RELATIONSHIP BETWEEN MATERNAL HEIGHT WITH CHILDREN UNDER TWO YEARS OLD STUNTING OCCURRENCE

Santika Danubrata[1*], Ernawaty[2]

[1-2]Faculty of Public Health, Universitas Airlangga

Email Korespondensi: danubratasantika@gmail.com

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ABSTRACT

The prevalence of stunting is often used as a marker of child malnutrition at the population level. The height of the mother reflects the previous nutritional and socio-economic status of the mother. This research aims to determine the relationship between maternal height and the incidence of stunting in children under two years old. An analytical study with a case-control study design was conducted based on medical records of mothers and their infants born in 2022 at a health center in Ngawi. This study identified 32 children with stunting were taken as cases and 32 other children with normal nutritional status as control. Maternal height had no association with the incidence of stunting (p=0.210). Adult height varies across countries, the extent to which the prevalence of stunting reflects parental height is also likely to vary. From a policy perspective, it is helpful to distinguish between the prevalence of child stunting attributable to the current environment and that attributable to parental height.

Keywords: Maternal Height; Nutritional Status; Stunting.

BACKGROUND

Stunting remains a major public health problem in low- and middle-income countries, including Indonesia. The prevalence of stunting is often used as a marker of child malnutrition at the population level (Karlsson et al., 2022). Reducing child stunting is the first of 6 goals in the Global Nutrition Goals for 2025 and a key indicator in the second Sustainable Development Goal of Zero Hunger (WHO, 2022). Stunting has been declining steadily over the last decade, with 148.1 million, or 22.3 per cent of children under age 5 worldwide affected in 2022 (United Nations Children's Fund (UNICEF), et al., 2023).

UNICEF/WHO and the World Bank estimate the number of stunted children at 151 million, or 22.2% of the world's children. Furthermore, compared to upper-middle-income (27%) and high-income (10%) countries, the proportion of stunted children is concentrated in low-income (16%) and lower-middle-income (47%) countries. As many as 21.3% or 144,000,000 children under nder age five experienced stunting and 54% of this number came from Asia in 2019 (UNICEF et al., 2020). The proportion of children diagnosed with stunting in Indonesia is higher than other countries, which is 27.67%, which does not meet the WHO standard of 20% (Ministry of Health of the Republic of Indonesia, 2021). According to stunting data from UNICEF and the World Bank,

Indonesia is ranked 115th out of 151 countries in the world in 2020. There are significant regional differences in the distribution of stunting in Indonesia.

Stunting is more prevalent in rural areas than in urban areas and is more prevalent in remote areas of Indonesia (UNICEF Indonesia, 2020). Stunting is seen in the lower-middle class population who rely only on agriculture as their main livelihood, as seen in Ngawi Regency (Rismay Pratama, 2021). In 2020, the population of Ngawi Regency was 870,057 people, with the percentage of poor people at 15.44%, or approximately 128,000 people (Central Statistical Bureau of Ngawi Regency, 2021). High poverty rates are associated with a decline in food quality. People in the lower middle class prefer foods that are low in fruits and vegetables and high in carbohydrates (French et al., 2019).

Stunting is the devastating result of poor nutrition in-utero and early childhood. Stunting occurs when children under five years of age are shorter or taller than they should be for their age by more than minus two standard deviations of the median WHO's growth standard for children (Kusrini & Laksono, 2020; Li et al., 2019). Stunting is irreversible and is caused by inadequate nutrition and repeated infections during the first 1,000 days of a child's life. Stunting affects an estimated 162 million children under the age of five worldwide and is one of the most significant barriers to human development. Stunting has long-term consequences for individuals and societies, including impaired cognitive and physical development, reduced productivity and poor health, and an increased risk of degenerative diseases such as diabetes (Abdulahi et al., 2017; Engidaye et al., 2019). Stunting is a well-established risk marker for poor child development, and stunting before age two predicts poorer cognitive and educational outcomes in later childhood and adolescence. Stunting has immediate and long-term consequences, including increased morbidity and mortality and adverse effects on childhood development and adult health, contributing to the cycle of malnutrition and hampering economic development (Li et al., 2019).

Child stunting is associated with the following determinants in Indonesia such as male sex, premature birth, short birth length, nonexclusive breastfeeding for the first 6 months, short maternal height, low maternal education, low household socio-economic status, living in a household with unimproved latrines and untreated drinking water, poor access to healthcare, and living in rural areas (Beal et al., 2018; Vilcins et al., 2018). The health status and nutritional status of the mother during pregnancy greatly affect the growth and development of the fetus, mothers who experience anemia during pregnancy will give birth to LBW babies, low birth weight is very closely related to low height or stunting. The high incidence of stunting is the result of high influencing factors such as parity, birth spacing, maternal height, parenting patterns, diet and maternal age (Nabwera et al., 2022).

The height of the mother reflects the previous nutritional and socio-economic status of the mother. Short height can be caused by hereditary factors due to pathological conditions caused by hormone deficiency, so there is a possibility of passing on a tendency for short genes. It can also be caused by maternal health factors due to nutritional deficiencies or diseases. According to Amin, children born to

short mothers are three times more likely to be stunted (Amin & Julia, 2016). Women who have been exposed to stunting since childhood will experience growth disorders, including reproductive disorders and complications during pregnancy. Stunted mothers are more likely to have stunted children, a phenomenon known as the intergenerational nutrition cycle (Wahdah et al., 2016). The purpose of this study was to determine the relationship between maternal height and the incidence of stunting in children under two years old.

LITERATURE REVIEW

Stunting is defined as a linear growth deficiency that is one of the failures of child growth and development. Stunting usually occurs after chronic malnutrition with a symmetric growth pattern: the ratio of height to weight and head circumference is normal, except for poor nutritional status. Stunting is diagnosed when the child's height is less than -2 SD of the normal height for age as defined by WHO. There are two WHO classifications of stunting, moderate and severe. Moderate stunting is identified when height is -3 ≤ SD < -2 and severe stunting when height is <-3 SD (Marcdante & Kliegman, 2015).

The etiology of stunting is caused by the cumulative effect of several factors that can inhibit bone growth, such as intrauterine growth restriction, lack of adequate nutritional intake, recurrent infections, acute or chronic diseases (American Academy of Pediatrics, 2019). According to Ghai (2019), growth and developmental disorders are caused by factors that can affect fetal growth, the postnatal period, and social factors.

Factors that influence stunting include those that are directly and indirectly related. The study "Effect of Maternal and Child Factors on Stunting: Partial Least Squares Structural Equation Modelling" says that related factors can come from the mother's condition, such as age during pregnancy, nutritional status and other prenatal factors. Exclusive breastfeeding and infectious diseases in infancy also contribute to stunting. Socio-economic factors are related to the availability of health services and a household's ability to pay for curative and preventive services (Santosa et al., 2022).

RESEARCH METHODS

A case-control study was conducted at Pitu Ngawi Health Center in June-October 2022 with a sample of 64 people. All children under the age of two who had a MCH book in the working area of Pitu Health Center, Ngawi were included in this study. Children who experienced stunting were considered as cases and the others as controls. Children with congenital and chronic diseases were not included in this study.

The minimum sample size was determined using a proportion difference approach with the assumption of a 95 % confidence level ($Z\alpha/2=1.96$), 80 % power ($Z\beta=0.84$) obtained a minimum sample size for each group of 32. There was a total of 64 eligible samples by using the purposive sampling technique, 32 children with stunting were taken as cases. For control, 32 other children the same period at Pitu Ngawi Health Center. Maternal height was the exposure/independent variable and stunting was the outcome/dependent variable

The data were obtained from the medical records in the MCH

books. The data information obtained from the MCH books were entered into a data collection sheet. The data sheet included the following information: maternal height and child nutritional status. We examined and categorized maternal height use median, maternal height data median is 154. The median can be used as a cut-off point for a classification of maternal height to create categorical variables with two groups. Maternal height was classified into two groups, namely normal height and short height. According to the median of the collected data, normal height is more than 154 cm and short height is less than or equal to 154 cm.

Ethical approval letter number I/062/UHT.KEPK.03/VIII/2022 was obtained from the Health Research Ethics Committee, Faculty of Medicine, Universitas Hang Tuah, Surabaya. A research permit was obtained from Pitu Ngawi Health Center, Indonesia as the research site. In addition, all information obtained from the research will be kept confidential throughout the research process.

Data were checked for completeness, then coded and entered into SPSS version 26.0 software. Before further analysis, the entered data were cleaned and edited. Summary statistics such as percentages were calculated for the case and control groups. Independent variables were cross-tabulated between cases and controls. Bivariate was used to determine the relationship between the independent variable and the dependent variable. Statistical tests used Chi-square test were considered significant at a p-value of less than 0.05.

RESEARCH RESULTS

Table 1. Characteristic Factors Children in Pitu Ngawi Health Center.

Factor	Stunting				Total	
	Yes		No			
	n	%	n	%	n	%
Sex						
Girl	13	40.6	18	56.2	31	48.4
Boys	19	59.4	14	43.8	33	51.6
Age (month)						
0 - 6	2	6.3	5	15.6	7	10.9
>6 - 12	8	25.0	14	43.8	22	34.4
>12 - 24	22	68.7	13	40.6	35	54.7
Number of children						
1	12	37.5	14	43.8	26	40.6
2	16	50.0	13	40.6	29	45.3

Factor	Stunting				Total	
	Yes		No			
	n	%	n	%	n	%
3	3	9.4	3	9.4	6	9.4
4	1	3.1	2	6.3	3	4.7
Total	32	100	32	100	64	100

There were 31 girls (48.4%) and 33 boys (51.6%) among the 64 children under the age of two at Puskesmas Pitu Ngawi included in this study. Nearly all children with stunting were older than 12 months (68.7%) and half of children with stunting were second children (50.0%) (Table 1).

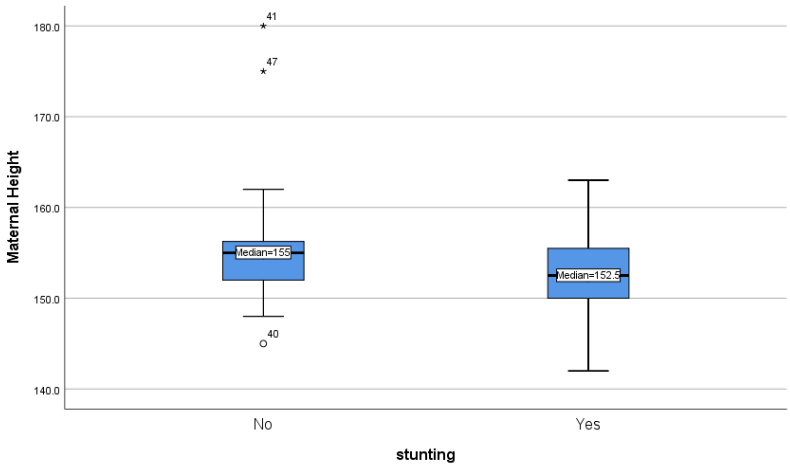

Figure 1. Boxplot Showing Maternal Height By Stunting Status Group Of The Child

The figure above shows the height of maternal height in the group of stunted and non-stunted children. The median height of maternal height is 152.5 cm in the group of stunted children and 155 cm in the group of non-stunted children. The average height of the women in this study was 154.023 cm (SD 5.8).

Table 2. Bivariate Analysis of Maternal Height for Stunting in Pitu Ngawi Health Center

Maternal Height	Stunting				Total		OR 95% CI	p value
	Yes		No					
	n	%	n	%	n	%		
Normal Height	12	37.5	18	56.2	30	46.9	2.143 (0.788 - 5.825)	**0.210**
Short Height	20	62.5	14	43.8	34	53.1		
Total	32	100	32	100	32	100		

Among the 62.5% of stunting children were birth from women with short height. While normal children group, 43.8% were birth from women with short height. Maternal height had no association with the incidence of stunting (p=0.210) (Table 2).

DISCUSSION

This is in contrast to Amin's (2014) study, which found a significant relationship with the incidence of stunting. Another study conducted by Baidho (2021) in Bali also found that mothers who are <150 cm tall have a higher risk of having stunted children than mothers who are >150 cm tall. Women who have experienced stunting since childhood will grow up with various growth disorders, including reproductive disorders, complications during pregnancy, difficulties in childbirth, and even perinatal death. Mothers who are stunted may give birth to children who are also stunted, creating a cycle of intergenerational malnutrition. The height of the parents is related to the physical growth of the child. Short mothers are one of the factors associated with the incidence of stunting (Baidho et al., 2021).

According to the researcher, the difference in research results may be related to the conditions of the research area, nutritional problems and the categorization of the mother's height. The mother's short height is due to her nutritional problems, so it will not affect her child's height. One or both parents who are short due to pathological conditions (such as growth hormone deficiency) have genes in the chromosomes that carry the trait of being short, increasing the risk that the child will inherit the gene and grow up to be stunted.

The definition of mid-parental height as the average height between parents dates back to 1886, when Galton argued that this variable best describes the transmission of height from parent to child (Krashniak & Lamm, 2021). To date, mid-parental height is still considered the strongest predictor of adult height, followed by birth weight and several socioeconomic factors. In the current analysis, within-site variability in child length attributable to parental height and several other factors was estimated. The prescriptive criteria applied in selecting the Multicenter Growth Study (MGRS) sample and the support provided to study mothers to ensure adequate feeding and care implicitly minimized variability in environmental influences on growth (Garza et al., 2013).

Genetic (including epigenetic) and hormonal factors may also be associated with parental height and offspring growth (Garza et al., 2013; Kuzawa & Thayer, 2011). Regardless of the exact relationship, parental height is a non-modifiable determinant of child stunting. Therefore, the prevalence of stunting reflects not only current environmental conditions, such as nutrition and infection, but also parental height. Because adult height varies across countries, the extent to which the prevalence of stunting reflects parental height is also likely to vary. From a policy perspective, it is helpful to distinguish between the prevalence of child stunting attributable to the current environment and that attributable to parental height (Karlsson et al., 2022). However, if the parents are short due to nutritional deficiencies or disease, the child can grow to a normal height

as long as the child is not exposed to other risk factors.

CONCLUSION

Maternal height had no association with the incidence of stunting. Adult height varies across countries, the extent to which the prevalence of stunting reflects parental height is also likely to vary. From a policy perspective, it is helpful to distinguish between the prevalence of child stunting attributable to the current environment and that attributable to parental height. This is a study that uses secondary data collected from medical records, which are limited in the amount of data found. This may be due to the possibility of missing or lost data during storage. In addition, this study did not allow for the assessment of socioeconomic, environmental, and dietary data, which require further investigation.

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