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The Relationship Between Risk Factors and the Incidence of Stunting in Children Aged 24-59 Months

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ABSTRACT

Stunting occurs due to malnutrition during pregnancy and early childhood which results in stunted physical growth and brain development of children which can have an impact on the quality of life of children in the future. This study aims to examine the relationship between risk factors and the incidence of stunting in children aged 24-59 months in the work area of the Pesantren I Health Center, Kediri City in 2023. A total of 189 toddler samples were randomly selected and the data were analyzed using the Chi-Square test. Mothers with low levels of education have a higher risk of having children with stunting (RR 0.3, p <0.05), while medium and high levels of education are not significantly related. Children who do not receive exclusive breastfeeding have a higher risk of experiencing stunting (RR 2.9, p <0.05), and children with low birth weight and short birth length are also at higher risk (RR 2.6 and 2.2, p <0.05). Mothers with a height of less than 150 cm have a higher risk of giving birth to children with stunting (RR 1.6, p < 0.05). To reduce the risk of stunting, it is important to improve maternal education, promote exclusive breastfeeding, and pay special attention to monitoring birth weight, birth length, and maternal height during pregnancy.

Keywords: children aged 24-59 months, incidence, risk factors, stunting

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BACKGROUND

Stunting is a negative impact of malnutrition that occurs during pregnancy and early childhood, resulting in children being unable to reach their optimal height potential and brain development. Globally, around 151 million children under five suffer from stunting, which is mostly caused by malnutrition and infectious diseases. In 2017, around 51 million children under the age of 5 experienced wasting, with 16 million of them experiencing wasting (WHO, 2018). Toddler nutritional status is one of the health indicators that is assessed for its achievement in the 2015 Millennium Development Goals (MDGs). Malnutrition is targeted to end in the 2030 Sustainable Development Goals (SDGs), including achieving the 2025 international target for reducing stunting in toddlers.

Stunting is defined as the adverse consequences of long-term malnutrition (WHO, 2020). Stunting is a major nutritional problem at the national and international levels (Rahmadi, 2016). Universally, there were 22% or around 149.2 million children under 5 years of age who suffered from Stunting in 2020, of which 53% lived in Asia and 41% lived in Africa (UNICEF, 2020). According to the results of the Indonesian Nutritional Status Study (SSGI) in 2021, the Stunting rate in Indonesia reached 24.4% (Ministry of Health of the Republic of Indonesia, 2021). Meanwhile, in Southeast Asia, Indonesia is in second place, one level below Timor Leste, which has a Stunting prevalence of 48.8% (Asian Development Bank, 2021). This condition has the potential to cause growth disorders that can lead to death if not treated properly.

The prevalence of stunting in the world in 2020 was recorded at 149.2 million children, while in Indonesia in 2021 it was recorded at 24.4% or around 5.33 million toddlers. This figure is still much higher than the maximum standard set by WHO, which is 20% of the total number of toddlers (UNICEF et al., 2021). In Indonesia, the prevalence of stunting in toddlers reached 21.6% in 2022, with the highest prevalence at the age of 24-35 months (23.79%) in East Java and Kediri Regency (Minister of Health of the Republic of Indonesia, 2022). Continuous stunting conditions can cause disorders in the physical, cognitive, and motor development of children which will impact their quality of life in the future.

Stunting begins to occur when the fetus is still in the womb due to the mother's food intake during pregnancy which is lacking in nutrition. As a result, the nutrition obtained by the fetus is insufficient. Malnutrition will inhibit the growth of the baby and can continue after birth. Signs of Stunting are usually only visible when the child is two years old (Erik et al., 2020). Children who suffer from Stunting can fail to reach their maximum growth potential (UNICEF, 2020). A child can be said to be Stunting if there is a condition where the child's height is less than that of his age (Ministry of Health of the Republic of Indonesia, 2018). This can be seen from the WHO growth curve which is less than minus two standard deviations (Trihoro et al., 2015).

Stunting can cause decreased intelligence, inhibit the ability to move limbs, make less productive in activities, and increase the possibility of experiencing degenerative diseases in the future. This is because children with stunting tend to be more susceptible to obesity, because people with short bodies also have low ideal body weight so that a weight gain of just a few kilograms can cause the person's Body Mass Index (BMI) to rise above normal limits (Permana & Wijaya, 2020). Around 80-90% of total brain cells are formed in the first 1000 days of life, but in stunting conditions this will be hampered due to insufficient

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nutrients. If this situation continues, it will cause the IQ score to drop by 10-13 points (Permana & Wijaya, 2020).

Age 24-59 months is often referred to as the golden age in the growth and development of the human brain. Therefore, at this time more attention is needed, especially in fulfilling nutritional intake in making them quality humans. In efforts to prevent stunting, knowledge is needed about the risk factors that can be drivers. The risk factors for stunting are very complex, involving maternal, child, and environmental factors. Several risk factors in the mother, such as too young or too old gestational age, and inadequate food quality, can increase the risk of stunting in children. In addition, child factors such as low birth weight, history of neonatal disease, and frequent diarrhea or infection, also play a role in worsening this condition (Nirmalasari, 2020). The impact of stunting not only affects physical growth, but also increases the risk of metabolic disorders, obesity, and decreased productivity and intelligence in the future if not handled properly (Black et al., 2017; Utami et al., 2019).

Stunting is a problem of prolonged malnutrition that affects the development and growth of children, if not handled quickly it will trigger morbidity and mortality. If the risk factors have not been identified, the incidence of Stunting will continue to increase and make prevention efforts more difficult.

Seeing this phenomenon, researchers are interested in conducting research with the aim of determining the relationship between risk factors and the incidence of stunting in children aged 24-59 months in the Pesantren I Health Center Work Area of Kediri City in 2023.

METHODS

This research design uses a correlational approach, to analyze the relationship between risk factors and the incidence of stunting in children aged 24-59 months. The independent variable of the study is the risk factor, while the dependent variable is the incidence of stunting in children of that age. The instrument used in this study, the data collection sheet, was designed systematically to obtain relevant information.

This research was conducted in the working area of the Pesantren I Health Center, Kediri City, in August 2023. The population in this study was 1,560 toddlers, with a sample of 189. The sampling technique was simple random sampling. Data analysis using the Chi-Square test to analyze risk factors that influence the incidence of stunting.

RESULTS

The following is the distribution of respondents based on research variables, including stunting incidence, mother's education, history of breastfeeding, birth weight, mother's height, and birth length which is shown in table 1.

Table 1. Distribution of respondents

Variable	n=189	%
Stunting incidence		
Stunting	55	29,1
Not stunting	134	70,9

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Mother's education		
Low	30	15,9
Middle	137	72,5
High	22	11,6
History of breastfeeding		
Not exclusive breastfeeding	61	32,3
Exclusive breastfeeding	128	67,7
Birth weight		
Lbw	54	28,6
Normal	135	71,4
Mother's height		
Short (≤ 150 cm)	66	34,9
Tall (> 150 cm)	123	65,1
Birth length		
Short (≤ 50 cm)	67	35,5
Tall (> 50 cm)	122	64,5

Based on the distribution of respondents, most children did not experience stunting, while some others experienced stunting. In terms of maternal education level, the majority of mothers had secondary education, followed by mothers with low education and higher education. Regarding the history of breastfeeding, most children received exclusive breastfeeding, while some did not receive exclusive breastfeeding. For birth weight, most children had normal birth weight, while others were categorized as low birth weight. Regarding maternal height, most mothers had a height of more than 150 cm, while others had a height of less than or equal to 150 cm. In terms of birth length, most babies were born with a body length of more than 50 cm, while some were born with a body length of less than or equal to 50 cm.

The results of the chi-square test analysis to see the relationship between risk factor variables, including: maternal education, history of breastfeeding, birth weight, maternal height, and birth length to the incidence of stunting are presented in Table 2 below.

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Table 2. Relationship of risk factors to the incidence of stunting in children aged 24-59 months

Variable	Stunting Incident				RR	CI 95%	p
	Stunting		Not Stunting				
	n	%	n	%			
Mother's education							
Low	3	5,4	27	20,1	0,3	0,12-0,92	0,004
Middle	42	76,4	95	70,9	0,9	0,78-1,05	0,169
High	10	18,2	12	9,0			
History of breastfeeding							
Not exclusive breastfeeding	33	60,0	28	20,9	2,9	1,94-4,26	0,000
Exclusive breastfeeding	22	40,0	106	79,1			
Birth weight							
Lbw	28	50,9	26	19,4	2,6	1,70-4,04	0,000
Normal	27	49,1	108	80,6			
Mother's height							
Short (≤ 150 cm)	26	47,3	40	29,8	1,6	1,08-2,31	0,023
Tall (> 150 cm)	29	52,7	94	70,2			
Birth length							
Short (≤ 50 cm)	32	58,2	35	26,1	2,2	1,55-3,20	0,000
Tall (> 50 cm)	23	41,8	99	73,9			

The results of the analysis in Table 2 show a significant relationship between several risk factors and the incidence of stunting in children aged 24-59 months. Statistically, low maternal education levels are at higher risk of stunting in children, with a p value <0.05 and a risk ratio (RR) of 0.3 indicating that mothers with low education are more likely to have children experiencing stunting. At the middle and high levels of maternal education, there was no significant relationship with the incidence of stunting. The history of breastfeeding is also closely related to the incidence of stunting. Children who do not receive exclusive breastfeeding have a higher risk of stunting than those who receive exclusive breastfeeding, with an RR of 2.9 and p <0.05. This means that exclusive breastfeeding can play an important role in preventing stunting.

Birth weight has also been shown to be associated with stunting. Children with low birth weight (LBW) are more likely to experience stunting, with an RR of 2.6 and p < 0.05. Then, maternal height also has a significant effect, where mothers with a height of less than or equal to 150 cm are more at risk of having children who experience stunting (RR = 1.6, p < 0.05). Birth length is also a significant risk factor for stunting. Children born with a length

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of less than or equal to 50 cm have a higher risk of stunting compared to children who are born longer (RR = 2.2, p < 0.05). Practically, these results confirm the importance of these factors in preventing stunting, so that attention to maternal education, exclusive breastfeeding, and monitoring maternal weight, height, and birth length are crucial to reducing the prevalence of stunting.

DISCUSSION

Mother's Education

The first factor related to stunting is the mother's education level. Mothers with low education levels are more likely to have children who experience stunting than mothers with secondary or higher education levels. The mother's level of knowledge plays a significant role in the incidence of stunting (Husnaniyah et al., 2020).

Education level, especially the mother's education level affects the level of health. This is related to its role which is most in the formation of children's eating habits, starting from arranging the menu, shopping, cooking, preparing food, and distributing food. Mothers who have secondary or higher education tend to be better in parenting patterns and better in choosing types of food for children. This is because mothers with secondary or higher education have a greater opportunity to access information about the nutritional status and health of children so that their knowledge increases (Rahayu & Khairiyati, 2014).

The results of this study show low maternal education levels are at higher risk of stunting in children, with a p value <0.05 and a risk ratio (RR) of 0.3 indicating that mothers with low education are more likely to have children experiencing stunting. At the middle and high levels of maternal education, there was no significant relationship with the incidence of stunting.

The results of this study are supported by research in South Sumatra that the maternal risk factor most associated with stunting in toddlers is the mother's education level (Susyani et al., 2022). The results of this study are also in line with the research of Kholia (2020) and Mentari (2018) which stated that there was no significant relationship between the level of maternal education and the incidence of Stunting in toddlers (p = 0.107). This study also stated that parental education is not a risk factor for Stunting. Parental education has a direct influence on childcare patterns which will then affect the child's food intake (Mentari & Hermansyah, 2018).

Mothers with low levels of education with access to current technological developments can easily access information from various media, so that mothers' knowledge increases (Ilmi Khoiriyah et al., 2021). Many toddlers who do not experience Stunting are also born to mothers with low levels of education (72.7%). This is because mothers with low education do not necessarily have no knowledge of nutrition. The level of maternal education does not guarantee that children will avoid malnutrition because a high level of education does not mean that the mother has sufficient knowledge of good nutrition (Mentari & Hermansyah, 2018).

Practically, this shows that the mother's education level greatly influences their parenting patterns and understanding of the importance of providing good nutrition for children, as well as access to health information. Children with highly educated mothers have better parenting skills than mothers with low education (Hanifah & Oviyanti, 2022). Therefore, increasing maternal education, especially at the elementary and secondary levels, is very important to reduce the risk of stunting in children.

History of Breastfeeding

The history of breastfeeding has also been shown to be closely related to the incidence of stunting. Exclusive breastfeeding is breastfeeding a baby purely. Babies are only given breast milk without additional fluids, such as formula milk, oranges, honey, tea, water, and

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without additional food, such as bananas, milk porridge, biscuits, porridge, or rice porridge. Exclusive breastfeeding is recommended for a minimum period of time until the baby is 6 months old (Pramulya, 2021). Exclusive breastfeeding for the first 6 months can result in optimal height growth because breast milk contains growth factors (Larasati et al., 2018).

Research at the Mekarsari Health Center, Banyuasin Regency, showed a significant relationship between exclusive breastfeeding and the incidence of stunting in toddlers aged 24-59 months (Rumingsih et al., 2022). Exclusive breastfeeding has very important nutritional content to support children's growth and development, as well as provide protection against infectious diseases that can affect children's nutritional status. Exclusive breastfeeding can protect low-income children from stunting (Hadi et al., 2021). Breast milk nutrition at every stage of lactation (colostrum, transitional milk, and mature milk) reduces the factors that cause stunting, namely infant morbidity and lack of nutritional intake in infants (Safaah et al., 2022).

Exclusive breastfeeding for 6 months provides protection against gastrointestinal infections that can cause severe malnutrition and stunting (Kahssay et al., 2020). Before the age of 6 months, the enzymes needed to digest food and the baby's digestive organs are not yet perfect so that babies under 6 months of age are not ready to receive food other than breast milk (R. Putri & Illahi, 2017). Breast milk contains Immunogobulin SigA (secretory immunoglobulin A) which works as an antiseptic intestinal paint that protects the surface of the baby's intestines against invasion of pathogenic microorganisms (including E.Coli) and foreign proteins. Babies who are not exclusively breastfed will not receive optimal immunoglobulin (SigA) so that babies will be less protected from exposure to pathogenic microorganisms in the surrounding environment (Kahssay et al., 2020).

Therefore, exclusive breastfeeding needs to be encouraged to prevent stunting, and this shows the importance of education about breastfeeding from pregnancy to postpartum for mothers.

Birth Weight

Birth weight factor also shows a significant relationship with the incidence of stunting. Children with low birth weight (LBW) have a greater risk of experiencing stunting. Children with a birth weight of less than <2,500 grams have a significantly higher risk of stunting 5.96 times compared to children with a birth weight ≥ 2,500 grams (Lukman et al., 2021).

Stunting is still a priority nutritional problem because its impact is not only present but will also have an impact in the future, so it can disrupt the quality of human resources (HR). Stunting itself is considered to be at greater risk of occurring in children with LBW. Birth weight is one of the indicators used to assess the growth and development of a child and to assess the nutritional status obtained while still in the womb. Low Birth Weight (LBW) is partly caused by the failure to meet adequate nutritional intake during pregnancy. The majority of LBW incidents occur in mothers who do not receive monitoring or the quality of food needed during pregnancy. If it continues for a long time and does not immediately receive proper treatment, it will cause obstacles to nutritional intake to the fetus in the womb (Trisiswati & Mardhiyah, 2021).

When the fetus is still in the womb, all of its nutritional needs come from what the mother consumes, if the mother consumes food carelessly it will endanger herself and the health and growth of the fetus in the womb. This incident can result in a decrease in the amount of blood circulating to the uterus and placenta, which can then cause the size of the placenta to shrink and the transfer of nutrients through the placenta to slow down. This is usually directly proportional to the growth of the fetus, which can be seen from its height (Trisiswati & Mardhiyah, 2021).

Children with LBW can still catch up on their body growth as they get older. In LBW

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children, if over time they get sufficient nutritional intake, proper health services, and their growth and development are continuously monitored, they will not progress to stunting. This is in accordance with the development of the fetus during the womb, namely through 3 trimesters where each semester the baby continues to grow and increasingly requires high nutritional intake, the source of the required nutritional intake can only be obtained through nutritional intake from the mother's energy reserves (Mardiah & Graha, 2021).

Low birth weight can be caused by various factors, such as malnutrition during pregnancy, infection, or other health problems in pregnant women (Damayanti et al., 2022). Proper handling of health problems during pregnancy, including monitoring maternal weight and good antenatal care, is very important to prevent LBW and stunting in children.

Mother's Height

In addition, maternal height also has a significant influence on the incidence of stunting. The result of this study show maternal height also has a significant effect, where mothers with a height of less than or equal to 150 cm are more at risk of having children who experience stunting (RR = 1.6, $p < 0.05$).

The results of this study are in accordance with research in Wonomerto District, Probolinggo Regency that there is a significant relationship between maternal height and the incidence of stunting in children aged 24-59 months (Sholeha, 2023). The results of this study are also in line with the research conducted by Noviana (2019) and Ngaisyah (2016) that maternal height does not have a significant relationship with the incidence of Stunting. However, these results differ from the results of the study conducted by Baidho (2021) which stated that maternal height is one of the factors related to the incidence of Stunting with a p value = 0.005 and OR 3.218 which means the risk of Stunting in toddlers born to mothers with short height is 3.2 times greater than toddlers born to mothers with normal height (Baidho, 2021).

Mothers with a height of less than or equal to 150 cm have a higher risk of giving birth to children with stunting. This may be related to genetic factors or maternal nutrition that affect the child's growth and development. The mother's height is not the main determining factor in the child's height because the father's height also has an influence on the 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 short trait, increasing the chance of the child inheriting the gene and growing up to be Stunting. However, if the parents are short due to malnutrition or disease, the child is likely to grow to normal height as long as the child is not exposed to other risk factors (Noviana & Ekawati, 2019). Therefore, it is important for mothers with short stature to receive special attention regarding optimal nutritional fulfillment during pregnancy and after giving birth.

Birth Length

The length of the baby at birth describes the baby's linear growth during pregnancy. A low linear size usually indicates a state of malnutrition due to a lack of energy and protein suffered in the past which begins with a slowdown or retardation of fetal growth. Inadequate maternal nutritional intake before pregnancy causes growth disorders in the fetus which can cause the baby to be born with a short birth length.

Based on the results of the study, it shows that the incidence of stunting can be influenced by the length of the child's birth. Children born with a body length of less than or equal to 50 cm have a higher risk of experiencing stunting compared to children born longer (RR = 2.2, $p < 0.05$).

Babies with short birth length (<50 cm) are four times and two times more likely to experience stunting at the age of 3 months and 2 years, respectively (Wulandari 2019). In fact, one study in Indonesia in 2021 showed that babies with short body length have a 5.06 times greater chance of experiencing stunting and delayed child development (Lukman,

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2021). This shows that birth length is significantly related to child growth and development. The percentage of short birth length with abnormal growth and development is greater (66.7%) than those with normal birth length (33.8%). Stunted children can fail to achieve motor development due to a lack of curiosity about the environment. In addition, stunted children will also affect the mechanical ability of the muscles due to obstacles in the process of muscle maturity. Children with a birth length of at least 50 cm can also survive longer than children with a birth length of less than 50 cm. This emphasizes the importance of adequate nutrition for the fetus during pregnancy to give birth to children with good nutritional status (Utami, 2018).

Inadequate nutritional intake in normal toddlers causes more severe growth faltering in normal toddlers. Babies who experience growth faltering at an early age show a risk of experiencing growth faltering in the next age period. Stunting caused by growth faltering and inadequate catch-up growth reflects the inability to achieve optimal growth. However, if adequate nutritional intake support is given, normal growth patterns will be pursued. Babies born with a short birth length indicate inadequate maternal nutritional intake during pregnancy, so that fetal growth in the womb is not optimal. Good nutritional intake is important to support the growth of children born with a short birth length so that they get a normal body length as they get older. Determining good intake is very important to catch up on the proper body length. The length of a baby at birth is one of the risk factors for stunting in toddlers. The short length of a baby at birth is influenced by the fulfillment of the baby's nutrition while still in the womb (Paulina, 2019).

CONCLUSION

Overall, factors such as maternal education, history of breastfeeding, birth weight, maternal height, and birth length showed a significant relationship with the incidence of stunting in children aged 24-59 months. Therefore, greater attention to these factors is very important in efforts to prevent stunting, both through public health programs, increasing maternal knowledge about nutrition and health, and improving access to quality health services.

Based on the results of this study, to prevent and reduce the incidence of stunting in children, several practical steps can be implemented. Increasing maternal education, especially those with low education, can be done through counseling programs on the importance of balanced nutrition and good parenting patterns. In addition, exclusive breastfeeding must be encouraged through education for pregnant women and families, with a focus on antenatal health services and integrated health posts. Handling of low birth weight (LBW) also needs to be strengthened by routine monitoring of the health of pregnant women. For mothers with a height of less than 150 cm, special attention related to nutritional fulfillment during pregnancy and after delivery is very important. Monitoring of infant height from birth must also be carried out to support optimal growth.

This study has several limitations that need to be considered. First, the observational study design cannot prove a causal relationship between risk factors and stunting incidence. Second, data collection using retrospective data collection sheets is at risk of bias, especially recall bias. In addition, other factors that may influence stunting, such as genetics and environment, were not included in the analysis. Another limitation is that the sample size is limited to the work area of the Pesantren I Health Center, Kediri City, which may not represent the wider population. Therefore, further research with larger samples and more robust methods is needed to strengthen these findings.

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