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Stunting sebagai Faktor Risiko Maloklusi Gigi pada Anak Berusia 34-59 Bulan

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ABSTRACT

The impacts of stunting are not only reflected in reduced height but can also lead to diminished learning abilities and cognitive development, as well as an increased risk of chronic diseases later in life. This study aimed to analyze the relationship between stunting and the risk of dental malocclusion in Pidie District. This study used a cross-sectional design and conducted in 10 health care centres in Pidie district. A total of 108 children was selected as a sample using an accidental sampling method. Data analysis was carried out in bivariate and multivariate analysis using Chi-square and logistic regression tests. This research found that 24,07% of children aged 34-59 months in Pidie were stunting. The stunted children have a risk of 1086,48 times higher to experience malocclusion than non-stunted children after controlling variables mother and father occlusion. As conclusion, stunting affects the occurrence of malocclusion. Therefore, comprehensive education about malocclusion issues and it impacts is required.
Keywords: stunting; dental malocclusion; cross-sectional study; child health

INTRODUCTION

According to data from UNICEF, in 2020, more than 149 million children worldwide experienced stunting, which accounts for 22% of the global under-five population.[1–4] Although this figure reflects a decrease from 26.7% in 2010, the prevalence of stunting remains high, particularly in developing countries, where approximately 54% of children under five face this issue.[5–8] In Indonesia, stunting prevalence is also a serious concern, with the latest data indicating a rate of 21.6% in 2022, a significant decrease from 27.6% in 2019. However, the government aims to reduce this figure to 14% by 2024. The main causes of stunting in Indonesia include maternal malnutrition during pregnancy and the first two years of a child's life, poor sanitation leading to recurrent infections, and early marriage, which increases the risk of giving birth to nutritionally at-risk children.[9,10] The impacts of stunting are not only reflected in reduced height but can also lead to diminished learning abilities and cognitive development, as well as an increased risk of chronic diseases later in life.[11]

The prevalence of stunting in Aceh remains high, with the latest data from RISKESDAS 2021 indicating rates between 24% and 29% for toddlers, while the national average in Indonesia is 24.4%(12–15). Several districts, such as Aceh Tengah and Pidie, report stunting rates above 20%, highlighting the urgent need for serious attention to this issue. Stunting negatively impacts children's physical and cognitive growth, particularly during the first 1,000 days of life, when approximately 80% of cases occur in children under the age of 2.[12,16,17] Despite various programs launched by the government and non-governmental organizations to improve nutrition and access to healthcare, challenges such as poverty and low educational levels continue to hinder efforts to reduce stunting in Aceh. Stunting is a health issue rooted in malnutrition, leading to shorter heights in children compared to their peers.[12,13] This condition arises during pregnancy and becomes evident by the age of 2, resulting in a broader range of dental issues. These issues not only include dental caries but can also affect the timing of tooth eruption. Delayed tooth eruption and suboptimal jaw development can lead to misaligned teeth, commonly referred to as malocclusion.[16] The negative impacts of malocclusion are linked to quality of life related to oral health, including impaired chewing function, difficulties in speech, periodontal diseases, and temporomandibular joint (TMJ) disorders.[16,17] Additional psychological effects associated with malocclusion include decreased self-esteem, particularly in individuals with crowded anterior teeth or Class III malocclusion. Stunted children often experience delays in physical growth and development, which can further affect their quality of life. Stunting influences jaw development and dental health, increasing the likelihood of malocclusion. The repercussions of malocclusion can significantly impact a child's overall quality of life. Therefore, the aim of this study is to analyze the relationship between stunting and the occurrence of dental malocclusion in children aged 13 to 14 years in Pidie Regency.

METHODS

This study was a descriptive-analytical with a cross-sectional design, aimed at examining the relationship between risk factors and outcomes, specifically the effect of stunting on malocclusion. This method involves the simultaneous collection of data to measure both dependent and independent variables. The research was conducted at 10 community health centers (puskesmas) that have dentists, namely Puskesmas Grong-Grong, Batee, Indrajaya, Pidie, Peukan Baro, Mutiara Timur, Tangse, Simpang Tiga, Tanjong, and Geumpang, to ensure that the necessary examinations could be carried out.

The study utilized both primary and secondary data collection methods. Primary data were obtained through examinations, observations, and direct interviews with respondents using standard dental examination tools and questionnaires, involving 15 enumerators consisting of 5 dentists and 10 nutritionist nurses. The

measured variables included children's dental occlusion, parental dental occlusion, congenital defects, harmful habits, abnormalities in the number and shape of teeth, and conditions such as missing teeth, delayed eruption, and caries. Meanwhile, secondary data were sourced from the 10 puskesmas in Pidie Regency, including diagnoses of stunting in children and profile data from the Health Office, with the stunting variable analyzed through the child health book (KIA).

Data analysis in this study was conducted using descriptive, bivariate, and multivariate approaches. In the descriptive analysis, the basic characteristics of the population were explored for each variable separately. Next, the bivariate analysis employed the Chi-Square test to evaluate the relationship between stunting and malocclusion, identifying whether children who experience stunting have a higher risk of malocclusion. Finally, the multivariate analysis utilized logistic regression to control for other variables, such as parental occlusion conditions, in order to obtain a more accurate estimate of the impact of stunting on the risk of malocclusion.

This research was conducted in compliance with all ethical principles of health research, such as informed consent, maintaining the confidentiality of personal information, not harming respondents and so on.

RESULTS

The study was conducted in Pidie Regency, one of the regencies in Aceh Province, Indonesia. The administrative center of this regency is located in Sigli, and it is the second most populous regency in Aceh after North Aceh. The total area is 3,087 km², with a population of 443,718 people. There are 23 sub-districts and 730 villages (gampong) in Pidie. Pidie Regency is served by 26 community health centers (Puskesmas), 70 auxiliary Puskesmas, 79 village health posts (Poskesdes), 764 integrated healthcare posts (Posyandu), and 79 village midwife posts (Polindes). The healthcare workforce includes 4 obstetric specialists, 2 specialists in internal medicine, 2 pediatric specialists, 2 ophthalmologists, 2 ENT specialists, 2 psychiatrists, 3 neurologists, 1 orthopedic specialist, 2 surgeons, 1 urologist, 1 clinical pathology specialist, 1 radiologist, 76 general practitioners, and 10 dentists.

Table 1. Distribution of gender per community health center

Community health center	Gender	
	Male	Female
Puskesmas Batee	3	8
Puskesmas Geumpang	5	4
Puskesmas Grong-Grong	4	7
Puskesmas Indra Jaya	7	4
Puskesmas Mutiara Timur	8	3
Puskesmas Peukan Baro	6	5
Puskesmas Pidie	1	10
Puskesmas Simpang Tiga	6	5
Puskesmas Tanjong	6	5
Puskesmas Tangse	4	7
Total	50	58

Table 2. Distributin of nutritional status based on community health center

Community health center	Nutritional status	
	No stunting	Stunting
Puskesmas Batee	9	2
Puskesmas Geumpang	7	2
Puskesmas Grong-Grong	11	0
Puskesmas Indra Jaya	7	4
Puskesmas Mutiara Timur	9	2
Puskesmas Peukan Baro	10	1
Puskesmas Pidie	9	2
Puskesmas Simpang Tiga	7	4
Puskesmas Tanjong	7	4
Puskesmas Tangse	6	5
Total	82	26

Based on Table 1, it shows that the proportion of female respondents is higher than that of male respondents. Among the 10 health centers, the highest number of male children is found at Mutiara Timur health center, while the lowest is at Pidie health center. Conversely, the highest number of female children is at Pidie health center, with the lowest number at Mutiara Timur health center.

Table 2 presents data on the nutritional status of children across several health centers in Pidie Regency, focusing on the comparison between children who are not stunted and those who are stunted. Out of a total of 108 children examined, 82 children (approximately 76%) were not stunted, while 26 children (approximately 24%) were stunted. Each health center had the same total number of children, which is 11, except for Geumpang health center, which had a total of 9. Grong-Grong health center showed the best results, with no children experiencing stunting. Conversely, Tangse health center had a higher proportion of stunting, with 5 out of 11 children affected, reflecting significant challenges in nutritional status in that area.

Table 3. Distribution of children's dental occlusion

Variable	Category	Frequency	Percentage
Child dental occlusion	Normal	71	65.74
	Malocclusion	37	34.26
Father’s dental occlusion	Normal	91	84.26
	Malocclusion	17	15.74
Mother’s dental occlusion	Normal	83	76.85
	Malocclusion	25	23.15
Congenital defects	None	108	100.00
Bad habits	None	104	96.30
	Present	4	3.70
Number and shape abnormalities	None	107	99.07
	Present	1	0.93
Tooth loss	None	107	99.07
	Present	1	0.93
Delayed tooth growth	Normal	99	91.67
	Delayed	9	8.33
Caries	None	10	9.26
	Present	98	90.74

Table 3 presents data on the dental health of children, fathers, and mothers, as well as other health conditions. Among the 108 children studied, 71 children (65.74%) had normal dental occlusion, while 37 children (34.26%) experienced malocclusion, indicating that about one-third of the children require more attention regarding their dental health. In contrast, 91 fathers (84.26%) and 83 mothers (76.85%) had normal dental occlusion, suggesting that occlusion issues are more common among children. No children were diagnosed with congenital defects, and only 4 children (3.70%) exhibited poor habits. Additionally, 107 children (99.07%) did not have abnormalities in the number and shape of their teeth, nor did they have missing teeth. However, 9 children (8.33%) experienced delayed tooth eruption, while a significant issue was found in dental health, with 98 children (90.74%) suffering from caries. This data highlights the need for further intervention and education regarding dental health and good oral hygiene practices.

The bivariate analysis revealed that only four variables were associated with children's dental occlusion: stunting, paternal occlusion, maternal occlusion, and poor habits. In contrast, variables such as congenital defects, abnormalities in the number and shape of teeth, missing teeth, delayed tooth eruption, and caries did not show any relationship with children's dental occlusion, and therefore, that data is not presented (Table 4).

Table 4. The relationship between stunting and dental occlusion in children

Risk factor	Category	Occlusion in children				OR (95%CI)	p-value
		Normal occlusion		Malocclusion			
		Frequency	Percentage	Frequency	Percentage		
Stunting	No stunting	68	82.93	14	17.07	-	0001
	Stunting	3	11.54	23	88.46	37.24 (9.81-141.30)	
Father's occlusion	Normal	68	74,73	23	25.27	-	0.0001
	Maloklusi	3	17,65	14	84.35	13.79(3.63-52.35)	
Mother's occlusion	Normal	61	73.49	22	26.51	-	0.003
	Maloklusi	10	40	15	60	4.15 (1.62-10.61)	
Bad habits	None	70	67.31	34	32.69	-	0.12
	Present	1	25	3	75	6.17 (0.61-61.60)	

The proportion of children with normal occlusion among those who are stunted is 11.54% (3 children), which is significantly lower compared to 82.93% (68 children) among non-stunted or normal children. Conversely, the percentage of children experiencing malocclusion among those who are stunted is 88.46% (23 children), which is much higher than the 17.07% (16 children) among non-stunted children. The odds ratio of 37.24 indicates that stunted children are 37 times more likely to experience malocclusion compared to their non-stunted peers. Statistical analysis yielded a p-value of 0.001, demonstrating a significant relationship between stunting and the occurrence of malocclusion in children (Table 4).

The category of children with normal occlusion whose fathers have malocclusion is 17.65% (3 children), which is lower compared to those with fathers who have normal occlusion, at 74.73% (68 children). Meanwhile, the percentage of children experiencing malocclusion with fathers who have normal occlusion is 25.27% (23 children), which is lower than the percentage of children with malocclusion whose fathers also have malocclusion, at 84.35% (14 children). The odds of 13.79 indicate that fathers with malocclusion are 13 times more likely to have children with malocclusion compared to fathers with normal occlusion, with a p-value of 0.001 (Table 4).

The percentage of children with normal occlusion whose mothers have normal occlusion is 73.49% (61 children), which is higher compared to mothers with malocclusion at 40% (10 children). Meanwhile, the percentage of children with malocclusion whose mothers have normal occlusion is 26.51% (22 children), which is lower compared to mothers with malocclusion at 60% (15 children). The odds ratio of 4.15 indicates that mothers with malocclusion are four times more likely to have children who will experience malocclusion compared to mothers with normal occlusion. Statistical analysis yielded a p-value of 0.003, indicating that there is a relationship between maternal occlusion and the occurrence of malocclusion in children (Table 4).

The percentage of children with normal occlusion who do not have bad habits is 67.31% (70 children), which is higher compared to those with bad habits at 25% (1 child). Meanwhile, the percentage of children with malocclusion who do not have bad habits is 32.69% (34 children), which is lower compared to those with bad habits at 75% (3 children). The odds of 6.17 indicate that children with bad habits are 6 times more likely to experience malocclusion compared to those without bad habits. Based on statistical analysis, the P Value is 0.12, indicating that there is no significant relationship between bad habits and the occurrence of malocclusion in children Table 4).

Table 5. The relationship between stunting and malocclusion in children while controlling for genetic factors

Dental occlusion in children	OR	95% CI	p-value
Stunting	1086.48	62.01 - 19035.83	0.0001
Father's occlusion	53.17	5.026.21 - 562.5267	0.0001
Mother's occlusion	51.78	3.803.50 - 705.0344	0.0003

Pseudo R^2 =0.699

Table 6. Relationship between stunting and malocclusion in children while controlling for behavioral factors

Dental occlusion in children	OR	95% CI	p-value
Stunting	46.69	11.96 - 182.23	0.0001
Bad habits	18.27	1.74 – 191.844	0.015

Pseudo R2 =0.37

In this multivariate analysis (Table 5), the father's and mother's occlusion were grouped as genetic factors, while the variable for poor habits was categorized as behavioral factors. Based on the pseudo-R^2, a value of 0.69 was obtained, meaning that 69% of the variability in children's dental occlusion can be explained by the variables of stunting, father's occlusion, and mother's occlusion. The study also indicated that stunted children have a risk of malocclusion that is 1,086.48 times (62.01-19,035.83) greater than that of non-stunted children, after

controlling for the occlusion of the father and mother. Based on the pseudo R^2 value, a value of 0.37 was obtained, indicating that 37% of the variability in children's dental occlusion can be explained by the variables of stunting and bad habits. The results also show that stunted children have a risk of malocclusion that is 46.69 times (11.96-182.23) greater compared to children who are not stunted, after controlling for bad habits.

DISCUSSION

The results of the study reveal that the odds ratio of 37.24 indicates that children experiencing stunting have a 37 times greater risk of developing malocclusion compared to children who are not stunted. Statistical analysis shows a p-value of 0.001, which indicates a significant relationship between stunting and the occurrence of malocclusion in children. These findings support the researcher's assumption that stunted children, who experience developmental delays, are also likely to encounter delays in jaw development, contributing to the occurrence of malocclusion. From the observations, only 11.54% (3 children) of stunted children had normal occlusion, a figure that is significantly lower compared to 82.93% (68 children) of those who are not stunted. Conversely, 88.46% (23 children) of stunted children experienced malocclusion, while only 17.07% (16 children) of non-stunted children faced the same condition.

An observational analytical study conducted in Gedong Tataan District, Pesawaran Regency, revealed that 56.7% of children in the area suffer from stunting, which is an indicator of chronic malnutrition and can have long-term impacts on children's health(18). Among the children experiencing stunting, 73.3% also exhibit malocclusion, characterized by crowded teeth that can affect chewing function and facial aesthetics. Another study adds that poor nutritional status contributes to suboptimal jaw growth, resulting in limited space for teeth and triggering malocclusion(19). This condition highlights the close relationship between malnutrition and dental health, as well as the importance of early intervention to prevent broader negative impacts on children's health and development. Nutritional deficiencies have a direct impact on the development of the jawbone and dental structure, where a balanced diet is crucial for supporting jaw maturity and the strength of tooth enamel and dentin(20). When nutritional intake is insufficient, jaw growth can be impeded, leading to inadequate space for tooth eruption, which in turn can cause various orthodontic problems.

Research also indicates that children with a history of stunting are more likely to have specific types of malocclusion, such as Angle Class I, with significant prevalence, underscoring that poor nutritional status affects not only physical growth but also overall dental health(19,21). To prevent stunting and malocclusion in children, several important steps are recommended. First, exclusive breastfeeding for the first six months of life is crucial, as it provides optimal nutrition and antibodies that enhance the child's immune system, significantly reducing health risks(22). Second, regular monitoring of child development through community health posts (posyandu) is essential for early detection of nutritional and health issues, allowing for timely interventions (Kementerian Kesehatan RI, 2020). Third, after six months, introducing nutritious complementary foods that are rich in animal protein is vital, as these foods support healthy jaw and dental development, thereby reducing the risk of malocclusion(15). Lastly, the routine consumption of iron supplementation for children, especially those at risk of anemia, can improve overall nutritional status, as anemia can adversely affect physical growth and cognitive development(14). By implementing these preventive measures, the prevalence of stunting and malocclusion can be reduced, promoting better health and quality of life for children in the future.

CONCLUSION

The conclusions drawn from this study indicate a noteworthy correlation between stunting and the prevalence of malocclusion in children. The statistical analysis reveals that this association is highly significant, suggesting that the relationship is unlikely to be coincidental. The data illustrates a robust connection, indicating that children who experience stunting are considerably more susceptible to developing malocclusion compared to their peers who are not affected by stunting. Moreover, even when accounting for parental factors related to occlusion, stunting continues to pose a significant risk for malocclusion. This underscores the profound implications of chronic malnutrition on children's dental health. The findings highlight that children suffering from stunting face a markedly elevated risk of malocclusion, which raises concerns about their overall well-being. These results stress the critical need for early monitoring and intervention strategies aimed at addressing stunting. Such measures are essential not only for supporting the physical growth of children but also for preventing dental health complications that could adversely impact their quality of life in the long term.

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