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Early Nutrition and Stunting: Why are Exclusive Breastfeeding and Complementary Feeding Essential for Optimal Growth?

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ABSTRACT

Exclusive breastfeeding and the timely introduction of appropriate complementary feeding are critical determinants of child growth and development. The promotion of exclusive breastfeeding in Indonesia has been increasingly emphasized as a strategy to reduce the high prevalence of stunting among young children. To analyze the relationship between exclusive breastfeeding, the introduction of complementary feeding (MP-ASI), and the incidence of stunting in toddlers at Puskesmas Yosomulyo. A cross-sectional study was conducted with a sample of 135 toddlers, comprising 45 stunted cases and 90 controls, selected through purposive sampling based on predetermined inclusion and exclusion criteria. Data on feeding practices and health outcomes were collected via structured interviews and questionnaires. Descriptive statistics and chi-square tests were employed to assess the association between feeding practices and stunting incidence. Toddlers who received exclusive breastfeeding and appropriate complementary feeding exhibited significantly lower rates of stunting compared to those who did not. Specifically, 33% of toddlers who were not exclusively breastfed experienced stunting, whereas only 19% of those who received appropriate complementary feeding were stunted. Exclusive breastfeeding, combined with the timely introduction of suitable complementary foods, plays a pivotal role in reducing stunting and supporting optimal child development. Strengthening parental education programs on the importance of exclusive breastfeeding and proper complementary feeding is essential to prevent stunting and promote child health.

INTRODUCTION

Stunting is a serious global health issue, especially in developing countries. Globally, the incidence of stunting reaches 22%, with the highest contribution coming from countries on the Asian continent, which account for 68.1% of the total cases, followed by countries in Africa (UNICEF, 2023). In Lampung Province, the results of the Indonesian Nutrition Status Survey (SSGI) in 2022 showed a stunting prevalence of 15.2%, a decrease of 3.3% compared to 2021, when the prevalence was recorded at 18.5% (Health Office of Lampung Province, 2022). According to the Lampung Provincial Health Profile, in 2019, the prevalence of stunting in the province was 26.26% (Ministry of Health Republic Indonesia, 2021). Meanwhile, the prevalence of stunting in Lampung Province in 2018 was recorded at 27.28% (Ministry of Healt Republic Indonesia, 2018).

The prevalence of stunting in Indonesia has decreased in the last three years. In 2020, the stunting rate was recorded at 26.9%, which then reduced to 24.4% in 2021 and further decreased to 21.1% in 2022. Nevertheless, this figure still falls short of the government's target to reduce stunting to 14% by 2024 (Ministry of Health Republic Indonesia, 2023). This situation not only impacts children's physical growth but also affects their cognitive development and learning ability (Ekholuenetale et al., 2020). Exclusive breastfeeding for the first six months of life and the introduction of appropriate complementary foods thereafter are crucial steps in meeting children's nutritional needs (WHO, 2023). However, many parents are still not fully aware of the

importance of these two aspects, which contribute to the high rate of stunting (Motee & Jeewon, 2014). Stunting not only affects a child's physical growth but also has significant long-term impacts (Azriani et al., 2024). Stunted children tend to have lower cognitive abilities, are more susceptible to disease, and have reduced productivity potential in adulthood (Ndagijimana et al., 2025). This can lead to a prolonged cycle of poverty, where the next generation is similarly trapped (Fauzi et al., 2025).

The causes of stunting are complex and involve multiple factors, with early nutrition being an important element. Exclusive breastfeeding for the first six months of life is crucial to ensure that children receive optimal nutrition (WHO, 2023). However, many children are not exclusively breastfed, which may be due to a lack of maternal understanding of the benefits of breastmilk, difficulties with breastfeeding, or social and economic factors that prevent access to breastfeeding support (WHO, 2024).

After six months, the introduction of appropriate complementary foods is also a crucial factor in preventing stunting. Many children do not receive nutritious complementary foods or are not given at the right time, which can lead to malnutrition. Additionally, an unbalanced diet, where children do not receive an adequate variety of foods, also contributes to an increased risk of stunting (Christian et al., 2015). Other factors that influence the incidence of stunting include maternal health conditions during pregnancy, such as anemia and malnutrition, which can impact fetal growth (Bafila et al., 2023). An unfavorable environment, such as poor sanitation and frequent infections, can also interfere with nutrient absorption and overall child health. Therefore, a holistic and integrated approach is needed to address the problem of stunting, with an emphasis on the importance of exclusive breastfeeding and nutritious complementary feeding as the foundation for optimal child growth (Grathima et al., 2024).

Reducing stunting requires comprehensive interventions, from raising awareness about the importance of exclusive breastfeeding and complementary feeding to implementing integrated nutrition programs (WHO, 2018). Educating mothers and families on how to provide proper nutrition is crucial in preventing stunting (Setiawan et al., 2024). Additionally, support from the government and health institutions is also necessary to create a supportive environment for children's growth (Marni et al., 2022).

Although numerous studies have been conducted on stunting, a lack of understanding remains regarding the specific relationship between exclusive breastfeeding, complementary feeding, and the incidence of stunting in local contexts. This article aims to fill this gap by presenting relevant empirical data and an in-depth analysis of the relationship between exclusive breastfeeding and complementary feeding, as well as the incidence of stunting in children under five years of age at Yosomulyo Health Center. The selection of Yosomulyo Health Center as the research location was based on the high prevalence of stunting in the area. The incidence of stunting in Metro City in 2022 increased from 7.29% in 2021 to 10.4% in 2022 (Health Office of Lampung Province, 2022). In 2021, the highest percentage of stunted children was reported at Yosomulyo Health Center, at 11%. Margorejo Health Center followed with a percentage of 10.4%, and Metro Health Center had a percentage of 9.4% (Health Office of Metro City, 2022). With diverse demographic characteristics and unique health challenges, these locations provide an ideal context for exploring the factors that contribute to stunting. This study aims to analyze the relationship between exclusive breastfeeding, complementary feeding practices, and the incidence of stunting in toddlers at Puskesmas Yosomulyo. Understanding these associations is crucial for addressing the persistently high rates of stunting and informing the development of more effective policies and intervention programs that can improve child nutrition and health outcomes.

METHOD

This study employs an analytical method with a retrospective case-control design. This research aims to analyze the relationship between exclusive breastfeeding and the introduction of complementary feeding (MP-ASI) and the incidence of stunting in toddlers at Puskesmas Yosomulyo. The population for this study consists of toddlers visiting Puskesmas Yosomulyo. The

research sample comprises 135 respondents, consisting of 45 individuals with stunting and 90 controls who do not experience stunting. The sample selection was conducted using purposive sampling, a non-probability sampling technique where participants were deliberately selected based on predetermined inclusion and exclusion criteria to ensure the sample accurately represents both stunted and non-stunted toddlers at Puskesmas Yosomulyo. Data were collected through interviews and the completion of questionnaires that included information regarding health history, exclusive breastfeeding practices, immunization history, complementary feeding (MP-ASI), and the educational level of the mothers.

Additionally, secondary data on the prevalence of stunting in the area were obtained from health reports from the Puskesmas and the Indonesian Nutrition Status Survey (SSGI). After conducting the normality test, it was found that the data were normally distributed; therefore, parametric testing was performed using the Chi-Square correlation test to analyze the relationship between the independent variables (risk factors) and the dependent variable (incidence of stunting) with a confidence level of 95% (α=0.05). The expected outcome of this study is a better understanding of the factors contributing to stunting at Puskesmas Yosomulyo, as well as recommendations for interventions that can be implemented to reduce the incidence of stunting in the area. With this methodology, it is hoped that the research can make a significant contribution to efforts to prevent stunting and improve child health at Puskesmas Yosomulyo.

This research received approval from the Research Ethics Committee of Poltekkes Kemenkes Tanjung Karang (Approval Number: 516/KEPK-TJK/VIII/2024, Approval Date: 2024-08-05). All participants provided informed consent, and the study adhered to the principles of voluntary consent, anonymity, and confidentiality for the participants. Furthermore, the accuracy and safety of the texts were ensured. Additionally, the necessary permissions for sampling were granted by the relevant authorities.

RESULTS

Table 1. Frequency distribution of toddlers

Variable	f	%
Stunting		
Stunting	45	33
Not stunting	90	67
Exclusive breastfeeding		
Not	59	44
Yes	76	56
Complementary feeding		
Not suitable	58	43
Suitable	77	57

Table 1 shows from 135 toddlers, 33% (45 toddlers) were affected by stunting, 44% (59 toddlers) did not receive exclusive breastfeeding, and 43% (58 toddlers) were given inappropriate complementary feeding.

Table 2. Analysis Results Using Chi-Square Test

Variable		Stunting		Total		p-value (CI 95%)
		Stunting	Not Stunting	n	%	
Exclusive breastfeeding	Yes	33	43	76	56	0.005*
	Not	12	47	59	44	
Complementary feeding	Suitable	19	58	72	57	0.014*
	Not suitable	26	32	58	43	

The results of Table 2 using the Chi-Square test indicate that toddlers who are exclusively breastfed experience less stunting (33 toddlers) than those who are not stunted (43 toddlers). Conversely, children who were not exclusively breastfed had more stunting (12 toddlers) than those who were not stunted (47 toddlers). A p-value of 0.005 indicates a significant relationship

between exclusive breastfeeding and the incidence of stunting. Children who were given appropriate complementary food were less stunted (19 toddlers) than those who were not stunted (58 toddlers). Toddlers who were not given appropriate complementary food had more stunting (26 toddlers) than those who were not stunted (32 toddlers). A P-value of 0.014 indicates that the provision of appropriate complementary food has a significant relationship with the incidence of stunting.

DISCUSSION

Proportion of exclusive breastfeeding and complementary feeding

Among the under-fives studied, a substantial proportion experienced stunting, with many not receiving exclusive breastfeeding or appropriate complementary feeding. These findings suggest a significant correlation between suboptimal feeding practices and the prevalence of stunting. It is assumed that inadequate nutrition during critical growth periods contributes to impaired physical development, underscoring the importance of promoting exclusive breastfeeding and proper complementary feeding to reduce stunting rates. The results of this study are in line with a study conducted by Hadi et al. (2021), which found that lack of exclusive breastfeeding and inappropriate complementary feeding contributes to the high rate of stunting among under-fives (Hadi et al., 2021). The study showed that children who were not exclusively breastfed had a higher risk of stunting compared to those who were exclusively breastfed. This emphasizes the importance of proper nutrition interventions in the early period of a child's life (Sianti et al., 2024).

Early Nutrition Theory states that the period of the first 1000 days of life, which starts from conception to two years of age, is a crucial time for a child's growth and development (Ren et al., 2025). Exclusive breastfeeding for the first six months and the appropriate introduction of complementary foods thereafter are crucial for meeting a child's nutritional needs and preventing stunting (Gelman et al., 2023). Inadequate nutrition during this period can have long-term impacts on a child's health and development (Georgieff, 2023). The low rates of exclusive breastfeeding and inappropriate complementary feeding among parents at Yosomulyo Health Center are due to a lack of knowledge and awareness about the importance of early nutrition. Additionally, social and economic factors can also impact parents' ability to provide their children with proper nutrition. Based on the results of this study, it is recommended that the Puskesmas of Yosomulyo enhance their education and counseling programs for parents on the importance of exclusive breastfeeding and appropriate complementary feeding. Integrated nutrition intervention programs also need to be strengthened to ensure that all children under the age of five receive optimal nutrition. In addition, collaboration with relevant agencies to provide resources and support for parents in good feeding practices is essential to reduce stunting rates in the region.

Effect of exclusive breastfeeding

The analysis revealed a statistically significant association between exclusive breastfeeding and a reduced incidence of stunting among children under five. This finding highlights the crucial role of exclusive breastfeeding in promoting optimal child growth and development. It is assumed that the protective effect of exclusive breastfeeding arises from the unique nutritional and immunological properties of breast milk, which contribute to enhanced nutrient absorption and immune defense. These results are consistent with prior research emphasizing the importance of exclusive breastfeeding in preventing growth faltering and promoting long-term health outcomes in early childhood. This study aligns with previous research indicating that exclusive breastfeeding has a positive impact on child growth. For example, a study by Victora et al. (2016) found that children who were exclusively breastfed had a lower risk of stunting compared to those who were not (Victora et al., 2016). Another study by Horta and Victora (2013) also confirmed that exclusive breastfeeding contributes to improved nutritional status and child health (Horta &

Victora, 2013). Thus, the results of this study contribute to the evidence that exclusive breastfeeding is a key factor in preventing stunting.

The theory underlying the importance of exclusive breastfeeding in preventing stunting can be explained through the concept of early nutrition. Adequate nutrition in the first years of life is essential for a child's physical growth and cognitive development. (Permatasari et al., 2024). Breastmilk contains all the nutrients babies need, as well as antibodies that help protect them from infection (Nuradhiani, 2020). According to the World Health Organization (WHO), exclusive breastfeeding for the first six months of life can reduce the risk of stunting and improve children's long-term health (WHO, 2023).

Exclusive breastfeeding may contribute to a better nutritional status and reduce the incidence of stunting. Researchers also assumed that other factors, such as parental education and access to health services, may influence breastfeeding and complementary feeding practices. However, this study did not explore these factors in depth, which may be a limitation in the analysis. Based on the results of this study, it is recommended that the Puskesmas of Yosomulyo enhance its education and counseling program for parents on the importance of exclusive breastfeeding and appropriate complementary feeding practices. This program could include training for health workers to provide accurate information and support parents in breastfeeding practices. Additionally, there is a need to collaborate with the community to create an environment that supports exclusive breastfeeding, including providing social support and access to necessary resources. With these measures, the stunting rate in the region can be significantly reduced.

Effect of complementary feeding

The results showed that toddlers who were given appropriate complementary foods experienced lower stunting, with only 19 toddlers affected, compared to 58 toddlers who were not stunted. In contrast, toddlers who did not receive appropriate complementary foods showed a higher stunting rate of 26. These findings confirm the importance of providing appropriate complementary feeding to prevent childhood stunting. This research aligns with previous studies, which have shown that appropriate complementary feeding significantly contributes to children's growth and development (El-Asheer et al., 2021). Recent research has found that children who receive nutritious complementary foods have a lower risk of stunting compared to those who do not (Onyango et al., 2014). This shows consistency in the results of studies that show a positive relationship between appropriate complementary feeding and children's nutritional status (Demirel Ozbek et al., 2025). Basic Nutrition Theory states that adequate nutritional intake during the early stages of life is crucial for a child's growth and development (Tanaka, 2017). According to this theory, appropriate complementary foods not only meet energy needs but also provide the necessary vitamins and minerals to support optimal growth and development. Inappropriate complementary feeding can lead to malnutrition, which contributes to the incidence of stunting (WHO, 2016).

Other factors that may affect children's nutritional status, such as maternal health conditions and socioeconomic environment, were considered and did not significantly affect the results. Based on the findings of this study, it is recommended that the Puskesmas of Yosomulyo should increase its education and counseling program for parents on the importance of appropriate complementary feeding. This program could include training on the types of nutritious foods and how to serve them, as well as the importance of timing complementary feeding appropriately. In addition, collaboration with health institutions and community organizations can help increase parents' awareness and knowledge about child nutrition, thereby reducing stunting rates in the area.

CONCLUSION

This study demonstrates a statistically significant association between exclusive breastfeeding, appropriate complementary feeding practices, and the incidence of stunting among

toddlers. The findings highlight that toddlers who received exclusive breastfeeding and timely, nutritionally adequate complementary foods exhibited a lower risk of stunting compared to those who did not.

These results highlight the crucial importance of optimal infant feeding practices in preventing stunting and promoting healthy growth and development. In light of these findings, it is imperative to enhance public health initiatives by implementing targeted educational programs for parents and caregivers that emphasize the benefits of exclusive breastfeeding and the importance of appropriate complementary feeding. Such interventions are crucial for effectively reducing stunting prevalence and improving child health outcomes at the community level.

AUTHOR'S DECLARATION

Authors' contributions and responsibilities

YY: Conceptualization, Visualization, Funding Acquisition; **SL:** Writing original draft; **YA:** Supervision (lead), validation (equal), review and editing; **RA:** Supporting original draft, formal analysis; **NRY:** Visualization (equal), editing.

Availability of data and materials

All data are available from the authors.

Competing interests

The authors declare no competing interest.

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