

The Prevalence and Estimate of Treatment Need for First Permanent Molar of 6-12 Years Old Children

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ABSTRACT

The M1 tooth is the first tooth to erupt at the age of 6-7 years which becomes a guide for the growth of other permanent teeth. Early eruption, tooth anatomy, poor child behavior and lack of parental knowledge make M1 teeth most at risk of caries. The prevalence of M1 dental caries in children aged 6-12 years is the number of people who experience caries in one population. This study to determine the prevalence and estimated need for M1 care for children aged 6-12 years at AlFalah Islamic Elementary School, Bukittinggi City. This study use cross sectional research design . The number of samples was 431 (total population). Data collection was through direct observation (examination) using the DMFT index and guided interviews with a questionnaire. Data analysis used *the chisquare test* , α : (0.05) and *the mean-Whitney test*. The prevalence of M1 caries in children aged 6-12 years was 45% with a mean DMFT of 0.85. Mark *The p value for gender*, age group and brushing frequency is $0.04 < 0.05$, meaning that there are differences in the prevalence of M1 caries based on gender, age group and frequency of brushing teeth regarding M1 dental caries. To estimate the need for restoration treatment for M1 teeth, the *p value for gender* is $0.02 < 0.05$, meaning there is a difference in the need for M1 caries restoration for women and men, the *p value for age group* is $0.3 > 0.05$, meaning there is no difference in need for restoration. M1 dental caries in children aged 6-9 and 10-12. The high prevalence of M1 caries occurs due to several interconnected factors. The prevalence of M1 caries in children aged 6-12 years reaches 45% with the average child having experience of 1 M1 tooth caries and the need for 1 M1 tooth filling. This must be a concern as a form of contribution to realizing a caries-free Indonesia by 2030.

Keywords -- M1 caries, prevalence , estimation , age 6-12 years

INTRODUCTION

Dental caries is a disorder of the oral cavity that causes the role and function of the teeth to not function normally, and can cause complaints of pain, which will have an impact on the productivity of the human body (Syafriani, 2019). Dental caries is one of the most common chronic diseases suffered by people throughout the world and individuals are susceptible to this disease throughout their lives. According to WHO, dental and oral diseases affected 3.5 billion people worldwide in 2013 (Organization, n.d.). Meanwhile, according to 2018 Riskesdas data, the percentage of people experiencing dental and oral health problems is 57.6%. Then data on the prevalence of caries in the 12 year age group is 72% with an average DMF-T of 1.9, which means that each child has 1-2 teeth with caries (RI, 2018). This condition will certainly affect children's learning concentration at school and also their appetite, thereby affecting nutritional status and disrupting children's physical growth, which in the long term will have an impact on people's quality of life (Handayatun, 2022).

The first molar tooth is the first permanent tooth to erupt at around 6-7 years of age which is most at risk of developing caries (Wulandari, Ninis Yekti, Tiara Fahriliyandi Putri, Vicka

Amalia, 2019). Because the eruption period is the main challenge in the development of caries due to limitations in mechanical function, it becomes a facility for the accumulation of dental biofilm on the surface of newly erupted teeth (Maciulskiene, Vita, Jaune Razmiene, Vilija Andruskeviciene, 2020). The first molar function is for chewing and also crushing food due to its many curves and wide chewing surface (Wulandari, Ninis Yekti, Tiara Fahriliyandi Putri, Vicka Amalia, 2019). These teeth grow behind the milk molars, and their growth is often not noticed (Handayatun, 2022). Permanent first molar teeth are susceptible to caries due to morphological and functional characteristics combined with environmental factors, such as regular consumption of cariogenic foods and poor parental perceptions of teeth and mouth, especially regarding the age of tooth development in children (Pitts, NB, Zero, DT, Marsh, 2017). The anatomical shape of the tooth with deep pits and fissures on the occlusal surface and a large crown is very good for the accumulation and development of plaque which causes the tooth to be at great risk of developing caries (Al Samadani, Khalid H.M, 2012). Then, with an earlier eruption time and difficulty in cleaning because it is in the rearmost position, there are several factors that cause first molar teeth to have the highest prevalence of caries among other permanent teeth (Edi, Imam Sarwo, Abdatur Rohmah, 2021). Losing the first molar tooth too early has a serious impact because this tooth is a guide for the growth of the next tooth. Apart from that, the loss of the first molar tooth can also result in malocclusion because the permanent molar tooth has the largest crown and root compared to other permanent teeth, so that if this tooth is lost the second permanent molar tooth can shift and fill the place of the first molar (Hidayat, Marlianti, Etty SM Asnar, 2022). Maintaining the health of first molar teeth is a very important thing to do because if these teeth are affected by caries and result in their extraction, it will create new risks such as changes in tooth position, affecting tooth occlusion, jaw joints and also the mastication process which has an impact on the absorption of food (Islamia, Puja, IG. A Kusuma Astuti N.P, 2022).

The role and low understanding of parents regarding the age of growth of milk and permanent teeth is one of the causes of dental caries problems in children (Risviani, Daisy, Arum Setiawan, 2021). Parents often do not realize that at the age of 6-7 years there are already permanent teeth erupting, namely the first molars. Some parents believe that permanent first molars are milk teeth which will have replacement teeth after being removed. So when first molar teeth experience caries, this is often ignored (Risviani, Daisy, Arum Setiawan, 2021). This will be the basis for forming a child's behavior in the habit of carrying out proper dental care. Parents should teach and train children to care for their own teeth because at this age children have reached motor maturity followed by intellectual development (Prasatiya, Rian Agung, I.G.A Kusuma Astuti. N.P, 2022).

The risk of caries increases due to changes in dietary patterns that tend towards cariogenic foods. Children more often consume sweet and sticky foods, such as candy, chocolate, ice cream,

donuts and other types of food. Cariogenic foods that are consumed easily stick to the teeth and can be fermented by bacteria to become acidic, causing the oral pH to remain below normal (Lestari, Ni Wayan Ayu Dewi, 2018). This means that the teeth will be at risk of enamel demineralization and of course as age increases and the length of time they are exposed to cariogenic foods causes the risk of caries in permanent first molars to increase. Caries does not occur in days or weeks, but in months or (Lestari, Ni Wayan Ayu Dewi, 2018).

Then, one of the predisposing factors that has quite an influence on the occurrence of dental caries is tooth brushing behavior. Where brushing teeth is the most important primary preventive measure recommended to remove food residue stuck to the surface of the teeth (Edi, Imam Sarwo, Abdatur Rohmah, 2021). According to 2018 Riskesdas data, the percentage of the population aged 10-14 years who brush their teeth every day is 96.5% and only 2.1% of them brush their teeth at the right time (RI, 2018). This means that children aged 10-14 years are accustomed to brushing their teeth regularly every day, but only a few of them brush their teeth at the right time (Kementerian Kesehatan RI, 2018). Objective study This is for know prevalence and estimated need for M1 care for children aged 6-12 years at AlFalah Islamic Elementary School, Bukittinggi City .

METHOD

The research design used was *cross sectional* . The sample size in this study was 431 children (the entire population). The research was carried out at Al Falah Islamic Elementary School, Bukittinggi City. First molar caries data was collected by direct observation (examination) using the DMFT index. Respondent characteristics data was collected through guided interviews with a questionnaire. The research was carried out by 12 enumerators, who had previously carried out a calibration test to obtain the level of conformity between the enumerators. The tools and materials used in the examination are a diagnostic set, nier bekken, 70% alcohol, mineral water, dry tissue, handscoon and DMF-T examination format. For data analysis used for numerical categorical data and normally distributed data, *the t test (independent sample t-test)* is used. If the data is not normally distributed then *the Mann Whitney test is used* and if the data is categorical then *the chisquare test is used* with $\alpha: 0.05$.

RESULTS AND DISCUSSIONS

Respondent Characteristics

The research was conducted on 431 elementary school children at Al Falah Islamic Elementary School, Bukittinggi City, consisting of 229 boys and 202 girls. Respondents' ages ranged from 6-12 years. The results showed that the prevalence of First Molar caries in elementary

school children was 45%. With the frequency of brushing teeth, 35% of children brush their teeth once a day and 65% brush their teeth $\geq$ twice a day.

Relationship between gender, age group and frequency of tooth brushing on the incidence of M1 dental caries

The prevalence of M1 dental caries in elementary school children based on sociodemographics, namely gender, age group and frequency of brushing teeth, is shown in Table1.

Table 1. Frequency Distribution of Caries in Permanent First Molar Teeth in Children Aged 6-12 Years

	N (%)	Caries	No Caries	$\bar{X}$	P
Gender					
Man	229 (53)	104 (41)	125 (59)	0.77	0.04
Woman	202 (47)	92 (50)	110 (50)	0.93	
Age group					
6-9	244 (57)	111 (42)	133 (58)	0.78	0.04
10-12	187 (43)	85 (50)	102 (50)	0.93	
Tooth Brushing Frequency / Day					
1x	149 (35)	68 (52)	81 (48)	0.97	0.04
$\geq 2x$	282 (65)	128 (42)	154 (58)	0.78	

Statistical Test (Chi Square) $\alpha < (0.05)$

Table 1 provides information that the prevalence of M1 caries in girls is higher than in boys, namely 50%:41%, with a mean DMFT for girls of 0.93 and boys of 0.77. This means that every girl and boy has 1 tooth experiencing caries on M1. These results are proven by *statistical tests (chisquare)* $p : (0.04) < \alpha : (0.05)$. Meanwhile, based on age group, the prevalence of M1 caries in children aged 10-12 years is higher than children aged 6-9 years (50%:42%), with an average DMFT aged 10-12 years 0.93 and aged 6-9 years 0.78. This means that every child aged 6-12 years has had 1 tooth experience of caries on M1. Then, based on the frequency of brushing teeth, the prevalence of M1 caries in children who brush their teeth 1 x is higher than children who brush their teeth twice a day, namely 52%:42%, with the average DMFT of children who brush their teeth once a day being 0.97 and those who brush their teeth twice a day. 0.78.

Estimation of Restoration Needs in First Molar Caries

The estimated need for M1 tooth restoration treatment in elementary school children based on gender and age group is shown in table 2.

Table 2. Estimated Need for Restoration Treatment (RTI) on M1

	N	D (RTI)		P
		Prevalence	$\bar{x}$	
Gender				
Man	209	100 (44)	0.7 ± 1.05	0.02
Woman	229	89 (44)	0.9 ± 1.07	
Age group				
6-9 years		107 (44)	0.7 ± 1.06	0.3
10-12 years		82 (44)	0.8 ± 1.08	

Mann Whitney test

Table 2 provides information that school age children have a caries prevalence of 45% with an average of 1 M1 tooth experiencing caries indicating a filling. This means that, based on gender or age group, every child has the same care needs, namely restoration/filling needs. The results of the Mann Whitney test show that there is a difference in the mean Decayed (D) in the First Permanent Molar between girls and boys $\alpha (0.02) < 0.05$. Meanwhile, based on age group, there was no significant difference.

The prevalence of M1 caries in children aged 6-12 years is 45% with a mean DMFT of 0.85. This means that each person who has 1 tooth experiences caries on the M1 tooth, which is dominated by the Decayed component, namely 0.80, meaning that every child aged 6-12 has had 1 (one) M1 tooth indicated to be filled due to caries. In other words, the research results show that children aged 6-12 years currently need restoration treatment on M1 teeth because they already have caries. Several other countries in the world also show figures similar to the results of this study, one of which is research in 2022 in China showing the prevalence of M1 caries, namely 47.6% with an average DMFT of 1.1 (Liu, Mingshan, Xiaoqin Xu, Qianqian Song, Hongmei Zhang, Fang Zhang, 2022).

One of the reasons for the high prevalence of M1 dental caries in school-aged children is the age at which teeth develop. In fact, the prevalence of M1 caries is quite high for children aged 6-9 years. As is known, the 1st molar erupts at the age of 6-7 years, this means that the newly erupted M1 tooth is already at risk of developing caries. This tooth is referred to as *the key of occlusion*, because the permanent first molar tooth is stable, malposition is rare, the largest tooth and is the first erupting tooth that does not replace the position of the primary tooth (Wahyuni, 2018). The eruption of permanent first molars plays an important role in facial coordination and provides sufficient occlusive support so that the masticatory system is not compromised (Almujadi, 2017). Apart from that, the permanent first molar also determines or guides the growth of other permanent teeth that have not yet erupted (Listrianah, R.A Zainur, 2018).

Teeth erupt earlier than other permanent molars, so these teeth interact more often with factors that cause dental caries (Sriani, Yustina, Aljufri, Normasari, 2018). The anatomical shape of teeth which have deep pits and fissures will make it easier for food debris to enter, which is very good for the accumulation and development of plaque so that the risk of caries increases (Al Samadani, Khalid H.M, 2012). Apart from the anatomy of the teeth, the position of the teeth in the oral cavity also influences the incidence of caries in M1. Permanent first molars are posterior teeth which are located at the back and when brushing your teeth, this area will be difficult for the bristles to reach effectively so that food remains will remain on the surface of the teeth and have a high potential for caries (Nulhakim, Asep Ridwan, Cahyo Nugroho, 2022).

The health of M1 teeth must also be a concern because the incidence of caries in M1 teeth, especially mandibular M1 teeth, is the tooth that has the highest prevalence of extractions and

is mostly caused by caries (Setianingsih, Nindya Putri, Rr. Megananda Hiranya Putri, Yenni Hendriani Praptiwi, 2020). So that M1 teeth with indications for fillings must be treated immediately because if they continue to be ignored, the process of caries formation will continue, increasing in size and depth and the risk of extraction will be greater (Listrianah, R.A Zainur, 2018). It should be noted that loss of the M1 tooth due to caries which requires early extraction can result in the surrounding permanent teeth slowly moving towards the space of the missing tooth, and ultimately worsening the normal occlusion of the teeth. So if the occlusion of a child's teeth is disturbed, there will also be interference with the chewing function so that this will have an impact on the child's nutritional intake in the future (Wijaya Muhammad Fajrin, Sari Aldilawati, 2022).

The incidence of M1 dental caries in children is also caused by children's lack of knowledge and behavior regarding dental and oral health. Children generally do not know how to maintain oral hygiene and what factors threaten oral health, so most children have poor oral hygiene. This is also reinforced by children's diets which tend to consume cariogenic foods, such as chocolate, wafers, ice cream and other types of sweet foods. The sugar content in cariogenic foods will be easily fermented by bacteria into acid. If acid production increases, the pH in the oral cavity will automatically remain below normal. And if this is left unchecked, the teeth will continue to experience enamel demineralization and in the long term will experience caries. So, with children's freedom to consume food and the large number of snacks available at school, the various types of sweet foods and drinks really threaten children's dental health.

Apart from that, brushing your teeth is also one of the factors that influences M1 dental caries. Based on the results of research conducted, 65% of children brush their teeth twice a day, but there are still many of them who experience caries on M1 teeth. When conducting direct interviews, most of them stated that they brushed their teeth twice a day, namely in the morning when taking a shower and at night before going to bed. This means that the high prevalence of caries in children is not caused by the frequency of brushing their teeth, but because the timing of brushing their teeth is not correct. Brushing your teeth should be done at least twice a day, namely in the morning after breakfast and at night before bed. Brushing your teeth after breakfast aims to clean food residue on the surface of the teeth and prevent plaque formation and brushing your teeth at night before bed to prevent interaction of bacteria with food residue that is still attached as a result of decreased saliva production during sleep so that it cannot clean the oral cavity naturally (Aprinta, I Kadek Pendi, Mia Ayustina Prasetya, 2018). So, children must be given a good understanding of brushing their teeth, be it frequency, time or good and correct brushing techniques.

Then, in maintaining oral health in school-aged children, the role of parents is very necessary. This is because generally they still depend on their parents and parents have an obligation to look after their children's health. Education regarding dental and oral health must be

introduced to children as early as possible so that they can know how to maintain healthy teeth and mouth properly and correctly. (Arsad, Sultan Amir Yasin, 2022). Good parental understanding of dental and oral health will also have an impact on children's behavior in maintaining healthy teeth and mouth. Parents must understand the age at which teeth grow, including M1 teeth. Because parents think that M1 teeth are milk teeth which will have replacement teeth after being removed. So when first molar teeth experience caries, this is often ignored (Risviani, Daisy, Arum Setiawan, 2021).

M1 caries occurs due to several interconnected causal factors. An earlier age of eruption, the deep shape of the pit and fissure of the M1 tooth are the initial factors in the occurrence of caries in this tooth. The risk of caries will increase due to changes in the eating patterns of school-age children who tend towards cariogenic foods, so that the oral cavity has the potential to always be in an acidic state. Apart from that, parents' lack of knowledge regarding dental and oral health will have an impact on children's lack of knowledge and behavior regarding dental and oral health, one of which is regarding the frequency and time of good and correct brushing. So, if these factors are ignored, children aged 6-12 years will be more susceptible to M1 tooth decay compared to missing ones. However, if teeth with decayed criteria do not receive immediate restoration treatment, it is possible that in the next few years the missing rate in school-aged children will be higher than the decayed rate.

CONCLUSION

The prevalence of M1 caries in children aged 6-12 reaches 45% with an average of each child having 1 tooth experience of caries on the M1 tooth. And on average each child needs filling of 1 M1 tooth due to caries. To realize a caries-free Indonesia by 2030, this situation must be of concern to both preventive dentistry experts, dental health workers and the government. Pit and fissure sealant application is an alternative to prevent increased caries on M1.

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