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Head Circumference as a Stunting Indicator in Toddlers

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Abstract
Stunting is a problem of chronic malnutrition marked by disturbance of linear growth in children, resulting from a lack of adequate nutrition, including infection, repetitive infections, and inadequate stimulation. The aim of this study is to analyze the connection between the circumference of the head and stunting incidents in children and toddlers. Research methods used a cross-sectional design with 100 children aged 2-5 years in Central Java. Data was collected through anthropometric measurements (height, weight, and head circumference) and interviews. Data analysis with univariate and bivariate. Research results show that children with a head circumference not normal to have a prevalence of stunting is higher (21%) compared to children with a normal head circumference (1%), and there is a present connection between head circumference and the incidence of stunting in children (p-value = 0.016). This study emphasizes the importance of integrating the circumference of the head in monitoring the growth of children, in addition to the conventional anthropometric parameters, for increased effectiveness in preventing stunting. The recommendations study covers a holistic approach involving repair nutrition, health of the mother, and environmental factors.

Keywords: nutritional status, anthropometric measurement, head circumference, children

INTRODUCTION

Stunting is a manifestation of a lack of nutrition, chronic nutritional deficiency in children at an early age, which is in the form of disturbed growth and development, resulting in children becoming shorter compared to their age (Aswi et al., 2024). Stunting is one of the chronic nutritional problems that is still a global health challenge, including in Indonesia. Conditions marked with the child's height are shorter than standard age peers, resulting in a lack of nutrition for a long time, repetitive infection, and non-stimulation (WHO, 2018). Stunting reflects prenatal malnutrition, food intake practices, and repeated infections (Lutter et al., 2011). Stunting also reflects an environment that grows fewer developmentally adequate (Leroy and Frongillo, 2019).

Stunting is still one of the main nutritional problems in Indonesia, with a high prevalence , although it has shown a decline over the last few years. According to data from the 2022 Indonesian Nutritional Status Survey (SSGI), the prevalence of stunting in toddlers in Indonesia reached 21.6%, down from 24.4% in 2021. This figure is still below the target set by the Indonesian government, namely 14% in 2024. Central Java is one of the provinces in Indonesia that have a high burden of stunting, even though it has experienced a decline in recent years and based on the Indonesian Nutritional Status Survey (SSGI) 2023, stunting prevalence in Central Java reached 20.2%, down from 23.% in 2021 (Kemenkes, 2023).

The impact of stunting is not limited only to aspects of physique in the form of short stature, but also includes various consequences of severe stunting. Stunted children are at risk of experiencing delayed cognitive development, immune function disorders, low academic performance, and declining work performance as they mature (Dewey and Begum, 2011). In addition, stunting is related to an increased risk of disease later day, such as diabetes, hypertension, and other heart diseases (Victora et al., 2008a). In addition to height, waist and head circumference are often used as indicators for detecting stunting, because the growth of the brain and skull is greatly influenced by food intake and nutrition during toddlerhood (Adair et al., 2013). Several studies show that the head's circumference is unrelated to age, can reflect disturbed brain growth, and is potentially related to stunting (Victora et

al., 2008b). Measurement of the circumference of the head is rated as more stable compared to height, especially in toddlers with difficulty in anthropometric measurement. However, nutrition and child health experts debate its validity as a stunting indicator.

Study by Alam et al., (2020) shows that children with stunting tend to have a smaller head circumference than children who grow normally. This study confirms the importance of measuring the circumference of the head as part of detecting early stunting. Based on a study Sindhu et al., (2019) circumference abnormal head shape is commonly found in children in semi-urban areas of India and is closely correlated with stunting. Genetic and socio-economic factors contribute to the growth circumference of a child's head. Therefore, measurement of the circumference of the head should be made as part of monitoring regular growth, besides weight and height, to detect early growth obstruction.

METHOD

This study was conducted in one of the kindergartens in Central Java. The research was implemented in July 2024. This involves various quantitative designs, analytical survey research, and a cross-sectional approach. The sampling method is purposive sampling with a sample size of 100 children aged 2-5 years. As for the inclusion study criteria, these are children aged 2-5 years who are cooperative in the process of anthropometric measurement. At the same time, the criterion for exclusion is a child who is not enrolled in the ongoing study and is unwilling to do the anthropometric measurement. Independent variables for research are circumference differentiated, with the head being normal and abnormal based on age, while the dependent variable is stunting incidents. Instruments used in the study. This is a sheet of observations used to collect primary anthropometric data on children, namely height, weight, circumference of the head, and age of the child. Data analysis in the study uses univariate and bivariate (Chi-square) analysis.

RESULT & DISCUSSION

Result

Research results were obtained with a sample of 100 children with the characteristics presented in Table 1 below.

Table 1. Characteristics Age and Gender of Child

Variables	Frequency (n)	Percentage (%)
Gender		
Boy	44	44,00
Girl	56	56,00
Age		
3-4 years	37	37,00
4- 5 years	63	63,00

Source: Primary Data (2024)

Table 1 shows that most respondents were aged between 4-5 years (63,00%). With a type almost identical, with a sex balance between boy and girl, 44,00% of boy and 56,00% of girl.

Table 2. Relationship head circumference with stunting incidents in children

Variables	Stunting Incident				Total		P Value
	Stunting		No Stunting				
	n	%	n	%	n	%	
Head Circumference							
Abnormal	21	21.00	55	55.00	76	76.00	0.016
Normal	1	1.00	23	23.00	24	24.00	
Total	22	22.00	78	78.00	100	100.00	

Source: Primary Data 2024

Table 2 presents the analysis of the connection between the circumference of the head and stunting incidents. The Chi-Square test results show that the p-value is 0.016, so Ha is accepted, which means there is a relationship between the circumference of the head and stunting incidents in children. There are 21,00% of children who have an abnormal head circumference and are experiencing stunting.

Discussion

Research shows a significant relationship between the circumference of the head and stunting incidents in children. Analysis bivariate reveals that children with a head circumference that is not normal have a higher percentage of stunting (21,00%) than children with a normal head circumference (1,00%). P-value 0.016 (<0.05) indicates that the relationship is significant in a statistical analysis. This is in line with a study previously stated that the circumference of the head is an essential indicator for evaluating growth and nutritional status in children, especially in the identification of stunting (De Onis and Branca, 2016).

Anthropometry is a method of measuring the physique of many bodies used to assess nutritional status, growth, and development in children. Measurement this includes parameters such as weight, height, head circumference , arm top circumference, and thickness folds skin. Anthropometric data were then compared to the standard WHO or CDC growth to determine whether the child experiences bad nutrition , stunting, wasting, or excess nutrition (WHO, 2018). An abnormal head can reflect disturbed brain growth and chronic malnutrition, which is often associated with stunting (Prendergast and Humphrey, 2014). Children with a small head (microcephaly) or no growth by standard growth are at risk of experiencing cognitive and physical developmental deficits, including stunting (Addo et al., 2020). This is reinforced by WHO data, which states that a head circumference percentile in the third or above 97th percentile can become a sign warning early of nutritional problems (WHO, 2018).

According to a study by Priyantini et al. (2024), there is a significant relationship between stunting and head circumference. The average growth circumference of the head in stunted children is lower compared to that of children who are not stunted. And children who are stunted have a trend of small head circumference. In line with research conducted by Yeasmin and Yeasmin (2018), assessing nutritional status in children aged 31-70 months in Bangladesh using circumference head and other anthropometric indices. The circumference of the head is used as an indicator, as it reflects the development of the brain and nutritional status in the past. Circumference of the head correlated significantly with stunting, underweight, and wasting. Girl are more prone to malnutrition based on head circumference. However, according to a study by Scheffler et al. (2017), under conditions of adequate nutrition and health , nutritional status, body size, and head circumference are related in a significant way. Growth bones, fat accumulation, and head volume follow different developments, this shows that if only nutritional intervention is possible, it is not enough to modify skeletal growth or brain growth.

Inadequate nutrition intake, especially during the first 1,000 days of life (since the content until the child is 2 years old), is the main reason for stunting. Lack of protein, nutrients, iron, zinc, vitamin A, and iodine can hinder children's linear growth and cognitive development. (Victora et al., 2021). In addition, the practice of giving suboptimal eating, such as exclusive breastfeeding that is not adequate or food breast milk substitute with low quality, contributes to stunting (WHO, 2018). Research in several low and medium-income countries finds that nutrition-based interventions at the community, such as iron supplementation and improved eating patterns, can lower stunting prevalence up to 20% (Sudfeld et al., 2015).

According to WHO (2018) stunting is a condition when height according to age (H/A) of a child is below -2 standard deviation from the standard median growth of WHO children. This becomes an important indicator of nutritional status and child health and reflects the long-term impact of a lack of nutrition. Nutrition plays a vital role in the growth and development of a child. Macro nutrients, such as protein, carbohydrates, and fat, as well as micronutrients, like Iron, zinc, vitamin A, and iodine, are essential in the growth of bones, muscles, and vital organs. A deficiency of one of these or a combination of substances in nutrition can hinder a child's growth overall.

Intake balanced nutrition covers appropriate macronutrients (carbohydrates, proteins, and fats) and micronutrients (vitamins and minerals) with age and the child's needs. Nutritional deficiency in toddlerhood can cause health disturbances like growth stunting, underweight, and a higher risk of infectious disease. According to WHO (2018) need energy for toddlers aged 1–3 years, around 1000–

1300 kcal per day, whereas for age 4–5 years, around 1400–1600 kcal. Source energy must originate from solid food nutrition, such as rice, vegetables, fruit, fish, eggs, meat, and processed milk products. After 6 months old, a baby needs a food substitute for breast milk which is rich in energy and nutritional substances. A food breast milk substitute must provide an amount sufficient and of quality, and with appropriate frequency and texture. In toddlerhood, food and family become a source of nutrition, so that the pattern of eating among family members should also be a good example for the child. UNICEF (2021) emphasize the importance of responsive feeding, namely giving mindful eating signals to hungry and full children, as well as a positive eating atmosphere.

Stunting is a major risk factor in obstructing the development of children. Decreasing stunting figures can have a big impact on human development. Therefore, that intervention not only prevents stunting but also increases the development of children who have experienced stunting (Perkins et al., 2017). Based on studies Beal et al., (2018) stunting intervention must be started before pregnancy, at the time pregnant, child and time puberty. Increasing access to sanitation, clean water, and health services, including trained medical personnel, is essential. Interventions based on local wisdom can be applied, especially in areas with a high prevalence of stunting.

One of the stunting control programs in Indonesia is the 1000 days of life nutrition intervention. The 1000 days of life program focuses on the period from Conception until the child is 2 years old, which is a critical phase for physical and cognitive development. Intervention consists of intervention nutrition specifics that include giving adequate nutrition for pregnant and breastfeeding mothers, supplementation with micronutrient substances (vitamin A, iron, and iodine), as well as exclusive breastfeeding and quality complementary feeding. In addition, there are also interventions that are nutrition-sensitive, such as repairing sanitation, access to clean water, education, nutrition, and management of poverty. Growth is limited to 2 years first, but is to be continued until puberty. Therefore, the 1000 days of life Plus program is required to monitor catch-up growth until the age of teenagers and provide nutrition-specific interventions in accordance the growth phases from birth until puberty (Djauhari, 2017).

CONCLUSION

Research results show the respondents' own type is almost identical, with a sex balance of males as much as 44.00% and females as much as 56.00%. The results of the analysis show that the p-value is 0.016, which means there is a connection between the circumference of the head and the incidence of stunting. A circle with an abnormal head can become a marker of risk of stunting, but requires a holistic approach that includes interventions in nutrition, health of the mother, and the environment. Integration of measurements of the circumference of the head in the monitoring program for child growth can increase the effectiveness of the prevention of stunting.

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