



## Description of Eruption of Permanent Lower Central Incisors in Stunted Children at Koto Balingka West Pasaman Elementary School

Intan B. E. Mahata,<sup>1,2</sup> Sri P. Utami,<sup>3,4</sup> Athifa Trisa<sup>5</sup>

<sup>1</sup>Department of Preventive and Public Health Dentistry, Faculty of Dentistry, Universitas Baiturrahmah, Padang, Indonesia

<sup>2</sup>Department of Public Health, Medical Faculty, Universitas Andalas, Padang, Indonesia

<sup>3</sup>Department of Pediatric Dentistry, Faculty of Dentistry, Universitas Baiturrahmah, Padang, Indonesia

<sup>4</sup>Dentistry Doctoral Education – S3 By Research, Universitas Hasanuddin, Makassar, Indonesia

<sup>5</sup>Faculty of Dentistry, Universitas Baiturrahmah, Padang, Indonesia

E-mail: [panduutamidrg@yahoo.co.id](mailto:panduutamidrg@yahoo.co.id)

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**Abstract:** Stunting is a linear growth disorder that is not appropriate for the child's age due to malnutrition. Malnutrition in stunted children can affect bone growth. The process of inhibited bone growth will affect the process of maturation of the periodontal bones that support the teeth being hampered so that children can experience delays in tooth eruption. This study aimed to describe the eruption of the permanent lower central incisors in stunted children at *Sekolah Dasar* (elementary school) Koto Balingka West Pasaman. This was a quantitative-descriptive-observational study with a case control design. Samples obtained by using purposive sampling technique were 68 children consisting of 34 (50%) stunted children and 34 (50%) normal children aged 6-7 years in the working area of the Parit Koto Balingka Health Center. Univariate analysis was presented in the form of frequency and percentage distributions. The results showed that among stunted children, 22 (64.7%) had not erupted permanent lower central incisors meanwhile 12 (35.3%) children did. Moreover, among normal children, 6 (17.6%) had not erupted permanent lower central incisors meanwhile 28 (82.4%) did. In conclusion, most children aged 6-7 years with stunting have not yet had erupted permanent lower central incisors, meanwhile most children with normal nutritional status have erupted permanent lower central incisors, with a mean age of eruption at 7 years.

**Keywords:** stunting; tooth eruption; permanent lower central incisor; malnutrition

## INTRODUCTION

Stunting is a problem of chronic malnutrition caused by insufficient nutritional intake for a long time due to the provision of food that is not in accordance with nutritional needs.<sup>1</sup> Stunting causes growth failure, so that, the children look shorter compared to others of their age.<sup>2</sup> Measurement indicators that can be used to identify children stunting are based on the index height for child's age according to the standard deviation of the World Health Organization Child Growth Standard with stunting criteria if Z score Height/Age value  $< -2$  Standard Deviation (SD).<sup>3</sup>

Growth in stunted children due to inadequate nutrition can affect the pattern of growth and development of tooth eruption. These disturbances can cause delayed process of tooth eruption.<sup>4</sup> According Jasmine et al,<sup>5</sup> there were more stunted children who had not yet had an eruption compared to those who have had an eruption, namely (66.7%). Children with stunting are 4.6 times more at risk of having a delayed eruption of permanent teeth compared to normal children. Tooth eruption is defined as a process of tooth movement from its place of formation in the alveolar bone to the direction of the occlusal plane in the oral cavity. Furthermore, tooth eruption can be used to estimate a child's age, to assess dental maturation and dental age clinically.<sup>6</sup>

Many factors influence tooth eruption, one of which is nutrition. In children with stunting, malnutrition can cause bone growth to slow down or hampered. Tooth eruption is closely related to bone growth. The process of tooth eruption involves the maturation process and the ability of the periodontal bone to support the existence of the tooth.<sup>7</sup> Adequate intake of nutrients is needed during the early period of growth and development. The growth and development of teeth and mouth are influenced by nutrients both systemically and locally. In the early stages, tooth growth is influenced by a number of nutrients, namely calcium, phosphorus, fluorine, and vitamins on diets.<sup>8</sup> During the tooth formation phase, these nutrients are important factors that must be present because they will later affect the occurrence of the tooth eruption phase. Lack of calcium and phosphorus can affect the growth and development of bone in the teeth.<sup>9</sup>

Based on data from the Health Office of West Pasaman District, there were 5,246 cases of stunted children in 2022. The working area of *Pusat Kesehatan Masyarakat* (Puskesmas) Parit Koto Balingka (Public Health Center) has the highest stunting incidence in West Pasaman Regency, and is the locus of stunting handling in West Pasaman Regency which has 760 stunted children. Based on the results of health screening data for elementary school students 2021/2022 academic year, there were 67 cases of stunted children and in the 2022/2023 school year there were 37 cases of stunted children aged 6-7 years in three elementary schools (SD) in the working area of the Parit Koto Health Center Balingka. The age range of 6-7 years was chosen because at that age the permanent teeth, namely the permanent lower central incisors, erupted for the first time.

Based on the background, it can be formulated that the purpose of this study is to obtain the description of the eruption of the permanent lower central incisors in stunted children at *Sekolah Dasar* (Elementary School) Koto Balingka West Pasaman.

## METHODS

This was a descriptive, observational, and quantitative study with a case control design. Samples were stunted and normal children aged 6-7 years in the working area of *Pusat Kesehatan Masyarakat* (Puskesmas) Parit Koto Balingka (Public Health Center) who met the inclusion and exclusion criteria. Samples were obtained by using the purposive technique method. Based on the Lemeshow's formula (1991), the samples consisted of 34 children, and their parents had to fill the informed consent containing an explanation about the study. The eruption status of the permanent lower central incisors in stunted and normal children was evaluated by using a mouth mirror.

The statistical analysis was carried out to determine the characteristics of each variable. Data were presented in the frequency distribution table to describe the eruption of the permanent lower central incisors in stunted and normal children.

**RESULTS**

Samples were 68 elementary school students of grade 1 consisting of stunted children and normal children aged 6-7 years in the working area of Puskesmas Parit Koto Balingka. Table 1 showed that based on sex, the highest percentage was found in male stunted samples, namely 20 children (58.8%), and normal male samples, namely 19 children (55.9%), while the fewest samples were stunted females, namely 14 children (41.2%).

**Table 1.** Sample characteristics based on gender

Nutritional status	Gender				Total	
	Male		Female		f	%
	f	%	f	%		
Normal	19	55,9	15	44,1	34	100.0
Stunting	20	58,8	14	41,2	34	100.0
Total	39	57,4	29	42,6	68	100.0

Table 2 showed that based on age, normal children aged 7 years were the largest group, namely 19 children (55.9%), while stunted children aged 6 years and 7 years had the same number, namely 17 children (50.0%).

**Table 2.** Sample characteristics based on age

Nutritional status	Age (years)				Total	
	6		7		f	%
	F	%	f	%		
Normal	15	44,1	19	55,9	34	100.0
Stunting	17	50.0	17	50.0	34	100.0
Total	32	47,1	36	52,9	68	100.0

Table 3 showed that most children with stunting had not yet had permanent lower central incisor eruption, namely 22 (64.7%) children, while most children with normal nutritional status had permanent lower central incisor eruption, namely 28 (82, 4%) children.

**Table 3.** Distribution of permanent lower central incisor eruption frequency

Nutritional status	Tooth eruption status				Total	
	No eruption yet		Erupted		f	%
	f	%	f	%		
Normal	6	17,6	28	82,4	34	100.0
Stunt	22	64,7	12	35,3	34	100.0
Total	28	41,2	40	58,8	68	100.0

Table 4 showed that children with normal nutritional status and stunted males were the largest numbers who had experienced permanent lower central incisor eruption, namely 17 (60.7%) children with normal nutritional status, and eight (66.7%) children on stunted children.

**Table 4.** Frequency distribution of dental eruption based on gender

Nutritional status	Sex				Total	
	Male		Female		f	%
	f	%	f	%		
Normal	17	60.7%	11	39.3%	28	100.0
Stunt	8	66.7%	4	33.3%	12	100.0
Total	25	62.5%	15	37.5%	40	100.0

Table 5 showed that children with stunting aged 6 years were the largest number that had not yet had permanent lower central incisor eruption, namely 13 (59.1%) children, while the least number of children who had not yet had central incisor eruption was children with normal nutritional status aged 7 years, namely two (33.3%) children.

**Table 5.** Frequency distribution of nutritional status based on age of not having permanent lower central incisor eruption

Nutritional status	Age				Total	
	6		7			
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Normal	4	66,7	2	33,3	6	100.0
Stunting	13	59,1	9	40,9	22	100.0
Total	17	60,7	11	39,3	28	100.0

Table 6 showed that children with normal nutritional status aged 7 years was the largest number experiencing permanent lower central incisor eruption, namely 17 (60.7%) children, while children with stunting status aged 6 years were the least number experiencing permanent lower central incisor eruption namely four (33.3%) children.

**Table 6.** Frequency distribution of nutritional status based on eruption age

Nutritional status	Age				Total	
	6		7			
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Normal	11	39,3	17	60,7	28	100.0
Stunting	4	33,3	8	66,7	12	100.0
Total	15	37.5	25	62.5	40	100.0

Table 7 showed that normal children and stunted children experienced the eruption of the permanent lower central incisors at the age of 7 years.

**Table 7.** The mean eruption age of permanent lower central incisors

Nutritional status	Average age of eruption	
	<i>f</i>	%
Normal	7	50.0
Stunting	7	50.0
Total	14	100.0

## DISCUSSION

The results showed that stunting was more frequent in male children (58.8%) than in females (41.2%). This is in line with the research of Mugianti et al<sup>10</sup> propounding that male sex had a greater risk of experiencing stunting because in the first year of life males were more susceptible to malnutrition than females. It might be due to that male's body size is bigger and requires more energy intake as well. Therefore, when nutritional intake is not adequate in the long term it will result in growth disturbances. From-metabolic aspect, muscle is more active comparing to fat, so muscle needs more energy than fat. Thus, men and women with the same height and age need different amount of energy and nutrition.<sup>14</sup>

In this study, it was found that most stunted children had not experienced the eruption of permanent lower central incisors (64.7%), while most children with normal nutritional status had experienced the eruption of permanent lower central incisors, namely 28 (82.4%) children. This result was in line with the research of Jasmine et al<sup>5</sup> who stated that more children with stunting

status had not experienced tooth eruption than children with normal nutritional status. In general, stunted children have a negative impact on the growth and development of teeth due to lack of nutrient intake. A tooth is said to be erupted if it has begun to emerge from the alveolar bone reaching the incisal or occlusal plane until a full crown appear, otherwise a tooth is said to have not erupted if it has not yet appeared on the surface of the oral cavity.<sup>11</sup>

Children with stunting status aged 6 years was the largest number who had not yet had the eruption of the permanent lower central incisors (59.1%), while children with normal nutritional status aged 7 years was the largest number who had experienced eruption of permanent lower central incisors (60.7%). Normal children and stunted children experienced the eruption of the permanent lower central incisors at the age of 7 years. This is in line with the research of Lantu et al<sup>8</sup> who stated that good nutrition was needed to support the growth and development of teeth. The growth and development of teeth and mouth are influenced by age, but they are also influenced by nutritional, genetic, and socioeconomic statuses. It is estimated that children with middle to upper socioeconomic status get sufficient nutritional intake which makes their nutritional status in the good (normal) category, so that the tooth growth is in accordance with the proper tooth eruption time, namely in the age range of 6-7 years. Kartika et al<sup>12</sup> stated that children with normal nutritional status on average had experienced the eruption of their permanent lower central incisors at the appropriate age. This is due to children with normal nutritional status obtain essential nutrients such as calcium, phosphorus, flour, protein, carbohydrates and vitamins in sufficient quantities, so that the tooth growth and development can be much better than the stunted children who have a lasting impact on biological function, hard tissues, soft tissues, and salivary glands, resulting in delayed permanent lower central incisor eruption which is the first permanent tooth to erupt.

Research by Jasmine et al<sup>5</sup> stated that stunted children had a 6.9 times chance of experiencing a delay in the eruption of permanent teeth. In children with stunting status, their permanent teeth grow and develop slower than in children with normal nutritional status. Delayed tooth eruption is a form of eruption abnormality involving one or only a few teeth.<sup>13</sup> Lateness of tooth eruption can happen locally or comprehensively. Locally delayed eruption can be caused by existing trauma, tooth abnormality, or systemic diseases, whereas late overall eruption can be caused by interference of endocrine disorders, or inadequate nutrition such as stunting.

Stunting that occurred in this study is caused by low parental economic status (most parents' job were farmers) and inadequate sanitation. The Koto Balingka area is included in the five big pre-prosperous family groups.<sup>15</sup> Education and old age also effect the nutritional status of children since parents with low education usually does not get adequate information about how to take care of their children, to maintain the children's health, and to provide good consumption patterns for the children as well as are lack of understanding about the pattern of growth and development of children's teeth. High-educated parents can educate their children about better eating habits, so their children's eating behavior will be well formed. The family economic status, especially the income, also influences the working condition of the parents, the condition of the family's residence, and the fulfillment of basic needs, one of which is food. Lack of family ability to provide nutritious and adequate food can lead to lack of nutritional intake in children resulting in vulnerability to stunting.

## **CONCLUSION**

Most stunted children in Koto Balingka West Pasaman have not had erupted permanent lower central incisors, whereas most children with normal nutritional status have had erupted permanent lower central incisors, with an average eruption age of 7 years.

Promotive and preventive efforts since pregnancy regarding stunting and maintaining dental and oral health as early as possible in children have to be implemented. Health workers also need to instill the importance of family involvement in child care patterns and daily health behavior,

and improving the nutritional status of stunted children needs to be in synergy with regular dental and oral care. Schools can improve the School Health Program (*Usaha Kesehatan Sekolah/UKS*), School Dental Health Program (*Usaha Kesehatan Gigi Sekolah/UKGS*), and form *kader dokter gigi cilik* (cadre of little dentists), therefore, they can work together in improving the nutritional status as well as dental and oral health of children at school. For future researchers, it is expected that they will carry out further research on stunting children in a larger population and samples as well as in different and easy-to-reach research locations, as a result, the research conducted can be more efficient in order to obtain more varied research information.

### Conflict of Interest

The authors declare no conflict of interest in this study.

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