease in IQ to diabetes and cancer and huge economic costs. The Ministry of Health estimates that the prevalence of stunting costs the state 2-3% of gross domestic product (GDP) of US\$27 billion annually.⁴ Second, stated by Achadi, a study from India proves that children who suffer from malnutrition will grow and tend to become short adults, furthermore tend to give birth to small babies who are at risk of having a low risk of educational achievement, and ultimately have a low economic status. Third, stated by Chandrakant and quoted by Achadi that stunting at an early age can predict cognitive performance and the risk of coronary heart disease in adulthood.⁵

To handle stunting, the government has stipulated presidential regulation No. 42 of 2013 concerning the National Movement for the Acceleration of Nutrition Improvement.⁶ Research by Apriani et al found that specific interventions have an effect on the prevalence of stunting, particularly indicators of exclusive breastfeeding and complete basic immunization.⁷ Furthermore, Fahmi et al stated that a specific intervention to prevent stunting in children under 2 years of age was breastfeeding children up to 2 years.⁸ While, Putu study found that there is no relationship between the role of specific interventions on stunting ($p=0.968$).⁹

Special capital region of Jakarta as a megapolitan has 27.0% of stunting in children under five years of age.¹⁰

The purpose of the research was to obtain information on the role of specific interventions to prevent stunting in children under five years in the first thousand days of life.

METHODS

This research was an analytic observational case-control design. The case subjects were all stunting in children under five years and controls, in the stunted locus were,

Jagakarsa Subdistrict, South Jakarta, Spesial area of the capital Jakarta Indonesia from 1 to 30 September 2021. Were normal children who were matched for age and sex, each of which was 28 children so that the total sample was 56 children. The inclusion criteria in this research were ages 6-59 while the exclusion criteria in this research were toddler under five years of age who had physical disabilities. The research hypothesis was that stunting in children under five years is determined by maternal factors, child factors, family factors, environment and sanitation hygiene. To prove the research hypothesis, the chi square test and multiple logistics regression test were used. This research has obtained approval from the Health Polytechnic Ethics Commission of the Ministry of Health Jakarta II Number: LB.02.01/I/KE/31/375/2021 dated May 5, 2020 and the subject has stated a willingness to participate in the research by filling consent after explanation (PSP) that is known by witnesses and enumerators. Toddler height was measured by using a microtoice with a capacity of two meters and an accuracy of 0.1 cm. To assess the nutritional status of TB/U toddler, the height of toddler was converted into a standardized value (Z-score) based on the height indicator according to age using the 2005 WHO anthropometric standards for toddler. Furthermore, based on the Z-score of these indicators, the nutritional status of toddler was determined with normal limits (Z-score ≥ -2.0) and short (Z-score < -2.0) according to the Ministry of Health Regulation number 2 of 2020 concerning child anthropometric standards. The weight measurement of toddler parents used a digital weight scale with a capacity of 180 kg with an accuracy of 100.0 grams.

Variables was processed and analysed consisting of child characteristics, parental characteristics, parental socioeconomic status, nutrient intake, immunization and infection. Multivariate analysis of multiple logistics regression prediction model to find out the role of independent variables simultaneously with stunting. The results of the bivariate analysis with $p < 0.250$ were included in the multivariate analysis.

RESULTS

The sample subject profile is shown in the Figure 1.

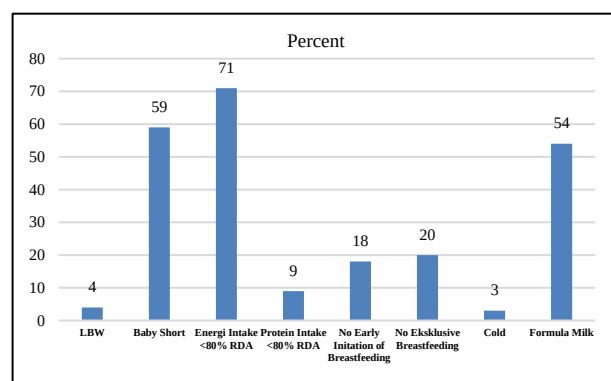


Figure 1: Characteristics of subjects.

The result of the analysis of the relationship between risk factors and stunting show in the Table 1.

The results of the analysis showed that there was a difference in stunting based on maternal height ($p=0.002$), there was no difference in stunting based on weight gain during pregnancy ($p=0.300$), there was no difference in stunting based on the age of married mothers ($p=0.258$), there was no difference in stunting based on maternal food acquisition during pregnancy ($p=0.107$). There was

no difference in stunting based on father's age ($p=0.580$), there was no difference in stunting based on father's education ($p=0.006$), there was no difference in stunting based on father's occupation ($p=0.580$), there was no difference in stunting based on mother's education ($p=0.298$), there was no difference in stunting based on mother's occupation ($p=0.178$). Furthermore, compose the final equation model with the provision that if the difference in OR was $>10\%$; $p<0.05$ and exit the model if the difference in OR $<10\%$; $p>0.05$.

Table 1: Characteristics of subjects and stunting.

Risk factors	Stunting		Normal		P	OR	95%CI
	N	%	N	%			
Child factors							
Baby birth length							
≤ 47.0 cm	22	66.7	11	33.3	0.005	4.958	1.539-15.978
>47.0 cm	6	26.1	17	73.9			
Supplementary feeding							
Not getting	4	3.3	8	66.7	0.064	0.278	0.066-1.167
Getting	24	54.5	20	45.5			
Early initiation of breastfeeding							
No	4	40.0	6	60.0	0.565	0.667	0.166-2.679
Yes	24	52.2	22	47.8			
Exclusive breastfeeding							
No	6	54.5	5	45.5	0.639	1.371	0.365-5.152
Yes	22	48.9	23	51.1			
Maternal height							
<150 cm	22	68.8	10	31.2	0.002*	5,727	1.765-18.507
≥150 cm	6	25.0	18	75.0			
Mother's age at marriage							
<19 years	3	42.9	4	57.1	0.258	0.384	0.068-2.172
≥19 years	25	51.0	24	49.0			
Pregnancy supplementary feeding							
Not getting	16	43.2	21	56.8	0.107*	0.444	0.143-1.385
Getting	12	63.2	7	36.8			
Iron tablets during pregnancy							
Not getting	1	14.3	6	85.7	0,101*	0.398	0.127-1.244
Getting	27	55.1	22	44.9			
Father's age							
<25 years	3	60.0	2	40.0	0.580	1.687	0.260-10.968
≥25 years	25	49.0	26	51.0			
Father's education							
≤Junior high school	12	63.2	7	36.8	0.006	5.169	1.520-17.580
≥High school	16	43.2	21	56.8			
Father's occupation							
Not fixed	5	45.5	6	54.5	1.000	0.797	0.212-2.93
Fixed	23	51.1	22	48.9			
Mother's education							
≤Junior high school	12	63.2	7	36.8	0.298	1.850	0.589-5.526
>High school	16	43.2	21	56.8			

DISCUSSION

This equation explained that babies born in length of <48.0 cm are at risk of 12,306 times short stunting occurs

after controlling for maternal height, energy intake, protein intake, cold infections, exclusive breastfeeding of pregnant women and children receive supplementary feeding during pregnancy, and father's education and

early initiation of breastfeeding. In this research, the final model of multivariate analysis was that short toddlers who were determined by the length of the baby born, energy intake, protein intake, colds, exclusive breastfeeding, maternal height, supplementary feeding [pregnant women and early initiation of breastfeeding for the length of the baby born according to the research by Nurillah et al showed that babies who were born short have 3.0 times chance of experiencing stunting and developmental delays (OR adj=3.08; 95%CI: 1.03-9.15) after were controlled by child's age, gender and father's education level; $p=0.000$] and the research by Try stated that birth length <48.0 cm have 5.06 risk of experiencing stunting (OR=5.06; 95% CI: 2.58-87.97).^{11,12} The impact of maternal height on stunting in children under five years according to research by Aditianti et al that toddlers from mothers who have a height of <145.0 cm have a 2.32 risk of becoming stunting compared to toddlers from mother who have a height of >145.0 cm (AOR 2.32; 95% CI: 1.94-2.77). This result was also in accordance with the research by Wiwid et al that a significant maternal height is a predictor of stunting (adjusted OR=2.720; 95% CI: 1.050-7.049 and the results of Alphonse study stated that maternal height is (OR 3.27; 95% CI 1.89-5.64). This confirms Achadi's statement that short mothers, thin pre-pregnancy, anemia, inadequate pregnancy weight gain and exposure of pregnant women to cigarette smoke have an impact on stunting.^{13-15,21} In this research also showed that father's education level has a significant impact on the incidence of stunting in children under five years, according to the results of Aditianti et al research that fathers' education who did not finish elementary school are (AOR 1.56; 95% CI: 1.22-1.99).¹⁰ Energy and protein intake also had an impact on stunting, this is in accordance with the findings of Farahiyah et al and Lalu showed that a comparison of stunting and non-stunting in children under five years and a significant difference ($p\leq 0.05$). So it can be concluded that a severe deficit in energy and protein intake is associated with the occurrence of stunting.^{12,15-18} This strengthens the theory that nutritional status and is directly affected by nutrient intake. While, the impact of influenza on stunting is in line with the findings of Kavle et al in 2005 and 2008 that in upper Egypt there was a significant reduction in stunting (28.8-21.8%, $p<0.001$). Lower Egypt experienced a significant increase in stunting (16.6-31.5 $p<0.001$), coincided with the 2006 avian influenza outbreak.¹⁹ Furthermore, the impact of exclusive breastfeeding on stunting was in line with the findings of Apri et al that a history of exclusive breastfeeding (OR=0.122; 95% CI: 0.075-0.199) was significantly related to the incidence of stunting in toddlers aged 2-5 years.²⁰ Likewise with the multivariate analysis, namely a history of exclusive breastfeeding with OR=0.108 (95% CI: 0.05-0.180) (95% CI: 4.892-59.511), but contrary to the findings of Bunga et al that exclusive breastfeeding is protective against the incidence of stunting in children, but the results were not significant, both for exclusive breastfeeding for >6 months (OR=0.9, 95% CI: 0.63-1.59) and exclusive breastfeeding for 4-<6 months

OR=0.93, 95% CI: 0.63-1.39.²¹ While, Rizal et al stated that children who do not receive exclusive breastfeeding have a risk of stunting 7.86 times (95% CI: 2.43-25.4) compared to children who are exclusively breastfed, other studies showed that there is a significant difference ($p=0.025$) in stunting based on exclusive breastfeeding.^{19,21-26}

For the provision of supplementary feeding for pregnant women that focus on both macronutrients and micronutrients for children under five years of age and pregnant women, it is very necessary to prevent low birth weight babies and stunting in children under five years, but in this research pregnant women who did not consume supplementary feeding had a risk of 0.266 95% CI: 0.029-2.445 children experiencing stunting compared to pregnant women who consumed supplementary feeding.¹⁷ Furthermore, Rizal stated that children who do not get early initiation of breastfeeding have a 2.63 times (95% CI: 1.02-6.82) chance of experiencing stunting.²⁶ Early initiation of breastfeeding is an enabling factor for exclusive breastfeeding mothers, according to the findings of Sofia, it showed that there was a significant relationship between early initiation of breastfeeding and exclusive breastfeeding ($p<0.05$) OR 9.17, indicating that respondents who did not initiate early breastfeeding were at risk of 9.17 were not exclusively breastfed compared to respondents who do early initiation of breastfeeding.²⁷⁻³¹

As a limitation this research was carried out during the COVID-19 pandemic, the number of samples was relatively small covering one village at the district level.

CONCLUSION

Stunting in children under five years of age are determined by the length of a baby at birth, energy intake, protein intake, colds, exclusive breastfeeding, maternal height, supplementary feeding for pregnant women, children, and early initiation of breastfeeding.

Suggestions, promotive and educational efforts are needed in increasing the height of prospective mothers, increasing the length of a baby born, increasing energy intake, protein intake, preventing cold infections, exclusive breastfeeding, pregnant women and children get supplementary feeding and early initiation of breastfeeding.

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