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A Review of Stunting Growth in Children: Relationship to the Incidence of Dental Caries and its Handling in Children

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ABSTRACT

Introduction: Nutritional problems that may arise due to the low quality of food consumed is called stunting on children. Stunting describes the inadequacy of body heigh according to its age due to malnutrition or chronic malnutrition. Stunting is often not known in the society where the treatment of such issue is very general thus considered as normal. Stunting also affects oral health of children.

Objective: To review the relationship of dental and oral condition with the incidence of stunting on children.

Methods: Scientific evidence and clinical cases are drawn from the literature to support this review and gather scientific information about the relationship of teeth to the incidence of stunting in children.

Results: There are several relationships of dental or oral conditions in children with the incidence of stunting experienced. Some of them are related to the incidence of dental caries in children, delayed eruption of permanent teeth, and have an influence on the flow rate of saliva in children.

Conclusion: The incidence of stunting in children is a condition that describes the lack of nutritional status that has a chronic nature during the growth and development of children since the beginning of life. Scientific studies from several literatures prove that there are some relationships between the incidence of stunting in children with the state of oral health of children.

Keywords: Stunting, Dental caries, Delayed eruption, Saliva flow rate

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INTRODUCTION

A healthy paradigm is a mindset, perspective, or health development model that views health issues as interrelated and influences many factors that are cross sectoral with efforts more directed at improving, maintaining, and protecting health, not only in efforts to cure disease but also in health recovery efforts. Nutritional problems that can arise as a result of the low quality of food consumed is stunting in children. Stunting describes the lack of height according to age caused by chronic or chronic malnutrition. The prevalence of stunting in Indonesia is highest in Southeast Asia and is included in the category of the top five countries in the world. [1]

Data on the prevalence of stunting children collected by the World Health Organization (WHO) released in 2018 said that Indonesia was among the 3rd countries with the highest prevalence in the South-East Asian Region after Timor Leste (50.5%) and India (38.4%), namely 36.4% and the prevalence of stunting in Indonesia is still above 20%.[2]

Stunting is often not recognized in societies where short stature is so common that it is considered normal. Difficulties in visually identifying children are stunted and the lack of routine assessment of linear growth in primary health care services. Stunting is also the core of six global nutrition targets for 2025 adopted by the World Health Assembly in 2012 (WHO 2012), and has been proposed as a leading indicator for the post-2015 development agenda. The increased international attention is the result of greater awareness of the importance of stunting as a major public health problem.[3]

Stunting at an early age increases infant and child mortality, causes sufferers to get sick easily and has a posture that is not maximal as an adult. The impact of stunting in the long run affects the cognitive development, learning ability to productivity in adulthood. Stunting also causes a decrease in the immune system and increases the risk of infectious diseases. The tendency to suffer from non-communicable diseases such as high blood pressure, cardiovascular disease, diabetes, obesity and heart failure will be higher when stunting children become adults.[4]

MATERIALS AND STUDY METHOD

Scientific evidence and clinical cases were taken from the literature to support information about the relationship of teeth with the incidence of stunting in children. The literature review was carried out by searching for all articles published about the relationship of dental conditions with the incidence of stunting in children. On April 17th 2020, a literature search was carried out using the following keywords: "Stunting in children, oral health and stunting, caries and stunting, oral health and malnutrition in children." The following databases were searched: PubMed and GoogleScholar.

DISCUSSION

Definition of Stunting

Stunting or failure to grow is a condition that describes underweight nutritional status that has a chronic nature during the growth and development of children since the beginning of life is presented with a height z-score according to age less than minus two standard deviations based on WHO growth standards. Stunting can be seen since the child is two years old. Stunting is a condition caused by unbalanced nutritional intake during the golden period, not caused by growth hormone abnormalities or as a result of certain diseases.[2]

Stunting is identified by assessing the length or height of a child and interpreting the measurement by comparing it with a series of acceptable standard values. There is international agreement that children are hampered if the length/height is below -2 SD from the median of the WHO Child Growth Standards for the same age and sex. Likewise, children are considered to be severely under height if their length/height is below -3 SD from the median WHO Child Growth Standards for the same age and sex.[3]

Epidemiology of Stunting

Globally 161 million children under five are stunted in 2013. In 2015, Africa had the highest stunted prevalence at 37.6%, followed by Asia at 22.9%. among children under five years old was 40%. In the Amhara National Regional State, Ethiopia, stunting and thinness were reported at 40%, 10%, and 33% respectively.[5]

The highest stunting prevalence in ASEAN in 2012 was Laos (48%), Cambodia (40%), and Indonesia (36%). The prevalence of stunting in Indonesia is still quite high during the last decade. The average prevalence of stunting under five in Indonesia in 2005-2017 was 36.4%.[3.1] In 2018 the prevalence of stunting and severely stunting in Indonesia decreased to 30.8% and Aceh became the 3rd highest province.[4]

Data on the prevalence of stunting children under five years old collected by the World Health Organization released in 2018 said that Indonesia was among the third countries with the highest prevalence in the South-East Asian Region after Timor Leste (50.5%) and India (38.4%) as much as 36.4% (Data and Information Center of the Ministry of Health, 2018). The prevalence of stunting in Indonesia is still above 20%.[2]

Factors that Cause Stunting

According to the UNICEF Framework there are 3 main factors causing stunting, unbalanced food intake, LBW (Low Birth Weight) and a history of disease. Supporting factors for stunting in Indonesia are low household socioeconomic status, non-exclusive breastfeeding, premature birth and parental education. Low parenting also causes poor nutritional status of children under five years old. Poor parenting in this regard is an indicator of feeding practice.[6]

The practice of feeding is related to the quality of food consumption which will ultimately increase the adequacy of nutrients.[7] The level of nutrient adequacy is one of the factors that can affect the nutritional status of children under five years old.[8] The second main cause of stunting is low birth weight. LBW is interpreted as a baby born weighing less than 2,500 grams regardless of the period of pregnancy.[9]

LBW is related to mortality, fetal mobility, neonatal, growth disturbance, cognitive developmental disorders and chronic diseases in future life.[10] Babies with LBW in developing countries are more likely to experience intrauterine growth retardation due to maternal nutritional status and an increased infection rate when compared with developed countries.[9,10] The nutritional status of mothers before and during pregnancy is one of the causes of LBW. [10]

1. The Relationship of Teeth with Stunting in Children

No.	Authors and Titles	Year	Conclusion and Results
1.	Linh Ngo Khanh, et al.[11] Early Childhood Caries,Mouth Pain,and Nutritional Threats in Vietnam. Journal: American Journal of Public Health, December 2015, Vol 105, No. 12	2015	Results: There was a high prevalence of dental caries (74.4%), mostly untreated, and mouth pain (47.1%). A moderate correlation was found between the consumption of soda from parents and children (q = 0.361; P <0.001) and salty snacks (q = 0.292; P <0.001). The severity of ECC was associated with a decrease in body weight z score and body mass index for age. The presence of caries involved in the pulp was associated with very low height (mean difference = 0.66; P = 0.001), weight (mean difference = 1.17; P <0.001), and body mass index based on age (mean difference = 1.18; P <.001) z-score. Mouth pain was associated with lower body mass indexes for age (mean difference = 0.29; P = 0.013). Conclusion: ECC might negatively impact the nutritional status of children, which may be mediated by the depth of caries, chronic inflammation, and oral pain. Family nutrition and prevention oriented and oral health programs are needed and must be started during pregnancy and the baby.
2.	Taupiek Rahman, Rosihan Adhani, Triawanti.[12] Relationship Between Short Nutrition Status	2016	Results: Based on the results of the caries index study in the group of stunting nutrition children 8.23, higher than the normal nutrition group of children 3.3. Chi-Square statistical test analysis with 95% confidence level showed the value of p = 0,000 (p <0.05) ie there was a significant difference between the dental caries index in children

	(Stunting) With Dental Caries Level Dentino Journal in Dentistry Vol I. No 1. March, 2016		with stunting nutritional status and children with normal nutritional status. Conclusion: Based on the results of this study it can be concluded that there is a relationship between short nutritional status (stunting) with the level of dental caries in kindergarten students in Kertak Hanyar Subdistrict, Banjar Regency.
3.	Jed Dimaisip-Nabuab, et al.[13] Nutritional status, dental caries and tooth eruption in children: a longitudinal study in Cambodia, Indonesia and Lao PDR Journal: BMC Pediatrics (2018) 18:300	2018	Results: Data on 1499 children (mean age at baseline = 6.7 years) were analyzed. Significant rates of dental caries and odontogenic infections in primary teeth were highest in underweight children, also in stunted children, and lowest in overweight children. Dental caries in children aged six to seven years was also significantly associated with an increased likelihood of underweight and is inhibited 2 years later. This relationship was not found consistently for dental caries and odontogenic infections in permanent teeth. Less weight and stunting were significantly associated with a lower number of erupted permanent teeth in children aged six to seven years and 2 years later. Conclusion: Stunting is associated with dental caries and delayed eruption of permanent teeth in children from Cambodia, Indonesia and Laos. The findings indicate that oral health can play an important role in the general growth and development of children.
4.	Margaret Wandera, Josephine Kayondo,Ingunn Marie S. Engebretsen, Isaac Okullo & Anne Nordrehaug Åstrøm.[14] Factors associated with caregivers' perception of children's health and oral health status: a study of 6- to 36-month-olds in Uganda Journal: *International Journal of Paediatric Dentistry 2009*	2009	Results: Poor children's oral health was reported by 40.2% and 17.5% of caregivers who reported their respective health, bad and good. Having the least amount of family wealth [odds ratio (OR) = 1.9] and reporting depressed family conditions (OR = 2.3) was associated with a higher chance of reporting poor children's oral health, while being rural residents (OR = 0.4) and reported no symptoms during tooth eruption (OR = 0.3) were associated with lower odds. Poor children's oral health perception (OR = 2.8) and had the lowest family wealth (OR = 1.7) was associated with a higher chance of reporting a child's poor health status, whereas no stunting was associated with a lower chance (OR = 0.5). Consistent with the effect of the gradient of family resources on various developmental and health outcomes, this study showed that wealth and poor stunting were the strongest predictors of parental responses to a child's overall health condition. Conclusion: The results support the growing recognition of oral health as a predictor of health and well-being in childhood.
5.	Walter J. Psoter, D.D.S., Ph.D, et al.[15] Effect of childhood malnutrition on salivary flow and pH. Journal : Arch Oral Biol. 2009 March 1.; 53(3): 231–237.	2009	Results: Stimulated and unstimulated salivary flow rates decreased to a statistically significant level in subjects who experienced severe malnutrition in their childhood such as stunting or who continued to experience nutritional stress resulting in delayed growth, measured at ages 11-19 years. Salivary pH showed little clinically significant variability between the malnutrition and nonmalnutrition groups. Conclusion: This study is the first to report a sustained effect on reduced salivary gland function in adolescence as a result of early childhood malnutrition (EC-PEM) and shows that the exocrine gland system can be compromised for a long period after EC-PEM, which may have important implications for systemic antimicrobial defense of the body.

Based on research results included in the scientific literature above showed that there was a relationship between the state of teeth and the incidence of stunting in children.[11,12,13,14,15] This finding is consistent with the generally accepted principle that underweight in children is associated with malnutrition in their mothers and with undernourished children before 2 years of age, whereas underweight children are associated with undernourished children at any age, including after 2 years of age. [16,17]

The same thing also shown in this study, that it also discussed the relationship between stunting in children and the presence of dental caries. Dental caries can occur due to four internal factors that influence each other namely teeth and saliva as host, microorganisms, substrate, and time.[18] New caries can occur if all four factors are present and interact with each other.[12,19]

Which stated that in malnourished children the development of salivary glands is atrophy thus salivary

secretion is reduced and causes salivary function as a buffer, cleanser, anti-solvent, and antibacterial are also reduced.[20,21,22] In the third study by Jed Dimaisip-Nabuab, et al in 2018, it also showed an association of dental conditions with the incidence of stunting in children.[13] This study states that there is a relationship between nutritional status and the number of erupted permanent teeth. Impaired tooth development and underweight or stunted growth have the same risk factors.[23,24]

For example, nutritional deficiencies, including energy-protein malnutrition, can interfere with tooth development through similar mechanisms that affect physical development.[13] There is evidence that malnutrition during the vulnerable developmental stages of the tooth, especially during the early years of children, can cause enamel hypoplasia, thus the teeth are more susceptible to demineralization and dental caries.[13,24,25]

In the fourth study by Margaret Wandera, Josephine Kayondo, Ingunn Marie S. Engebretsen, Isaac Okullo & Anne Nordrehaug Åstrøm in 2009.[14] This study is one of the studies that investigated the influence of socio-demographic, clinical, and non-clinical oral health indicators on children's health perception and oral health status, taking into account the relationship between the determinant factors related.[14,26,27]

And in the last study by Walter J. Psoter, DDS, Ph.D, et al in 2009.[15] Different from some previous studies, in this study, the writer described the relationship between salivary flow rate and the incidence of stunting in children. Longitudinal study findings suggest that stimulated and unstimulated salivary flow decreased in malnourished children generally consistent with previous reports that were limited to animal and human studies.[15,28,29]

The confounding effect observed on the current stunting coefficient when these variables are entered and excluded from the model shows that the most conservative interpretation of these findings is that chronic postnatal malnutrition begins in early childhood, is correlated with decreased salivary flow to adolescence, namely from birth until the age of 19 years.[30,31]

Figure 1: Comparison of Height on Normal Children with Stunted Children (Source: Google)

Figure 2: Late Eruption of Teeth and Dental Caries in Stunted Children (Source: Google)

HANDLING OF STUNTING IN ITS RELATIONSHIP WITH DENTAL HEALTH

Strengthening of dental and oral health services was carried out to maintain and improve the degree of public health in the form of improving dental health, dental disease, treatment and restoration of dental health by the central government, regional governments, and the community which were carried out in an integrated and sustainable manner.[32,33] The relevant health policy holder must guarantee the availability of health personnel, service facilities, dental and oral health equipment and medicines in the framework of providing safe, quality and affordable dental and oral health services to the public.[34,35]

World Health Organization (WHO) in 2003 made a reference to the Global Goals for Oral Health 2020, which is to minimize the impact of oral and craniofacial diseases by

emphasizing promotive efforts and reducing the impact of systemic diseases that manifest in the oral cavity with early diagnosis, prevention and effective management of systemic diseases.[36,37]

Oral health programs in general need to be further improved and target oral health in early childhood by developing effective strategies to promote programs to prevent the occurrence of children's tooth decay from the start by taking into account the risk factors that occur.[38] It is necessary to consider the form of prevention efforts carried out through integrated cooperation between the fields of dental health, general health, the field of early childhood education, and involving community participation.[39]

Health workers who handle basic care must be familiarized with preventive measures for children before they need dental care, which is detecting early signs of dental caries and providing appropriate education that can be carried out independently.[40] Dentists must be able to provide preventative care and effective treatment methods at the clinic. Then we can promote dental and oral health into a clean and healthy lifestyle behavior.

Conduct education on the importance of regular dental and mouth care by dental health workers. This can be done both individually and to the society.[39,40,41] To provide understanding to parents so that they can find out about improper consumption behavior patterns like the consumption of bottled milk, the addition of sugar to milk, the consumption of sweet foods with a frequency of two or more times, the habit of picking up food, which is the cause of the high risk of early caries in children.[42,43,44,45]

CONCLUSION

There is a relationship between the incidence of stunting in children with the oral health conditions of children including caries incidence rate, delay in eruption of permanent teeth, and affect the rate of salivary flow. Stunting in children and dental health conditions are interrelated.

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