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Analysis of Factors Related to Stunting Among Children Aged 6-24 Months in Central Jakarta

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A B S T R A C T

Stunting is a condition in which children aged 0-5 years have height-for-age with a z-score of below -2SD based on growth standards according to WHO, which occurs at the age of 0-5 years. Stunting condition may result in the inhibition of cognitive and motor development so as to create a generation that is less competitive and have disrupted metabolic system and they are at risk of various diseases. The causes of stunting are multi-dimensional factors such as birth length and genetics, maternal height, economic status, level of education and child care patterns. This study aims to analyze factors related to the incidence of stunting among children aged 6-24 months in Central Jakarta with a cross sectional study using a questionnaire. Data were analyzed using Chi-square and multiple logistic regression tests. The results showed that there was no relationship between education, age, family income, gestational age, BMI, newborn length and exclusive breastfeeding with stunting (P>0.05). In contrast, there was a relationship between maternal height and stunting (p <0.05). Furthermore, the results of regression test showed that the most dominant influential factor on the incidence of stunting was maternal height.

Stunting merupakan kondisi dimana balita menurut usianya (0 – 5 tahun) memiliki panjang atau tinggi badan dengan hasil nilai z-score dibawah -2SD berdasarkan standar pertumbuhan menurut WHO. Kondisi stunting mengakibatkan terhambatnya perkembangan kognitif dan motorik sehingga menciptakan generasi yang kurang berdaya saing serta mengganggu sistem metabolik yang beresiko terjadinya berbagai penyakit. Stunting disebabkan oleh faktor multi dimensi, diantaranya yaitu panjang badan lahir yang dipengaruhi nutrisi saat hamil dan genetik, tinggi badan orang tua yang dapat diturunkan kepada anakkya, status ekonomi yang berhubungan dengan kemampuan pemenuhan gizi, pendidikan yang mempengaruhi pengetahuan terkait gizi dan pola asuh anak. Penelitian ini bertujuan menganalisis faktor yang berhubungan dengan kejadian stunting pada anak usia 6-24 bulan di Jakarta Pusat dengan metode cross sectional menggunakan kuesioner. Analisis menggunakan Chi-square untuk mengetahui hubungan antara faktor penyebab stunting dan menggunakan uji regresi logistik ganda untuk mengetahui faktor yang paling berpengaruh terjadap kejadian stunting. Hasil penelitian menunjukkan tidak ada hubungan antara pendidikan, usia pendapatan keluarga, jarak kehamilan, IMT, panjang badan lahir dan pemberian ASI eksklusif dengan kejadian stunting (P >0,05) serta ada hubungan antara tinggi badan ibu dengan kejadian stunting (p<0.05). Sedangkan, hasil uji regresi menunjukkan faktor yang paling berpengaruh terhadap kejadian stunting adalah tinggi badan ibu.

Introduction

Stunting is a condition of under-five children with chronic malnutrition (since pregnancy and in the early life stages after birth), who experience growth failure that does not appear until the age of 2 years (Ministry of Health, 2019). Stunting can be caused by chronic child malnutrition, so it takes a long time to restore the length/height-for-age condition (Richardson & Dutton, 2016; United Nations-World Health Organization-The World Bank Group, 2019). WHO data (2018) showed that the incidence of stunting ranks first in Southeast Asia (57.9%). Indonesia is one of the countries in the list of countries in the Southeast Asian continent. Among several countries in Southeast Asia, Indonesia has the second

highest prevalence of stunting after Cambodia. Basic Health Research (2018) recorded a decrease in the incidence of stunting by 47.2% in 2013 to 30.8% in 2018 or around 9 million infants and 29.9% occurred in children under 2 years old (Ministry of Human Development and Culture Coordinator, 2018; Ministry of Health of the Republic of Indonesia, 2019; Unicef/WHO/The World Bank, 2019).

Stunting conditions can impair brain development regarding the inhibition of cognitive and motor development so as to create a generation that is less competitive and have disrupted metabolic system and they are at risk of various diseases. such as obesity, stroke, diabetes and heart disease. In Indonesia, stunting is a major problem as it affects the country's economy and increases poverty, resulting in losses of up to 3% per year.

The second goal of one of the SDG'S programs focuses on reducing hunger and poverty. It is expected that by 2030, the problem of malnutrition can be solved and the nutritional needs of pregnant and breastfeeding women can be met to reduce the incidence of stunting. Nutrition-related interventions have been shown to be up to 70% effective in terms of success in improving community nutrition, particularly in reducing the incidence of stunting (Ministry of Health of the Republic of Indonesia, 2019).

The critical intervention to reduce the prevalence of stunting occurs in the first 1000 days of life in under-five children, especially before the age of 2 (TNP2K, 2017). A study conducted by Kusuma (2013) concluded that children's growth slowed down at the age of 2-3 years, so the process of growth at this age had less chance than at the age of 6-24 months. Causes of stunting are multidimensional factors such as birth length affected by maternal diet during pregnancy, genetics, parents of short stature, economic status which is related to ability to fulfill diet during pregnancy through infancy, and level of education which affectt parents knowledge about nutrition and child care. Inappropriate parenting carries a greater risk of inhibiting children (Kusuma, 2013).

The impact of stunting in Indonesia is very wide and the success of interventions performed on children under 2 years old is very high. Based on the beackgroud, researchers are interested in understanding factors related to stunting among children aged 6 to 24 months in Central Jakarta in 2019.

Methods

This was an observational analytical study with a cross-sectional method performed on all children aged 6 to 24 months in Johar Baru Village, Central Jakarta, with a total number of 35 children. The samples were selected using total sampling technique. The study was conducted in February-August 2019 using a questionnaire that included informed consent as a means of approval and data collection. The results obtained were then analyzed with SPSS. Bivariate analysis applied chi-square to determine the relationship between stunting variables and multivariate analysis applied multiple logistic regression to determine the most dominant factor in the incidence of stunting. Before implementing multivariate analysis, bivariate analysis was performed which obtained a p-value of < 0.25. There was a requirement for multivariate analysis, and the dependent variable was categorical. According to the results of the bivariate analysis, the independent variables appropriate for further analysis by multiple logistic

regression were maternal age, maternal height, breastfeeding and the dependent variable was growth retardation.

Results

Table 1. Distribution of stunting frequency, maternal level of education, age, BMI, height, family income, pregnancy spacing, newborn length, gestational age and exclusive breastfeeding

Variable	N	Percentage (%)
Stunting		
Yes	9	25,7%
No	26	74,3%
Maternal Level of Education		
Primary Level	16	45.7%
Further level	19	54.3%
Maternal Age		
<20 or >35 years	9	25.7%
20-35 years	26	74.3%
Maternal BMI		
< 18.5 or > 24.9	7	20%
18.5 – 24.9	28	80%
Maternal Height		
≤150 cm	6	17.1%
>150 cm	29	82.9%
Family Income		
< Rp. 2.500.000	13	37.1%
≥ Rp 2.500.000	22	62.9%
Pregnancy Spacing		
≤ 2 years	4	11.4%
>2 years	31	88.6%
Newborn Length		
< 48 cm	23	65.7%
≥ 48 cm	12	34.3%
Gestational Age		
Preterm or Postterm	0	0%
Aterm	35	100%
Exclusive Breastfeeding		
No	5	14.3%
Yes	30	85.7%

Table 1 revealed that a small proportion (25.7%) of the respondents had underdeveloped children or shorther height-for-age, most of respondents (54.3%) had a further level of education, most of respondents (74.3%) had an age range between 20 and 35 years old, almost all respondents (80%) had a BMI (Body Mass Index) in the normal category, namely 18.5 to 24.9, almost all of respondents (82.9%) had body height of > 150cm, most of respondents earned almost Rp 2,500,000 per month. Furthermore, almost all respondents (88.6%) had pregnancy spacing of >2 years or had just had their first child, all respondents (100%) had children with term pregnancies, most of respondents (65.7%) gave birth to children in the newborn length category of <48 cm and almost all respondents (85.7%) reported to do exclusive breastfeeding.

Table 2. Relationship between maternal level of education, age, pregnancy spacing, BMI, height, family income, newborn length, and breastfeeding with the incidence of stunting

Variable	Stunting		N P value	OR (95% CI)
	Yes (n = 9)	No (n= 26)		
Maternal Level of Education				
Primary Level	3 (33.3%)	13 (50%)	0.460	0.842 (0.573 – 1.238)
Further Level	6 (66.7%)	13 (50%)		

Variable	Stunting		N	OR
	Yes (n = 9)	No (n= 26)	P value	(95% CI)
Maternal Age				
<20 or >35 years	4 (44.4%)	5 (19%)	0.192	1.454 (0.787 – 2.686)
20-35 years	5 (55.6%)	21 (81%)		
Maternal BMI				
< 18.5 or > 24.9	3 (33.3%)	4 (15.4%)	0.340	1.375 (0.704 –2.687)
18.5 – 24.9	6 (66.7%)	22 (84.6%)		
Maternal Height				
<150 cm	4 (44.4%))	2 (7.7%)	0.027	2.483 (0.791-7.792)
≥150 cm	5 (55.6%)	24 (92.3%)		
Family Income				
≤ Rp. 2.500.000	2 (22.2%)	11 (42.3%)	0.431	0.806 (0.558 – 1.164)
>Rp 2.500.000	7 (77.8%)	15 (57.7%)		
Pregnancy spacing				
≤ 2 years	1 (11.1%)	3 (11,5%)	1.000	0.989 (0.541-1.807)
>2 years or first child	8 (88.9%)	23 (88.5%)		
Newborn Length				
≤ 48 cm	5 (55.6%)	18 (69.2%)	0.685	0.852 (0.541 – 1.342)
> 48 cm	4 (44.4%)	8 (30,8%)		
Exclusive Breastfeeding				
No	3 (33.3%)	2 (7.7%)	0.095	2.000 (0.674 – 5.939)
Yes	6 (66.7.%)	24 (92.3%)		

Table 2 shows the factors related to stunting, including maternal height. The results of the chi-square analysis of maternal height obtained a p-value = 0.027 or < 0.05. Such finding indicated that there was a significant relationship between maternal height and stunting. Most of respondents (44.4%) who had stunting children were women with body height of <150 cm. Accordingly, the results of the analysis with a 95% confidence level showed that women with body height of <150 cm 2.4 times more likely to have stunted children than women with body height of >150 cm.

Table 3. Logistic regression analysis of maternal age, height, exclusive breastfeeding with stunting

Variable	Koef (β)	SE (β)	Wald	P value	Exp.B (95% CI)
Martenal Age (< 20 years and > 35 years)	1.111	0.975	1.301	0.254	3.039 (0.450 – 20.525)
Maternal Height (<150 cm)	2.444	1.084	5.083	0.024	11.522 (1.376 – 96.467)
Non-Exclusive Breastfeeding	1.914	1.144	2.801	0.094	6.781 (0.721 – 63.814)
Constant	2.343	0.721	10.560	0.01	

Hosmer and Lemeshow Test= 0.892

Table 3 provides information on the variables that put children at risk of stunted growth. In the variable of maternal age (< 20 years and > 35 years), there was a 3.039-fold (22.48%) probability of having a stunted child. Furthermore, the maternal height lead to 11.522-fold (52.38%) and that exclusive breastfeeding lead to 6,781 fold (39.39%) probability of having a stunted child. And if the maternal age was <20 years old or >35 years old with height of <150 cm and no exclusively breastfeeding, then the probability that the infant was at risk for stunting was 95.80%.

Discussion

The results of this study indicated that there was a significant relationship between maternal height and the incidence of stunting (p-value of <0.05). This showed that women with height of <150 cm were at risk of having underdeveloped children. This is consistent with a study conducted by Husna (2017), which found that women with height of <150 cm were 6.35 times more likely to have children with stunting (Husna, 2013). Likewise in the study by Toliu et al., it was found that genetic factors (height) had an impact on the incidence of stunting among under-five children. Having one or both parents short due to pathological conditions (such as growth hormone deficiency) means that they have genes on their chromosomes that carry short traits, making children more likely to inherit those genes and grow into the stunting generation. However, if the parents are small due to nutritional deficiencies or disease, it is likely that the child can grow to a normal size as long as the child is not exposed to other risk factors during growth (Nasikhah & Margawati, 2012; Toliu, Malonda, & Kapantow, 2018).

According to Rahayu and Khairiyati (2014), children of young mothers are at risk of being underdeveloped due to physical conditions. They have gene structure that can carry short traits, giving children the opportunity to inherit genes as they grow into stunting. Mothers of short stature are 7 times more likely to have underdeveloped children compared to mothers with high stature (150 cm) because genetic/hereditary factors can influence fetal growth and the function of the formed organs (Manggala, Kenwa, Kenwa, Sakti & Sawitri, 2018; Soetjiningsih, 2016). Maternal height was significantly related to the incidence of stunting and has a three times higher risk of having a child with stunting, as short mothers inherently have limited organ capacity and function (Nur Hadibah Hanum, 2019).

High level of knowledge can influence parents in determining compliance with family dietary and parenting patterns. Inappropriate parenting may increase the risk of stunting (Adriani and Wirjatmadi, 2012). In this study, more than half the incidence of stunting (66.7%) occurred in mothers with higher education. Basically, higher education tends to have better employment opportunities and the level of ability to obtain information (Atmarita, Trihono; Tjandrarini, Dwi Hapsari; Irawati, Anies; Utami, Nur Handayani; Tejayanti, Teti; Nurlinawati, 2015). However, higher education does not guarantee either that someone has better knowledge, especially in relation to nutrition. From direct observations, mothers with low levels of education tend not to work so that they have time to come to the posyandu for extra food and to take part in nutritional and health counseling (Wanimbo & Wartiningsih, 2020). This shows that higher education does not guarantee that children are free from malnutrition, because higher education does not mean that one has a good knowledge on nutrition(Iswati et al., 2019). Highly educated mothers are more likely to work as professionals than as housewives, so childcare is often left to caregivers who may not have adequate training and knowledge of nutritional issues. This is the possible reason why maternal low educational level is not a risk factor for stunting in children aged 1-2 years (Pramesti, SA, Fitriahadi, E, Candra, 2019).

In this study, it was shown that almost half (44.5%) of respondents with underdeveloped children were aged <20 years and >35 years, which age was taken into account as the age at risk for stunted children. This is consistent with a study conducted by Yu, et al. (2016) that relatively young maternal

age was closely related to growth failure in infants aged 0-11 months. Besides, women with gestational age of <20 years do not have enough experience and knowledge to take care of their pregnancy. Wanimbo and Wartiningsih (2020) also found that under-fives with stunting were more likely to be from the group of mothers aged <20 years. Maternal age was found to be significantly related to the incidence of stunting. Women aged <20 years were at higher risk of stunting during pregnancy compared to women of childbearing age (20-34 years). Teenage mothers are 8 times more likely to have stunting than mothers in the optimal reproductive age. Likewise, it was known that mothers who are older than 35 years tend not to take care of their pregnancy, so this can also lead to stunted fetal growth during pregnancy. In addition, at this age, the absorption of nutrients also decreases, leading to imbalanced food intake and malabsorption that reduces nutritional fulfillment in infants (Hasandi, 2018). At too young (<20 years) and too old (> 35 years) age, women have 4 times greater risk of having stunted growth compared to women in the optimal reproductive age (Manggala et al., 2018; Yu, Mason, Crum, Cappa & Hotchkiss, 2016).

This study shows that there was a significant relationship between maternal age and the onset of stunting. This is consistent with Wemakor's (2018) statement that maternal age is significantly related to the incidence of stunting. (Wemakor, Garti, Azongo, Garti & Atosona, 2018). This may be due to the ongoing physical growth in adolescent women, resulting in competition for nutrients between mother and fetus (Stephenson, Tammy, and Schiff, 2019). As a result, women are at risk of intrauterine growth restriction (IUGR) and give birth to low birth weight (LBW) and small children. If there is no catch-up growth in the first 2 years, the toddler will grow into a small child. In addition, young mothers are psychologically immature in terms of mindset, so child rearing in adolescent mothers is not as good as in older mothers (Wanimbo & Wartiningsih, 2020).

BMI is one of the indicators in determining a person's nutritional status through anthropometric measurements. Nutritional problems are the most important direct factor in causing growth retardation. The results of this study indicated that there was no significant relationship between BMI during pregnancy and the incidence of growth retardation (p-value >0.05). This study is consistent with a study conducted by Astuti et al. (2020) which revealed that BMI had no significant relationship with the incidence of stunting. Such finding might happens because mothers and families already have good nutritional status, so they can prevent the onset of low birth weight and stunting (Astuti, Susanti, Nurparidah & Mandiri, 2017).

The level of family income was known to affect the incidence of stunting, as low-income families impair families' purchasing power, while high-income families allow families to meet their nutritional food needs (Adriani and Wirjatmadi, 2012). High-income families will be able to meet all of the children's primary and secondary needs, thereby reducing the incidence of stunting, and they will also have better access to health services than low-income families.

This study found that family income was not significantly related to stunting. Low income is not the only cause of stunting and it can be explained by the fact that families with high economic abilities sometimes spend their income not entirely on basic foodstuffs but on other needs, so this certainly does

not guarantee good nutritional status for young children. Low-income families can actually maximize their income by managing nutritious foods with simple and inexpensive ingredients to keep the baby growing well (Mawaddah, 2019; Susilaningrum, Nursalam, & Utami, 2013). Good parenting by providing information on nutrition, parenting patterns, and parenting courses can increase parental engagement and awareness of what influences children's growth and development (Coordinating Ministry of Human Development and Culture Midwives, 2018). Children in families of low economic status tend to consume less food in terms of quantity, quality, and variety. High economic status drives a person to select and purchase nutritious and varied foods (Agustin & Rahmawati, 2021). However, the ability to buy groceries does not necessarily guarantee that a child will grow up better than a low-educated family. When administering complementary food, the strategy must be timely, appropriate, safe, hygienic, and responsive to administration. Sometimes the ability of the parents to buy expensive foods is considered good, sometimes the nutrition is insufficient to meet the needs of the body to grow and develop (Illahi & Zki, 2017; Roesli, 2012).

However, this study found that family income had no significant relationship with the incidence of stunting in children aged 6 to 24 months. This result is consistent with Ambarwati (2019) who found that there was no significant relationship between family income and the incidence of stunting among under-five children. The similar finding sa also presented ina study conducted by Putri (2012), which finds that there was no relationship between family income and the incidence of stunting in young children. This could be because the income received was not entirely spent on basic food needs, but on other needs. A highincome level does not necessarily guarantee good nutritional status for children under the age of five, as the income level is not necessarily adequately provided for nutritional purposes. If low-income families can manage nutritious food with simple and inexpensive ingredients, the baby's growth will also be good. Poor economic status can also mean low purchasing power, thus affecting the ability to buy good and cheap food (Indonesia, 2018; Susilaningrum et al., 2013).

It is well known that short pregnancy spacing indicates that parents tend not to provide optimal care for their children. The older children are not yet independent and still need a lot of attention. The results of this study indicated that there was no significant relationship between pregnancy spacing and the incidence of stunting (p-value >0.05). This is likely because almost all respondents in this study were their first children, so they did not experience iron deficiency during pregnancy, which causes anemia and affects the mother's nutritional status. BAPPENAS explained that by providing information about nutrition, parenting patterns, and parenting classes. Good parenting can increase parental engagement and awareness, which impacts children's growth and development (BAPPENAS, 2018).

The results of this study showed that more than half (55.6%) of infants with stunted growth had a birth length of 48 cm. The body length of an infant at birth describes linear growth in the uterus. If the mother suffers from a lack of energy and protein during pregnancy, there is a risk that the baby will be 48 cm long. Andini, 2019 added that babies born with a short body length were 75.5 times more likely to suffer from stunted growth (Andini, Maryanto, & Mulyasari, 2020; Supariasa, Bakri, & Fajar, 2012, 2016).

The results showed that the infant's birth length was not significantly related to the incidence of stunting (p-value >0.05). This study is consistent with a study conducted by Indrianti (2019) and Pramesti (2019) whic concluded that there was no relationship between birth length and the incidence of growth retardation (Indrianti, 2019; Pramesti, SA, Fitriahadi, E, Candra, 2019). The lack of this relationship is because birth length is not the main factor causing stunting. It is known that there are many other causes that cause a child to retard growth. Adequate parental upbringing and nutrition from birth can catch up (catch up) in body length. It is known that heightening can be carried out until infants are 2 years old. In addition, regular monitoring of children's growth and development by healthcare workers can identify growth disorders early for further evaluation and treatment by physicians (BAPPENAS, 2018; Rahmawati, 2018). If infants are born short buty get adequate stimulation and nutrition, their height will approach normal children's height even though they cannot match non-stunting criteria (Dr. Nurlailis Saadah, S.Kp., 2020).

Breast milk is the first and most important food for babies. Breast milk is the ideal food for babies as it contains all the nutrients babies need. It should be exclusively breastfed. Proper breastfeeding for babies has many positive effects on health and the growth and development process. Breast milk is an ideal nutritional source with a balanced composition and in line with the baby's growth needs (Hairunis, Rohmawati, & Ratnawati, 2016; Manungkalit, Nyoman, Arthina, & Kartiko, 2018; Mawadda, 2019; Walyani, 2015).

This study concluded that there was no relationship between exclusive breastfeeding and growth retardation. This study is consistent with a study conducted by Winny in 2014, which found that exclusive breastfeeding was not related to growth retardation. However, another study concluded that babies who were not breastfed were at risk 2 times more likely to be underdeveloped (Rambitan et al., 2014). The results of a study conducted by Marlan et al., 2013 also agreed that exclusive breastfeeding was not related to growth retardation. It is possible that non-breastfed babies are also fed by the mother in a balanced way, so that their growth does not differ significantly from that of breastfed children. Moreover, there are many factors that cause growth retardation, not only those without exclusively breastfeeding. Many other factors that influence the incidence of growth retardation (Pang Kong). Rattu & Malonda, 2013). In cintrast, breastfeeding > 6 months also increases the risk of stunting by 1.36 times compared to children breastfed <6 months. This may be because breastfeeding >6 months runs the risk of delaying complementary feeding such inadequate nutritional intake. It is known that breast milk in children >6 months of age is unable to meet the nutritional needs for child growth and development (Khasanah, Hadi, & Paramashanti, 2016). Paramashanti, 2020, also concluded that exclusive breastfeeding was not the only factor affecting the incidence of stunting, but there were other factors such as diet during pregnancy and preconception (Khasanah et al., 2016; Wardani et al., 2018).

The results of this study indicated that the most influential factor in the incidence of stunting was maternal height (p-value <0.05). The study revealed that stunted children were born from mothers with height of <150 cm which increased the incidence of stunting. In addiiton, Husna (2017) found that there was a relationship between maternal height of <150 cm with the incidence of stunting and women

with height od <150 are 6.35 times were more likely to have stunting children than women with normal height (Husna, 2013). 40% of a child's height is influenced by growth hormones, genetics and a healthy lifestyle and happiness, so although genetics have an influence, the percentage is not large as it is influenced by other factors (Lissauer & Clyden, 2012). A study conducted by Latif and Istiqomah in 2017 found that stunting was related to genetics, the role of genetics was about 25% and the other 75% was influenced by environmental factor (Latif & Istiqomah, 2017). One or both parents who are short due to pathological conditions (such as growth hormone deficiency) have genes on their chromosomes that carry short traits, making their children more likely to inherit these genes and grow up with stunted growth (Iswati et al., 2020). However, if the parents are small due to malnutrition or illness, it is possible for the child to grow to a normal size as long as the child is not exposed to other risk factors (Nasikhah & Margawati, 2012). Short women have limited organ capacities and functions, so whatever enters the mother's body is adapted to the capacity of the mother's organs (Nur Hadibah Hanum, 2019).

Conclusions

The causes of growth retardation are very diverse. The results of this study identified factors that cause growth retardation in children aged 6 to 24 months, including maternal level of education, age, BMI during pregnancy, height, family income, pregnancy spacing and gestational age upon delivery, the length of the baby at birth and exclusive breastfeeding. Of all the factors examined, only maternal height had a significant relationship. Furthermore, it was known that the most dominant influential factor for the incidence of stunting was maternal height.

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