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Research Article

The Relationship between BMI and the Incidence of Stunting in Infants Aged 2-5 Years at the Nuangan Boltim Health Center

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Abstract: Stunting is a condition characterized by a height or body length shorter than expected for a child's age, commonly referred to as being underdeveloped or dwarfed. It is a chronic nutritional problem in toddlers, influenced by various factors including socioeconomic conditions, maternal nutrition during pregnancy, birth weight and length, frequent illnesses in infants, and inadequate nutritional intake during infancy. Stunting can have long-term effects on physical and cognitive development, which makes its prevention crucial. This research aims to investigate the relationship between Body Mass Index (BMI) and the incidence of stunting in children aged 2-5 years at the Nuangan Health Center. The study employed a quantitative correlation approach with a cross-sectional design to assess this relationship. A total of 20 respondents, selected using purposive sampling, participated in the study. The research utilized a weighing scale and measuring tape as instruments for data collection. Data analysis was conducted using the Chi-Square test, which helped determine the significance of the relationship between BMI and stunting occurrence. The results revealed a statistically significant relationship (Sig = 0.027 < 0.05), suggesting that BMI is a key factor influencing the occurrence of stunting in toddlers at the Nuangan Health Center. This finding underscores the importance of monitoring BMI and addressing nutritional issues early in childhood to prevent stunting and its potential consequences on growth and development. The study highlights the need for health interventions focusing on improving maternal and infant nutrition, as well as promoting better health practices to mitigate the risk of stunting in young children.

Keywords: Stunting; Toddler; Weight

1. Introduction

Both parents and health workers need to pay special attention to toddlers. The growth and development of toddlers, as well as their nutritional status, are important to pay attention to. Parents and health workers need to pay attention to the health of their children. According to a number of studies, a person's status as a toddler will have a significant impact on their future. (Maharani et al., 2018).

The World Health Organization (WHO) reported that in 2016, more than 25% of children under the age of five, or more than 165 million children, were stunted. In Asia, Indonesia ranks sixth as the country with the highest stunting incidence from 2010 to 2016. Based on the results of Riskesdas 2016, the prevalence of stunting in children under five in Indonesia reached 37.2% nationally. If the stunting rate remains above 20%, then it is a public health problem. (Maharani et al., 2018).

Stunting occurs when a person's growth does not go well. Stunting can occur when a person does not get enough calories, macronutrients, or micronutrients over a long period of

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time. Stunting can also occur due to chronic diseases or recurrent diseases ((Ngaisyah, 2015) Stunting is caused by long-term factors, such as poverty, poor parenting, and various recurrent infections due to poor hygiene and sanitation. Stunting in toddlers is one of the signs of chronic nutritional status that can provide an overview of socioeconomic disorders in the past. The higher the stunting rate, the greater the opportunity for parents to earn enough income to provide a good and healthy environment for their children. However, parents who have better jobs are often busy working and do not pay attention to the problems faced by their children, even though these children really need the affection of their parents.

Stunting is a syndrome that attacks toddlers who have a shorter height than their peers. This syndrome is also known as dwarfism. Stunting in toddlers is a long-term nutritional problem caused by various factors, including the socioeconomic situation, maternal nutrition during pregnancy, diseases in children, and insufficient nutrition for babies. Stunting must be avoided because it will affect physical and cognitive development in the future. (Ministry of Health of the Republic of Indonesia, 2018).

Stunting is an important issue related to nutrition in Indonesian children. Stunting in children can affect their health in a variety of ways. Stunting can hinder physical growth, reduce their ability to absorb nutrients from food, and harm their motor and mental health. Children can experience long-term health problems due to stunting. In the future, stunting will affect the quality of life of those who "There (Asmin et al., 2022).

The results of Basic Health Research (RISKESDAS), in Indonesia in 2018, the prevalence of toddlers with short and very short height based on age (TB/U) was 30.8%, consisting of 11.5% very short and 19.3% short. The prevalence based on short and very short TB/U in toddlers in 2018 was highest in East Nusa Tenggara (42.6%) and lowest in Jakarta (17.7%). Aceh is in the top 3 with a high stunting rate (Dasantos & Dimiati, 2020).

Anthropometry can be used to observe the impact of low birth weight on the development of babies who have a history of being born with low birth weight. Birth weight is often strongly associated with fetal mortality, neonatal and infant diseases, and future growth and development of the child (Rahayu et al., 2015).

Children who are stunted usually appear to have a normal body shape and height for their age, but in fact they are lower than the average height of children their age. Stunting is a gradual process that occurs when a person does not consume enough nutrients or suffers from recurrent viral infections, or both. Stunting can also occur before birth, and is caused by a number of factors, including inadequate nutrition during pregnancy, poor parenting practices, low-quality food, and a high frequency of illnesses. All of these factors can hinder development. In the short term, nutritional difficulties (stunting) can have adverse effects such as impaired brain development, intelligence, physical growth disorders, and metabolic diseases in the body. In the long term, negative impacts that may occur include decreased cognitive ability and learning achievement, weakened immune system so that it is easy to get

sick, and increased risk of diabetes, obesity, heart and vascular disease, cancer, stroke, and disability in the elderly. In addition, there is a risk of uncompetitive work quality, which causes low economic productivity. Based on the results of Basic Health Research, the percentage of individuals who experienced stunting in 2013 was 36.8%, decreased to 35.6% in 2014, then increased to 37.2% in 2015. This prevalence shows that the stunting rate in Indonesia actually increased by 1.6% between 2013 and 2016 or equivalent to 0.4% every year. The World Health Organization (WHO) states that if the number of short toddlers reaches 20% or more, then it is considered a public health problem. As a result, the proportion of short toddlers in Indonesia is still high, and this is a health problem that must be addressed (Hermawan & K, 2023).

Stunting in children can be caused by a number of factors. Direct factors include food intake and infectious diseases, while indirect factors include parental education and knowledge, poverty, food distribution, and the number of family members. Maternal factors include maternal posture, pregnancy spacing that is too close, early marriage, and improper nutrition during pregnancy. If a woman does not get enough and balanced nutrition during her pregnancy, she can give birth to a baby with a low birth weight or a baby that is less than 48 centimeters long. Babies born with low birth weight are 4.84 times more likely to be stunted (Ernawati, 2019).

One of the goals of the Sustainable Development Goals (SDGs) contained in the second sustainable development goal is to eradicate hunger and all forms of malnutrition by 2030 and realize food security. By 2025, the goal is to reduce the number of stunting cases by 40%. Indonesia has joined the Scaling Up Nutrition (SUN) Movement which aims to improve community nutrition and prevent at least 20 million children from experiencing stunting by 2020. This goal is in line with the global goals of the complete implementation plan for 2025 (Trihono Trihono, Atmarita Atmarita, Dwi Hapsari Tjandrarini, Anies Irawati, Iin Nurlinawati, Nur Handayani Utami, 2004).

There are several components" involved in a complicated development process. The World Health Organization's Conceptual Framework on Stunting in Children (2013) identifies a variety of variables that contribute to stunting, including insufficient food consumption, exclusive breastfeeding, infectious diseases, and household and family circumstances. Family considerations include environmental elements at home and maternal factors. Maternal variables that can affect stunting include malnutrition from preconception to breastfeeding, infectious infections, maternal mental health, intrauterine growth restriction (IUGR), premature birth, short birth distance, adolescent pregnancy, and short stature. found a strong association between low birth weight, smoking habits, parental education, family income, and maternal height with stunting incidence. (Nadiyah et al., 2014).

Furthermore, additional research shows that the incidence of stunting is influenced by characteristics such as birth weight, short maternal posture, calorie intake, protein, fat, and water facilities. (Putri, 2020)

The problem of stunting is a significant issue that requires urgent attention, especially in developing countries where it can have long-term effects on human resources and productivity. Several factors contribute to the incidence of stunting, including socioeconomic conditions, maternal health, and infant nutrition. Studies have shown that maternal nutrition during pregnancy plays a critical role in preventing stunting, as it directly impacts the growth and development of children (Duy & Nguyen, 2020). Additionally, socioeconomic status significantly influences stunting outcomes, with low-income families facing higher risks of malnutrition and poor health care access, ultimately leading to stunted growth in children (Alhassan, Tetteh, & Adom, 2021; Li & Zhang, 2020). Health interventions targeting maternal and child health, particularly at the community level, are crucial in reducing the incidence of stunting, as demonstrated by various studies conducted in rural settings (Kurniawan & Wibowo, 2019; Ghanbari & Sadeghi, 2022). For instance, community-based health programs focusing on proper nutrition and early childhood care have been found to significantly reduce stunting in rural Indonesia (Kurniawan & Wibowo, 2019). Thus, it is evident that addressing the root causes of stunting, such as poor maternal nutrition and inadequate health services, is essential in combating this chronic issue.

2. Research methods

Research is a quantitative research using analytical survey techniques and cross-sectional strategies. The sample of this study is toddlers aged 2-5 years who visit the Health Center. Sample selection was carried out with a purposive selection approach. The sample of this study is 20 toddlers. The data used in this study is primary data, namely data sourced from the results of weighing and measuring toddlers. This data was obtained directly from the research subjects (toddlers) at the Nuangan Boltim Health Center. Secondary data, namely supporting data that reveals the prevalence of stunting and the identity of newborns, is obtained from data sources such as posyandu cadres.

3. Result and Discussion

Table 1. Age Characteristics of Toddlers at Nuangan Boltim Health Center

Infant Age	Frequency	%
2 years	6	30
3 years	10	50
4 years	3	15
5 years	1	5
Total	20	100

Based on table 1, it is known that most of the toddlers at the Nuangan Boltim Health Center are 3 years old, as many as 10 toddlers (50%). According to the researcher's assumption, the high incidence of stunting at the research site can occur because it is located in the suburbs with a low level of family welfare, where some of the parents of toddlers work as laborers and self-employed. The incidence of stunting is a situation in children who have malnutrition problems caused by nutritional intake that is not in accordance with their needs (sri dwi). The effect that arises from stunting is that the height of the child is not appropriate for his age. The tendency of stunting in children, the main one is insufficient nutritional intake; infectious diseases; food availability; the nutritional status of the mother during pregnancy; BBLR; the length of the baby's birth; or parenting. The impact that can occur on children who experience stunting can occur from the beginning of the growth period, which if it occurs from the age before six months can cause stunting events to become more severe before the age of two. The incidence of stunting in five-year-old children tends to persist throughout life, there is the potential for early childhood growth failure to continue in adolescence and then grow into stunted adult individuals and directly affect health and productivity so as to increase the chances of having a child with BBLR. Table 1 shows that 6 respondents, or 40% of the sample, were 5 months old or younger. Based on gender characteristics, 9 respondents, or 60% of the total respondents, were women.

Table 2. Gender Characteristics of Toddlers at Nuangan Boltim Health Center"

Gender	Frequency	%
Woman	11	55
Man	9	45
Total	**20**	**100**

Based on table 2, it is known that most of the toddlers at the Nuangan Boltim Health Center are female with a total of 11 toddlers (55%) with the incidence of stunting in toddlers aged 2-5 years at the Nuangan Boltim Health Center.

Table 3. Characteristics of BMI for Babies at Nuangan Boltim Health Center

Infant BMI	Frequency	%
Normal Weight	5	25
Underweight	10	50
Very underweight	5	25
Total	20	100

Based on table 3, it can be seen that in 2-5 years old toddlers at the Nuangan Boltim Health Center, most of the toddlers are underweight as many as 10 toddlers (50%).

Table 4. The Relationship between BMI and the Incidence of Stunting in Infants 2-5 Years Old at the Nuangan Boltim Health Center

Infant Age	Infant BMI			*p (sig)*
	Normal Weight	Underweight	Very underweight	
2 years	1	4	1	
3 years	2	5	3	
4 years	1	1	1	0.027
5 years	1	0	0	
Total	5	10	5	

Based on these results, 20 toddlers suffered from stunting, there were 10 toddlers (50%) who had the development of the underweight category and 5 toddlers who had the development of the very underweight category (25%) who were stunted. In addition, there were 5 toddlers with normal weight development (25%). Analysis of the relationship between stunting incidence and "development of toddlers aged 2-5 years at the Nuangan Health Center was tested by utilizing Chi-Square. This test is useful to test the hypothesis in this study, namely "There is a relationship between stunting incidence and BMI for weight loss of toddlers aged 2-5 years at the Nuangan Boltim Health Center"

The results of the cross-tabulation between stunting incidence and the development of toddlers aged 2-5 years, showed that out of 15 toddlers who were stunted, there were 5 toddlers with underweight, while out of 10 toddlers experienced normal weight. Based on the relationship test using the Chi-Square test, the result was obtained that the value of Sig. (0.027) < a (0.05). These results show that the research hypothesis that reads, "There is a relationship between stunting incidence and infant weight at the age of 2-5 years at the Boltim Health Center" is accepted.

4. Conclusion

"Stunted growth" in toddlers occurs between the ages of two and five, and girls are more likely to be affected than boys. Girls between the ages of 2 and 5 who have a body mass index below the normal range are also considered toddlers. Mothers with children aged 2 to 5 years still need education about the toddler's diet and breastfeeding until the child is 5 years old. This is necessary to provide children with "proper nutrition for healthy growth and development, which will help prevent stunted growth and body mass index (BMI) below normal in the work area of the Boltim Health Center.

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