



Relationship between Nutrition Intake and Stunting Incidence among Toddlers in Indonesia

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ABSTRACT:

Introduction: Improvements nutrition during the first few years of life can lay a strong basis for assisting people, families, and nations to escape poverty, which can be caused by malnutrition.

Objectives: This study was to determine the association between nutrition intake and stunting incidence among toddlers.

Methods: The study was an observational analytical survey with a case-control design. Purposive sampling was used to select 122 respondents for the study, who were divided into two groups consisting of 61 respondents for the case group and 61 respondents for the control group. A 24-hour meal recall questionnaire and a Z-Score calculation method were the instruments utilized to collect the data. The Chi-Square test was used to evaluate the data in univariate and bivariate analysis with a significance level of 0.05.

Results: The results showed that there was a significant relationship between nutrition intake and stunting incidence among toddlers ($p < 0.001$).

Conclusions: It implies that an increase in minimum nutritional intake is adjusted to the nutritional intake needs of toddlers so that stunting does not occur.

1. Introduction

Poverty can lead to malnutrition, but enhancing nutrition in the early years of life can lay a strong basis for assisting people, families, and countries in escaping poverty¹. The 1000-day, from conception to age two years, is a short chance to do something profitable². A diet rich in nutrients will help children grow to meet their optimal physical and cognitive potential³.

According to the World Health Organization in 2020, one of the age groups is prone to nutrition for toddlers with chronic nutritional problems (stunting). Stunting in toddlers needs special attention⁴. Sustainable Development Goals in 2030, end all forms of malnutrition, and by 2025 reduce the prevalence of stunting (22.2%), wasting (7.5%), severe wasting (2.4%), and overweight (5.7%) in toddlers⁵.

A third (39%) of the world's stunted toddlers are found in Africa, while 55% of them are from Asia⁶. The majority of the 83.6 million Asian toddlers with stunting (58.7%) and the smallest percentage (0.9%) were from South Asia. At 27.7%, Indonesia ranks third among Southeast Asian nations with the greatest prevalence⁷.

In Indonesia, the average prevalence of stunting in toddlers is 36.4%⁸. The percentage dropped slightly to 35.6% in 2010. However, the proportion of stunted toddlers rises once more to 37.2% in 2013. According to the survey, stunting affects 29.9% of children under the age of two in 2018. 30.8% of toddlers are affected. Additionally, the prevalence of stunting in 2019 is 27.67%⁹.

In North Sumatra Province in 2018 the prevalence of stunting is found to be 32.4% of stunted toddlers. Whereas in 2019 the prevalence of stunting is 30.11%.



The 15 districts/cities where stunting prevention is located in North Sumatra are Nias, South Nias, North Padang Lawas, Mandailing Natal, Simalungun Dairi, West Nias, Deli Serdang, Padang Lawas, West Pakpak, Central Tapanuli, Medan Langkat, Gunung Sitoli and North Nias¹⁰.

Based on the Indonesian Nutritional Status Survey in 2022, it was found that the prevalence of stunting in Central Tapanuli district is 30.5%¹¹. Factors that cause stunting are social, economic, food intake, infection, nutritional status of the mother, infectious diseases as well as micronutrient deficiencies and the environment¹². Nutrient intake is one of the direct factors that can contribute to stunting. Nutrition obtained from birth is very influential on growth, including the risk of stunting¹³. Therefore, it is of interest to researchers to determine the association between toddler stunting and nutrition intake.

2. Objectives

This study was to determine the association between nutrition intake and stunting incidence among toddlers.

3. Methods

The study was a case-control observational analytical survey. The 187 participants in this study were stunted toddlers between the ages of 12-59 months. They were located in the Kolang Public Health Center. The study was carried out between December 2022 and April 2023. In this study, 122 respondents were used, split into two groups consisting of 61 respondents for the case group and 61 respondents for the control group. Purposive sampling was used to choose the sample, and the following criteria were used: 1) mothers with toddlers aged 1 to 5 years; 2) toddler mothers who are literate; 3) toddler mothers who are stay-at-home (no employment); and 4) toddlers who are not chronically or acutely ill.

Nutrition intake, or the amount of energy from the kilocalories of food taken on average each day, was measured using a 24-hour food recall questionnaire. If $\geq 80\%$ is fulfilled, $< 80\%$ is not fulfilled¹⁴. Z-Score calculation formula was applied to determine stunting however the data were obtained based on medical records from Kolang Public Health Center. The acquired data were analyzed using a computer statistical program, IBM Statistical Package for the Social Science (SPSS)

version 26 as univariate and bivariate analysis with the Chi-Square test at a significance level of 0.05.

4. Results

According to Table 1, there were more female toddlers than male toddlers (50.9% in the control group and 78.7% in the case group). In both the control group (88.5%) and the case group (67.2%), the majority of the population was aged 31 to 59 months. The majority of nutrition intake was fulfilled in the control group (93.4%), however in the case group was not fulfilled (81.7%).

Based on the cross-tabulation results of the gender with the stunting incidence in toddlers in the Kolang Public Health Center, it was found that the value of $p = 0.001 < 0.05$ with OR of 0.280 (95% CI). This shows a relationship between gender and the incidence of stunting in toddlers. Based on the cross-tabulation results of the age with the stunting incidence in toddlers in the Kolang Public Health Center, it was found that the value of $p = 0.005 < 0.05$ with OR of 3.763 (95% CI). This shows a relationship between age and the incidence of stunting in toddlers. Based on the cross-tabulation results of the nutrition intake with the stunting incidence in toddlers in the Kolang Public Health Center, it was found that the value of $p = 0.001 < 0.05$ with OR of 0.015 (95% CI). This shows a relationship between nutrition intake and the incidence of stunting in toddlers. (Table 2)

5. Discussion

The relationship between gender and the incidence of stunting in toddlers in the Kolang Public Health Center North Sumatra, Indonesia in 2023 showed that the chi-square statistical test results revealed a p -value = $0.001 < 0.05$ with OR of 0.280 (95% CI). This study supports Ntenda and Chuang's results that young male children are most commonly affected by stunting. This might be the case because a boy is more prone than a girl to be impacted by environmental stress¹⁵. Boys may therefore display the effects of chronic undernutrition more clearly. Studies showed that gender inequality in childhood undernutrition was more frequent in contexts where stresses including chronic illnesses, chemical exposure, and air pollution were present¹⁶. The observed sex discrepancies may also reflect caregiver activity patterns, such as responsive feeding techniques or



nursing frequency, according to gender-based cultural presumptions¹⁷.

Regional and study-specific variances in the prevalence of stunting by gender exist. In general, boys are more likely than girls to experience stunting¹⁸, particularly in lower socioeconomic tiers of Sub-Saharan Africa¹⁹. However, research in various contexts reveals a range of sex differences, from none in worldwide comparisons to boys being more at risk of stunting in particular places, such as Myanmar, South Africa, and Senegal²⁰ and girls in South Asia (21,22) and East Africa having a greater rate of stunting²³.

The results of this study also found the same thing in a study in India that stunted toddlers were more male (25.4%) than female (19.3%) and the results of multivariate regression showed the possibility of stunting in males was 38% higher than in children female²⁴. Differences in the nutritional status of toddlers can be influenced by the existence of a standard calculation of height per age and categorized by gender according to anthropometric standards for assessing children's nutritional status²⁵. Other studies also show that the prevalence of growth failure in toddler females is higher than in males²⁶. This finding is consistent with research showing that this difference can arise due to social and cultural discrimination between genders, meaning that some families pay more attention to the nutrition of male toddlers than females, so this can provide the potential for growth failure and other health problems in toddlers female²⁷.

The relationship between age and the incidence of stunting in toddlers in the Kolang Public Health Center North Sumatra, Indonesia in 2023 showed that the chi-square statistical test results revealed a p-value = 0.005 < 0.05 with OR of 3.763 (95% CI). Consistent with the study by Sujianti and Pranowo stated that age is related to the incidence of stunting in toddlers where toddlers aged 24-59 months have a risk of experiencing stunting 10 times greater than toddlers aged 12-23 months²⁸. The risk factor for stunting is at the age of 6-36 months. The results showed that the highest prevalence of stunting was at the age of 25-36 months (57.9%) and slightly at the age of 6-36 months (46.7%)²⁹. The same research shows that there is a greater chance of stunting in Bangladesh at the age of 36-47 months and in rural areas (38.1%) compared to those aged 6-12 months³⁰.

The incidence of stunting in toddlers is probably caused because at the age of 24-59 months, children are already active consumers, they are already able to choose the food they like such as random snacks without paying attention to the type of food chosen and the cleanliness of the food. Toddlers aged > 24 months also do not understand personal hygiene and are in an environment that does not adopt healthy lifestyles. Lack of cleanliness can cause toddlers to get sick easily, if toddlers experience sick there can be a decrease in appetite and this can result in a lack of nutrients entering the body, thus causing the growth of toddlers to be disrupted resulting in stunting³¹. The process of becoming stunted in a child in a poor area starts at around 6 months of age and appears mainly in the early 2 to 3 years of life. Stunting that occurs in the first 36 months is usually accompanied by long-term effects²⁹.

The relationship between nutrition intake and the incidence of stunting in toddlers in the Kolang Public Health Center North Sumatra, Indonesia in 2023 showed that the chi-square statistical test results revealed p-value = 0.001 < 0.05 with OR of 0.015 (95% CI).

Following the findings of Wati and Musnadi's study, which revealed a connection between dietary intake and the prevalence of stunting in toddlers³². Another study revealed a connection between nutritional (energy) consumption and the nutritional status of toddlers in low-income communities aged 2 to 5 years. That poor nutritional status is caused by poor nutritional (energy) intake, besides that it is caused by insufficient family income so that children's nutritional intake is inadequate which can affect children's nutritional status³³. This implies that the incidence of stunting decreases the better the feeding pattern.³⁴

A child's health and well-being are primarily determined by their nutritional state³⁵. One possibility is that males' nutritional needs can rise because they engage in more outdoor activity than females do. Additionally, there is evidence that male children have higher rates of infectious diseases common in newborns and young children, which was linked to greater male mobility²⁰. In a previous study, it was discovered that stunted children's average daily nutritional intake of calories, protein, carbs, and lipids was lower than that of non-stunted children in a Dhaka, Bangladesh, urban slum community³⁶. According to a cohort study of under-5-



year-old children from a rural area of Kenya, children who consume traditional foods had a 2.5 to 3.1 times higher risk of being stunted than those who consume diets high in protein³⁷.

Conclusion

The Kolong Public Health Center in North Sumatra, Indonesia, found a correlation between gender, age, nutrient intake, and the incidence of stunting in toddlers. Further study will be recommended to explore nutrition intake based on cultural diversity.

Conflict of Interest:

The authors have no conflicts of interest to declare.

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Table 1. Frequency distribution of characteristics of toddlers (n=122)

No	Characteristics of toddler	Control	%	Case	%
Gender					
1	Male	30	49.1	13	21.3
2	Female	31	50.9	48	78.7
Ages (months)					
1	12-30	7	11.5	20	32.8
2	31-59	54	88.5	41	67.2
Nutrition intake					
1	Fulfilled	57	93.4	11	18.3
2	Not fulfilled	4	6.6	50	81.7

Table 2 Cross-tabulation of the relationship between gender, age, nutrition intake and stunting incidence of toddlers (n=122)

	Stunting				Total		p-value	OR (95% CI)
	Control		Case		n	%		
	n	%	n	%				
Gender								
Male	30	24.6	13	10.7	43	35.2	0.001*	0.280 (0.127- 0.618)
Female	31	25.5	48	39.3	79	64.8		
Total	61	50.0	61	50.0	122	100		
Ages (months)								
12-30	7	5.7	20	16.4	27	22.1	0.005*	3.763 (1.453- 9.747)
31-59	54	44.3	41	33.6	95	77.9		
Total	61	50.0	61	50.0	122	100		
Nutrition intake								
Fulfilled	57	46.7	11	9.0	68	55.7	0.001*	0.015 (0.005- 0.052)
Not fulfilled	4	3.3	50	41.0	54	44.3		
Total	61	50.0	61	50.0	122	100		

Chi Square Test, *p < 0.05