

The relationship between stunting and breastfeeding cessation in toddlers

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ABSTRACT

This study aimed to analyze the relationship between breastfeeding cessation and the incidence of stunting in toddlers in Medan City. A total of 124 toddlers participated, with 50% experiencing stunting. Descriptive analysis showed that most mothers stopped breastfeeding between 0–6 months (50.81%), while the majority of toddlers (89.52%) consumed formula milk until 54–60 months. The Kolmogorov-Smirnov normality test indicated non-normal data distribution ($p = 0.000$), leading to the use of Spearman's rank correlation. Results revealed a significant moderate positive correlation between breastfeeding cessation age and stunting incidence ($r = 0.432$; $p = 0.000$), indicating that earlier cessation of breastfeeding increases the risk of stunting. These findings align with previous research emphasizing the critical role of breastfeeding in stunting prevention. Although formula milk consumption was common, it did not significantly influence stunting alone. Therefore, stunting prevention efforts should prioritize exclusive breastfeeding for six months and continued breastfeeding up to two years, alongside improved complementary feeding, environmental sanitation, and maternal nutrition. A multisectoral approach is essential to effectively reduce stunting prevalence and improve toddler health in Medan City.

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INTRODUCTION

Stunting, a growth failure condition where a child's height is below the average for their age, can be caused by chronic malnutrition in toddlers. Although this nutritional problem begins during pregnancy and early life, stunting is typically identified when a child reaches two years of age. Stunting is defined as linear growth failure caused by chronic malnutrition if the child's height-for-age is below -2 standard deviations on the growth curve. Stunting remains a significant problem in developing countries such as Indonesia due to its high prevalence (Daracantika et al., 2021).

In 2019, 21.3% of stunting cases occurred in children under five years old worldwide. In Indonesia, during the same year, 12.8% of toddlers (0-59 months) were classified as severely short, and 17.1% were classified as short. This percentage showed an increase compared to 2018, where the prevalence of severely short toddlers was 11.5%, and short toddlers were 19.3%. The Indonesian Ministry of Health reported that in 2018, 3 out of 10 Indonesian children experienced stunting. Stunting poses a serious threat to the quality of human resources and national competitiveness, as it not only hinders physical growth but also impairs brain development. Consequently, children's learning abilities, productivity, and creativity in their productive age may be affected (Aurima et al., 2021).

Breastfeeding is a crucial part of maternal and child health. According to the World Health Organization (WHO), exclusive breastfeeding (EBF) for the first six months, followed by continued breastfeeding up to two years and beyond, is very important. During the first six months, breast milk provides the best source of nutrition for the infant and fosters bonding between mother and child (Kebede et al., 2020).

Preventive measures against stunting include complete essential vaccinations for toddlers and exclusive breastfeeding. The aim of this literature review is to analyze the relationship between stunting in toddlers in Medan and the practice of exclusive breastfeeding. For both mother and child, specifically designed and comprehensive nutritional interventions can prevent stunting. Exclusive breastfeeding is a crucial preventive step. With its content of macronutrients (fat, protein, and carbohydrates) and micronutrients (water, vitamins, and minerals), breast milk is the primary source of nutrition for infants. This study recommends that mothers exclusively breastfeed their children and ensure they receive all necessary nutritional support and basic medical care. Additionally, health institutions are advised to enhance health service interventions by providing ongoing education about the dangers of stunting in Indonesia (Jezua et al., 2021).

Moreover, socioeconomic factors, maternal education, and local breastfeeding culture in Medan play a significant role in influencing early weaning practices and the prevalence of stunting. Lower socioeconomic status often limits access to adequate nutrition and healthcare services, making mothers more likely to introduce complementary foods earlier than recommended due to financial constraints or lack of knowledge. Maternal education is strongly correlated with breastfeeding practices; mothers with higher education levels tend to have better awareness of the benefits of exclusive breastfeeding and are more likely to adhere to WHO recommendations. Additionally, cultural beliefs and norms around breastfeeding within Medan's communities can either support or hinder sustained exclusive breastfeeding. In some cases, traditional practices or misinformation may lead to early weaning, which compromises the infant's nutritional intake and increases the risk of stunting. Understanding these contextual factors is essential to designing effective interventions that promote exclusive breastfeeding and ultimately reduce stunting rates in Medan.

RESEARCH METHOD

Research Design and Location

This study is a retrospective observational study with a descriptive and analytical approach, aimed at analyzing the relationship between the incidence of stunting and breastfeeding cessation in toddlers. The research location is in Medan City, North Sumatra, and the study is planned to be conducted from February until completion, according to the predetermined research schedule.

Population and Sample

The participants in this study include all children in Medan City aged between 6 and 24 months who had ceased breastfeeding before the age of 2 years. Each item or subject in the study possessing specific characteristics and serving as the analysis unit to draw conclusions is referred

to as the population. Besides humans, the population may also include relevant events, symptoms, or other occurrences related to the research (Nidia Suriani, Risnita, 2023). In this study, toddlers with and without stunting were selected as samples based on certain inclusion and exclusion criteria. To represent the entire population, the sample is a portion of the population chosen based on size and specific attributes (Nidia Suriani, Risnita, 2023).

Sample size determination was performed using Cochran's formula with parameters including a Z-value of 1.96 (based on the standard normal distribution at a 5% significance level), a proportion of breastfeeding cessation (p) of 0.5 in the absence of prior specific data, and a sample error margin (d) of 0.1 for a 90% confidence level. The inclusion criteria for this study consisted of toddlers experiencing or not experiencing stunting, having a history of breastfeeding cessation before two years of age, and having complete anthropometric data and medical records. Exclusion criteria included toddlers with a history of chronic diseases or congenital abnormalities that could affect growth, as well as incomplete medical records.

Data Collection

Data collection was conducted through a retrospective observational method using a questionnaire as the primary instrument. The questionnaire was designed to measure two main variables: breastfeeding cessation and the incidence of stunting in toddlers. The first part of the questionnaire included questions about reasons for stopping breastfeeding, family support, and the use of breast milk substitutes. The second part evaluated the occurrence of stunting based on the child's growth history, nutritional intake patterns, and other contributing factors. The collected data were analyzed descriptively and analytically to identify the relationship between the timing of breastfeeding cessation and the nutritional status of toddlers, as well as to assess the influence of other factors on the incidence of stunting in the study area.

Stunting in children and breastfeeding cessation are the two main topics covered by the questionnaire used as the research tool. Content validity of the questionnaire was checked in a pilot study, and every item in both sections had a correlation value greater than 0.3. An item is considered valid for measuring the intended variable if its correlation value exceeds 0.3, following Azwar's criteria (2014). Therefore, all questions in the questionnaire were deemed valid and appropriate for use in the main study. Additionally, instrument reliability was assessed using Cronbach's Alpha, yielding a value of 0.679. According to Azwar (2014), this score indicates that the instrument is reliable and sufficiently consistent for data collection.

Variables and Operational Definitions

In this study, the independent variable is breastfeeding cessation, defined as the discontinuation of breastfeeding before the child reaches two years of age. The dependent variable is the incidence of stunting in toddlers, characterized by growth failure marked by height below the WHO growth standards (< -2 SD). Operational definitions were established to clarify the study scope. Breastfeeding cessation refers to stopping breastfeeding before two years of age, based on reports from mothers or caregivers, whether exclusively or non-exclusively breastfed. Exclusive breastfeeding refers to providing only breast milk without any additional food or drink from birth to six months of age. Formula milk is defined as the provision of artificial milk that can influence breastfeeding duration, measured by frequency and the age at which it was first introduced. Stunting in this study is measured by height-for-age anthropometry (HAZ) and analyzed using WHO z-score standards (children are classified as stunted if the z-score < -2 SD) (Anna Uswatun Qoyyimah & Lilik Hartati, 2020).

The operational definitions of variables also follow literature references, where breastfeeding cessation is understood as the gradual or abrupt discontinuation of breastfeeding before the age recommended by health organizations (Muharyani & Widita, 2022), and stunting is a linear growth disorder resulting from chronic nutritional deficiency during the critical growth period of a child (Anna Uswatun Qoyyimah & Lilik Hartati, 2020).

Data Analysis

The data analysis design applies both descriptive and analytical approaches. Total sampling technique was employed for data collection, and all analyses were conducted using SPSS software. Data normality was tested using Shapiro-Wilk or Kolmogorov-Smirnov tests depending on data distribution. To examine the relationship between breastfeeding cessation and stunting incidence, the Chi-Square test was used if assumptions were met, or Fisher's Exact Test if expected frequencies were less than 5. Additionally, Pearson or Spearman correlation tests were applied depending on the data distribution characteristics. Results interpretation was based on a significance level of $p < 0.05$ and aligned with ethical research standards. This approach is expected to provide a comprehensive overview of the impact of breastfeeding cessation on the nutritional status and growth of children in Medan City.

RESULTS AND DISCUSSIONS

Descriptive Statistics

a. Stunting Cases in Toddlers

Table 1. Descriptive statistics results of stunting cases

Category	Case	Control	Total
Frequency	62	62	124
%	50	50	100
Max			2
Min			1
Mean			1.5
Std. Dev			0.502028

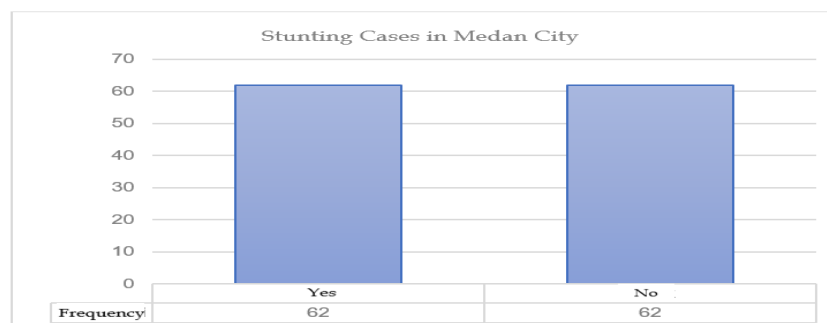


Figure 1. Stunting cases among toddlers in Medan City

Based on the results of the descriptive analysis regarding the stunting status among toddlers, a total of 124 children were included as respondents, with an equal proportion of toddlers experiencing stunting (62 children or 50%) and those not experiencing stunting (62 children or 50%). The maximum value of the data is 2, the minimum value is 1, with a mean of 1.5 and a standard deviation of 0.502.

These results indicate that the incidence of stunting among toddlers in this study is relatively high, as half of the total respondents were found to be stunted. This finding suggests that stunting remains a significant public health issue among toddlers and requires further attention, both in terms of prevention and intervention efforts.

b. Toddler Age

Table 2. Descriptive statistics results of toddler age

Age	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	Total
Frequency	2	3	4	4	10	11	17	11	38	24	124
%	1.61	2.42	3.23	3.23	8.06	8.87	13.71	8.87	30.65	19.35	100

Age	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	Total
Max											10
Min											1
Mean											7.58871
Std. Dev											2.270389

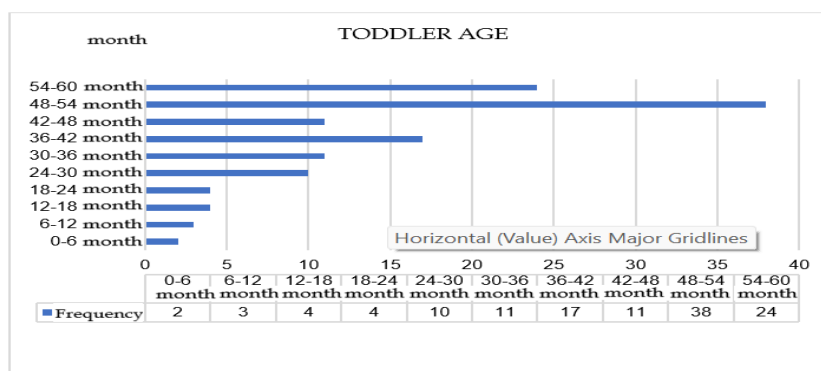


Figure 2. Descriptive statistics of toddler age

Based on the results of the descriptive analysis regarding the age distribution of toddlers, a total of 124 children were included as respondents, with an age range of 0–60 months. The largest distribution was found in the 48–54 months age group, with 38 children (30.65%), followed by the 54–60 months group with 24 children (19.35%), and the 36–42 months group with 17 children (13.71%). Meanwhile, the smallest distribution was in the 0–6 months age group, with only 2 children (1.61%). The maximum value for the age category was 10 (highest age group), and the minimum was 1 (lowest age group), with a mean of 7.59 and a standard deviation of 2.27.

These results indicate that the majority of toddler respondents in this study were in the older age groups (above 36 months), suggesting that the age distribution was uneven and tended to be concentrated in the group approaching 5 years old.

c. Age of Breastfeeding Cessation

Table 3. Descriptive statistical results of age of breastfeeding cessation

Age	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	Total
Frequency	63	16	18	27	0	0	0	0	0	0	124
%	50.81	12.90	14.52	21.77	0.00	0.00	0.00	0.00	0.00	0.00	100
Max											4
Min											1
Mean											2.072581
Std. Dev											1.237447

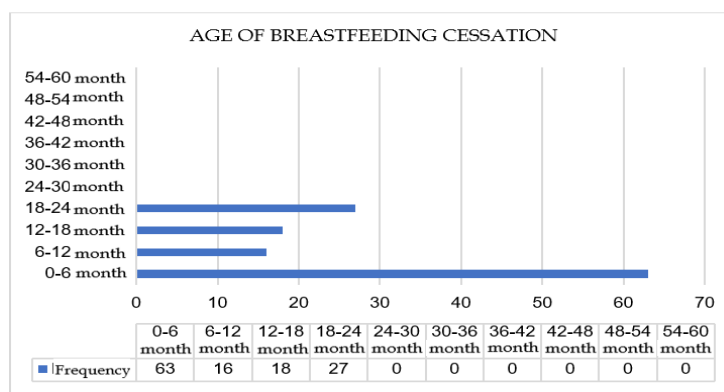


Figure 3. Descriptive statistics of age of breastfeeding cessation

Based on the descriptive analysis of the age of breastfeeding cessation, a total of 124 mothers of toddlers were included as respondents. The frequency distribution showed that the majority of respondents stopped breastfeeding at the age of 0-6 months, totaling 63 individuals (50.81%), followed by cessation at 18-24 months with 27 individuals (21.77%), at 12-18 months with 18 individuals (14.52%), and at 6-12 months with 16 individuals (12.90%). Meanwhile, there were no respondents who stopped breastfeeding after 24 months.

The minimum value from the data was category 1 (0-6 months), and the maximum value was category 4 (18-24 months), with a mean of 2.07 and a standard deviation of 1.237. These results indicate that, in general, most mothers stopped breastfeeding early, i.e., before the child reached the age of 2 years. This finding suggests a potential risk to the health and development of toddlers, considering the WHO recommends exclusive breastfeeding for the first 6 months and continued breastfeeding up to 24 months or beyond.

d. Formula Feeding

Table 4. Descriptive statistical results of formula feeding

Category	Yes	No	Total
Frequency	111	13	124
%	89.52	10.48	100
Max			2
Min			1
Mean			1.10483871
Std. Dev			0.307588268

Source: Processed by Researchers, 2025

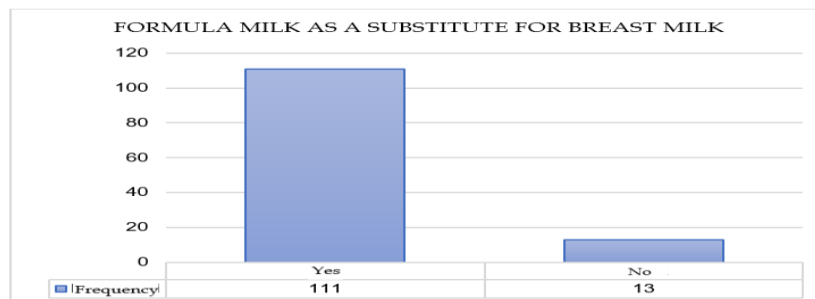


Figure 4. Descriptive statistics of formula milk feeding

Based on the descriptive analysis of formula milk feeding among toddlers, a total of 124 children were included as respondents. Of this number, 111 toddlers (89.52%) were reported to consume formula milk, while 13 toddlers (10.48%) did not. The maximum value of the data is 2, the minimum is 1, with a mean of 1.105 and a standard deviation of 0.308.

These results indicate that the majority of toddlers in this study consumed formula milk, with a proportion of nearly 9 out of 10 children. This finding suggests that formula milk serves as a relatively dominant source of nutrition for toddlers, although there remains a small proportion of children who do not consume it.

e. Age of Formula Milk Cessation

Table 5. Descriptive statistical results of age of formula milk cessation

Age	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	Total
Frequency	14	9	5	4	16	7	15	8	10	36	124
%	11.29	7.26	4.03	3.23	12.90	5.65	12.10	6.45	8.06	29.03	100
Max											10
Min											1
Mean											6.48387097

Age	0-6	6-12	12-18	18-24	24-30	30-36	36-42	42-48	48-54	54-60	Total
Std. Dev											3.19911023

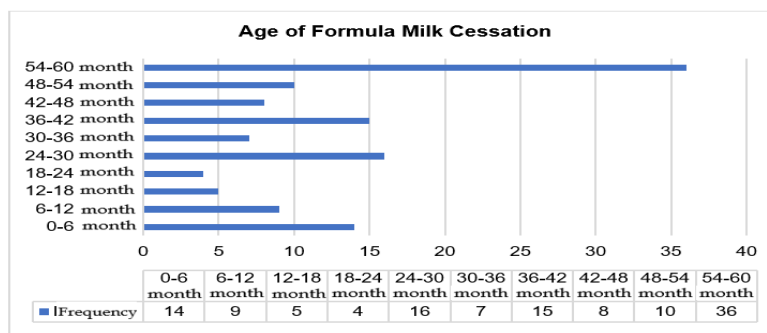


Figure 5. Descriptive statistics of age of formula milk cessation

Based on the descriptive analysis of the age at which toddlers ceased consuming formula milk, a total of 124 children were included as respondents. The distribution revealed that the majority of toddlers stopped consuming formula milk at 54–60 months of age, totaling 36 children (29.03%), followed by the 24–30 months group with 16 children (12.90%), the 36–42 months group with 15 children (12.10%), and the 0–6 months group with 14 children (11.29%). Meanwhile, the age group with the fewest respondents was 18–24 months, with only 4 children (3.23%). The minimum value of the data was 1, the maximum was 10, with a mean of 6.48 and a standard deviation of 3.20.

These results indicate that the majority of toddlers in this study continued to consume formula milk until a relatively older age (54–60 months), suggesting a trend of extending formula milk usage beyond the age of two years.

Research Hypothesis Testing Results

a. One-Sample Kolmogorov-Smirnov Normality Test

One-Sample Kolmogorov-Smirnov Test		Unstandardized Residual
N		124
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	8.75990283
Most Extreme Differences	Absolute	.131
	Positive	.131
	Negative	-.052
Test Statistic		.131
Asymp. Sig. (2-tailed)		.000 ^c
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Figure 6. One-sample kolmogorov-smirnov normality test results

Based on the results of the One-Sample Kolmogorov-Smirnov normality test, the Asymp. Sig. (2-tailed) value was obtained as 0.000, which is smaller than the significance level of 0.05 ($p < 0.05$). This indicates that the data do not follow a normal distribution statistically, thus not meeting the assumption of normal distribution required for parametric tests. Therefore, to analyze the relationships between variables in this study, the non-parametric Spearman Rank test was used as an alternative more suitable for the characteristics of the non-normal data distribution. The use of the Spearman test aims to obtain valid relationship analysis results even though the data do not follow a normal distribution.

b. Spearman Rank Correlation Test Results

		Correlations		
			Breastfeeding Cessation	Kejadian Stunting Balita
Spearman's rho	Breastfeeding Cessation	Correlation Coefficient	1.000	.432**
		Sig. (2-tailed)	.	.000
		N	124	124
	Kejadian Stunting Balita	Correlation Coefficient	.432**	1.000
		Sig. (2-tailed)	.000	.
		N	124	124

** . Correlation is significant at the 0.01 level (2-tailed).

Figure 7. Spearman rank correlation test output

Based on the results of the Spearman correlation test between breastfeeding cessation and the incidence of stunting in toddlers, a Spearman's rho coefficient of 0.432 was obtained with a significance (2-tailed) value of 0.000. This value indicates a moderate positive relationship between the timing of breastfeeding cessation and the incidence of stunting, meaning that the longer the breastfeeding period is maintained, the lower the risk of stunting, and conversely, early cessation of breastfeeding tends to increase the risk of stunting.

Based on the moderate correlation coefficient and the positive direction of the relationship, it can be concluded that the relationship between breastfeeding cessation and the incidence of stunting in toddlers is moderate and statistically significant ($p < 0.05$). If related to the research hypotheses, where H_0 states there is no significant relationship between breastfeeding cessation and the incidence of stunting in toddlers, and H_a states there is a significant relationship between these two variables, the results support the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_a).

b. Relationship Between Breastfeeding Cessation and Stunting Incidence in Toddlers in Medan City

Based on the analysis using Spearman's rho correlation test, a correlation coefficient of 0.432 with a significance value of $p = 0.000$ ($p < 0.05$) was obtained from a total of 124 respondents. This indicates a significant relationship between breastfeeding cessation and the incidence of stunting in children. The positive correlation suggests that the earlier the cessation of breastfeeding, the higher the risk of the child experiencing stunting. A correlation coefficient of 0.432 is considered moderate, implying that breastfeeding cessation has a meaningful impact on the occurrence of stunting.

Hypothesis testing results show that H_0 is rejected and H_a is accepted, meaning there is a significant relationship between breastfeeding cessation and the incidence of stunting in children in Medan City. Therefore, the longer a child receives breast milk as recommended (exclusive breastfeeding for 6 months and continued until 2 years of age), the lower the likelihood of the child experiencing stunting.

The findings of this study align with research conducted by Batubara et al. (2023) in the working area of Puskesmas Pokenjior, involving 90 respondents. Their study revealed that 64.4% of toddlers did not receive exclusive breastfeeding, and chi-square test results indicated a significance value of $p = 0.002$ ($p < 0.05$). This suggests a significant relationship between the absence of exclusive breastfeeding and an increased incidence of stunting in toddlers.

Similarly, a study by Rilyani, Wandini, and Lestari (2021) in the working area of Puskesmas X Lampung Tengah, with a sample size of 82 toddlers, found that 75.0% of stunted toddlers did not receive exclusive breastfeeding, whereas 52.9% of non-stunted toddlers did. This reinforces the evidence that exclusive breastfeeding serves as a protective factor against stunting.

Furthermore, research by Chairunnisa, Nugraheni, and Kartini (2020) through a literature review of 37 articles, indicated that breastfeeding practices, such as early initiation of breastfeeding (IMD), exclusive breastfeeding, and breastfeeding duration, are significantly associated with the incidence of stunting in toddlers in Indonesia. The absence of IMD and exclusive breastfeeding increases the risk of stunting, with Odds Ratios (OR) of 3.69 and 19.50, respectively. Additionally, a study conducted in Desa Sendang Ayu, Lampung Tengah (2020), involving 80 toddlers aged 6–24

months, utilized chi-square tests and found a significance value of $\rho = 0.01$ ($p < 0.05$) for the exclusive breastfeeding variable, indicating a significant relationship with the incidence of stunting. Other factors, such as the age of introducing complementary feeding (MPASI) and the frequency of MPASI, were also found to be associated with stunting. The comparison between previous studies and this research is as follows:

Table 6. Comparison of relevant research findings

No	Study	Main Finding	Statistical Test Value	Comparison with This Study
1	This Study (2025), Medan City, 124 toddlers	Earlier cessation of breastfeeding increases stunting risk	Spearman's rho $r = 0,432$; $p = 0,000$	Reference point
2	Batubara et al. (2023), Puskesmas Pokenjior, 90 toddlers	64.4% of toddlers not exclusively breastfed experienced stunting	Chi-Square, $\rho = 0,002$	Significant; supports this study's findings
3	Rilyani, Wandini & Lestari (2021), Central Lampung, 82 toddlers	75% of stunted toddlers were not exclusively breastfed	Chi-Square, $p < 0,05$	Significant; reinforces this study's results
4	Chairunnisa, Nugraheni & Kartini (2020), Review of 37 articles	Not exclusively breastfed increases stunting risk (OR = 19.50)	Literature Analysis	Consistent; breastfeeding practices strongly linked to stunting
5	Sendang Ayu Village Study (2020), Central Lampung, 80 toddlers	Significant relationship between exclusive breastfeeding & stunting	Chi-Square, $\rho = 0,01$	Significant; breastfeeding factor affects stunting

In addition to previous studies emphasizing the important role of breast milk in preventing stunting, there are also other studies linking formula milk consumption to the occurrence of stunting. A study by Langgai Naroso (2025) in the working area of Puskesmas Labuan with 72 respondents showed that there was no significant relationship between formula milk feeding and the incidence of stunting in toddlers (p -value = 0.981; $p > 0.05$). Of the 26 toddlers who experienced stunting, the distribution between those who were given formula milk and those who were not was almost the same. This indicates that the factor of formula milk feeding alone is not the main determinant of stunting, but is still influenced by other factors such as nutritional status, family eating patterns, and the health condition of toddlers.

In contrast, a study by Sherly Mediana & Rina Pratiwi (2016) in Semarang City with 106 respondents (children aged 2-5 years) found a significant relationship between standard formula milk consumption and the incidence of stunting ($p = 0.032$; OR = 2.334). Children with excessive formula milk consumption were 2.3 times more likely to experience stunting compared to children who did not consume it excessively. Multivariate analysis also showed that, in addition to family income, the amount of formula milk consumption was a factor influencing stunting.

The differences in the results of these two studies can be explained through the quality and consumption patterns of formula milk. Although formula milk is fortified with various nutrients, it: (a) Has a composition that is not as optimal as breast milk. (b) Excessive use can replace the intake of balanced nutritious food. (c) Is influenced by family economic limitations. (d) May be given in incorrect proportions.

Thus, although formula milk can be an alternative when breast milk is unavailable, these studies emphasize that formula milk cannot fully replace the benefits of breast milk. In fact, improper use can increase the risk of stunting. When related to the results of the study in Medan City, the earlier the cessation of breastfeeding, the higher the risk of stunting ($r = 0.432$; $p = 0.000$). This is consistent with literature showing that breast milk has a strong protective role against stunting, while formula milk does not provide the same protection and, in certain conditions, can contribute to stunting. Therefore, exclusive breastfeeding for the first 6 months, followed by continued breastfeeding up to 2 years of age, is the best strategy in preventing stunting compared to replacing it with formula milk.

CONCLUSION

Based on the results of this study, strategies to control other major factors influencing stunting, such as complementary feeding (MP-ASI), environmental sanitation, and maternal nutritional status, should be integrated into public health interventions. Improving the quality and diversity of complementary foods through community education and nutritional counseling can ensure toddlers receive adequate nutrients after exclusive breastfeeding. Enhancing environmental sanitation by promoting clean water access, proper waste management, and hygiene practices can reduce the risk of infections that impair nutrient absorption and growth. Furthermore, improving maternal nutritional status before and during pregnancy through supplementation programs and health monitoring is essential to support optimal fetal growth and reduce the risk of stunting. A multisectoral approach involving healthcare providers, nutritionists, local governments, and community leaders is crucial to effectively address these interrelated factors and further reduce stunting prevalence in Medan.

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