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Research Article

Dental caries surveys of first permanent molar teeth among 6-8 year-olds during the pandemic: cross-sectional study

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ABSTRACT

Introduction: A survey is necessary for annual screening and recording. Dental caries is one of the indicators in oral health surveys. Dental caries is the most common and prevalent chronic infectious disease among children. The most prevalent dental caries is in the child's first permanent molar. The first permanent tooth eruption in the oral cavity was the first molar of 6-year-old children. This study aims to determine dental caries in first permanent molars among children aged 6-8 years old during the pandemic in Cimahi City, West Java, Indonesia. **Methods:** The research method used was a cross sectional study with pathfinder surveys using basic oral health survey methods. Schoolchildren were invited to participate in this survey. The survey collected data through intraoral photos and questionnaires through an online form. The prevalence of dental caries was the percentage. After calculation, the data is presented in tables and graphs. **Results:** The result of this study on 98 children showed that the prevalence of dental caries was 96.93%. The caries index primary teeth (DMFT) mean was 7.86, and the caries index permanent teeth (DMFT) mean was 0.37. Dental caries of the first permanent molar teeth was at 19%. **Conclusions:** There is a high prevalence of dental caries in primary teeth and high categories of dental caries in primary teeth. The incidence of dental caries in the first permanent molars was 19%.

KEY WORDS: dental caries, first permanent molar, children

Survei karies gigi pada gigi molar permanen pertama pada anak usia 6-8 tahun selama pandemi: studi cross-sectional

ABSTRAK

Pendahuluan: *Survei diperlukan untuk penjaringan dan pencatatan yang digunakan setiap tahun. Salah satu indikator dalam survei kesehatan gigi dan mulut adalah karies gigi. Karies gigi adalah penyakit infeksi kronis yang paling umum dan umum terjadi pada anak-anak. Karies gigi yang paling banyak terjadi adalah gigi molar pertama permanen. Erupsi gigi permanen pertama di rongga mulut adalah gigi geraham pertama yang berumur 6 tahun. Penelitian ini bertujuan untuk mengetahui karies gigi pada gigi geraham pertama permanen pada anak usia 6-8 tahun pada masa pandemi di Kota Cimahi, Jawa Barat, Indonesia.* ***Metode:*** *Metode penelitian yang digunakan adalah cross sectional study dengan menggunakan pathfinder survey dengan metode dasar survey kesehatan gigi dan mulut. Kami mengundang anak-anak sekolah untuk berpartisipasi dalam survei ini. Survey dilakukan dengan mengumpulkan data melalui foto intra oral dan kuesioner dengan menggunakan sistem online yaitu google form. Prevalensi karies gigi dalam bentuk persentase dan disajikan dalam bentuk tabel dan grafik.* ***Hasil:*** *Sebanyak 98 anak menunjukkan prevalensi karies gigi sebesar 96,93%. Rerata indeks karies gigi sulung (dmft) adalah 7,86 dan rerata indeks karies gigi permanen (DMFT) adalah 0,37. Karies gigi gigi molar pertama permanen adalah 19%.* ***Simpulan:*** *Prevalensi karies gigi tinggi pada gigi sulung dan kategori karies gigi tinggi pada gigi sulung. Insiden karies gigi pada gigi molar pertama permanen adalah 19%.*

KATA KUNCI: *karies gigi, gigi molar satu permanen, anak-anak*

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INTRODUCTION

Recent years have shown high caries prevalence around the world, including in Indonesia. Oral health is also one of the factors that support the paradigm of a healthy body and is a national development strategy to realize that health development is important for socially and economically productive human resources; therefore everyone must have a high awareness of improving oral health.[1 2,3]

According to the World Health Organization (WHO), dental caries is the most highly prevalent disease globally and affects more than 90% of schoolchildren. Dental caries is a multifactorial disease, either directly or indirectly. Based on Basic Health Research (Riskesdas) of 2018 in Indonesia, the prevalence of dental caries in Indonesia was 88.8%. Meanwhile, based on the 5-year-old children is 90.2% and 72% for 12 years old.[4]

At the age of six, children's primary teeth begin to transform into permanent teeth. The molar is the first permanent tooth to erupt starting at age 6 . This molar is also called the First Permanent Molar (FPM).[5] Due to the anatomical structure and early eruption in the mouth, it is important to protect FPMs from caries. The FPM has an important role in establishing the occlusion. A lot of research has shown that there were dental caries in the FPMs. The prevalence of dental caries in FPM amongSudanese Children reached

61%. The FPM have been reported to be highly susceptible to caries attack.[6,7]

Dental caries is a chronic bacterial infectious disease destroying the tooth's hard tissues.[8,9] Among the risk factors in children, it was found that more than one hundred factors were significantly associated with dental caries, which can be grouped into demographic and dietary factors. Moreover, the factors related to various clinical, bacteriological, and physiological parameters have failed after being applied to different models for predicting caries. There are Streptococcus mutans and Lactobacilli bacteria, as well as bacteria that cannot increase the incidence of caries; however, the Sologic is not necessary due to the effectiveness of the cost. According to the statistics, the direct treatment of dental caries cost 298 billion rupiah, amounting to 4.6% of global health expenditures. The other factors can be found in the morphology of the teeth (deep pits and fissures).[10,11,12]

Dental caries is a dental oral disease with the highest prevalence in Indonesia, especially in the city of Cimahi, West Java. One of the sub districts in the city of Cimahi is Central Cimahi. Central Cimahi is an urban area. One of the first level health facilities in Central Cimahi is the community health center (Puskesmas) in Padasuka. According to the results of Puskesmas Padasuka report in 2019, dental caries and periodontal tissue were among the top ten diseases. In addition, the report shows that 60% of children aged three to five have caries[21], according to the Indonesian Ministry of Health through the UKGS program implemented by schools and health centers. The presence of the pandemic throughout the world, including Indonesia, has led to delays in routine surveys, which are conducted twice a year. Furthermore, school activities have become interrupted. At this time, the learning system has shifted to an online format. Therefore, the health survey was also conducted/completed online. The objective of this study is to determine the dental caries in the permanent molars of children aged 6-8 years during the pandemic.

METHODS

The research method used was a descriptive observational, with a cross-sectional research design. The population and sample in this study were students from the primary school in Cimahi City, West Java. There are 116 primary schools in the city of Cimahi. The selection of the school is done randomly using the random table. The inclusion criteria in this study were children aged 6-8 years, willing to participate in the research completely, having a gadget or mobile phone with a camera, parents or guardians accompanying the children. The exclusion criteria in this study were unerupted first permanent molars, parents or guardians and children who did not attend the study until the end. Samples were obtained according to the inclusion criteria through simple random sampling techniques. The research subjects were children aged 6-8 years in primary schools under the guidance of the Central Cimahi subdistrict. The first step of simple random sampling was knowing the number of elementary schools in the area of research and looking for a population of children aged 6-8 years at each of these elementary schools. The last step was randomly calculating and selecting the number of subjects based on the number of samples.

The sample size obtained is in accordance with the research method used, namely a cross-sectional analytic study through the proportion (prevalence) of the dependent variable. In this study, in order to determine the total number of diseases, or the prevalence of dental caries in children between the ages of six and seven in Cimahi City, we must know the number of diseases in the area. However, due to the low number of research in this area, we used a proportion of 0,5 to obtain the sample size.

The pandemic has limited children's school activities, resulting in an online oral dental examination. Researchers worked with the selected schools to collect data simultaneously. They provided an online guide called "GERAHAM ONLINE". Geraham was named for the movement of oral health reports. The parents or guardians had been guided before watching a YouTube video as a reference for taking photos of the teeth. The link to the YouTube video was https://www.youtube.com/watch?v=zb9vgedVVQc.[8] After the parents or guardians saw the guidelines, they filled out a questionnaire that included the results of their children's oral dental online examinations with the following link: http://bit.ly/2KbjBOV. The researchers then processed the results of the dental examination obtained by the parents/guardians, and measured the primary dental caries examination using the dmft index, which showed the average number of decayed primary teeth (decayed / d). Furthermore, the indications of extracted teeth (m), missing teeth or none caused by caries were observed. Thereafter, the categories of teeth that were filled (f) due to dental caries were divided based on the number of people who had the examination.

The DMFT index was used to determine the prevalence of dental caries in permanent teeth according to these following criteria: the Decayed (D)h indicated that the permanent teeth were damaged or teeth with caries;Missing (M) meant missing teeth due to caries (Missing/M); and Filled (F) described filled teeth due to caries.[10] To determine molar dental caries using Decayed (D) criteria from DMFT index, WHO has provided the following categories in the calculation of DMF-T and dmf-t as interval degrees: Very low: 0.0 - 1.1 2.; Low: 1.2 - 2.6 3.; Moderate: 2.7 - 4.4 ; High: 4.5 - 6.5.; Very High:> 6.6. To obtain the prevalence of dental caries , the summary (numbers) of the decay, missing, and filled teeth were divided by the number of people examined. Results of dental caries prevalence were

presented as percentage. Aftercalculation, the data was presented in tables and graphs. Research subjects had completed informed consent prior to conducting research and examinations listed on the Google Form. Data analysis by descriptive study was used to count percentage, mean of dental caries.

RESULTS

The results of the research conducted at Padasuka Mandiri 1 Primary School showed that there were 100 students in 1st Grade. The inclusion criteria for this study included 98 children aged 6 to 8 years. This research was conducted online due to the Covid-19 pandemic, and the implementation of the research was changed using the telesurvey method of oral examination photos.

Table 1. Respondents in this study consisted of the gender and age of 1st grade students in *Sekolah Dasar Negeri* Padasuka Mandiri I

Respondents	Total	%
Gender of children		
Boysi	41	41.8
Girls	57	58.2
Age (year)		
6	30	30.6
7	56	57.1
8	12	12.2

The results showed that most of the gender were boys;and the majority of ages in this study were 7 years old. The description of dental caries in children between the ages of 6 and 8 can be seen in Figure 1 below.

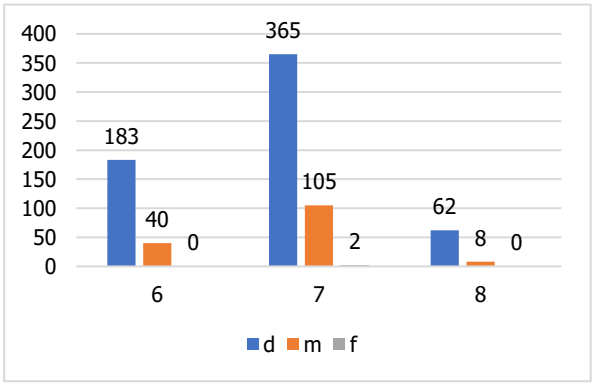

Figure 1. The description of decay (d) missing (m), filled (f) primary teeth of 1st grade students aged 6-8 years old in *Sekolah Dasar Negeri* Padasuka Mandiri I Kota Cimahi

Figure 1 showed that the caries of primary teeth was mostly found in children aged 7, with 365 caries teeth. Of the children aged 7, the missing or extracted teeth due to caries, and the time for eruption was 105 . The number of filled teeth due to caries was still very low, even almost nonexistent or zero (0), while there were two filled teeth found in 7-year-old children.

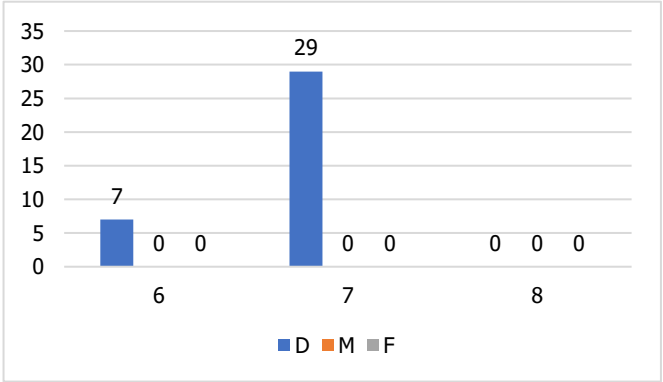

Figure 2. The illustration of *Decay (D) Missing (M), Filled* (F) in permanent teeth among 1st grade students aged 6-8 years old in *Sekolah Dasar Negeri* Padasuka Mandiri I Kota Cimahi. The missing and filling teeth in children aged 6-8 years indicate that most of the children's permanent teeth were affected by caries. The study showed that there were 29 teeth in children aged 7 who had dental caries.

Table 2. Caries index of 1st grade students aged 6-8 years old in *Sekolah Dasar Negeri* Padasuka Mandiri I Kota Cimahi

Caries index	Mean
d-t	6.22
m-t	1.56
f-t	0.02
dmft index (primary teeth)	7.86
D-t	0.13
M-t	0.37
F-t	0.08
DMFT index (permanent teeth)	0.37

Dental caries index is the mean of caries appearance, missing teeth due to caries, and filled teeth caused by dental caries. It is divided by the number of people examined. According to Table 2, the caries index for primary teeth (dmft index) was 7.86, which was in a very high category, according to WHO criteria (standards). The permanent dental caries index (DMFT index) in children aged 6-8 years 0.37, which was ranked as very low criteria.

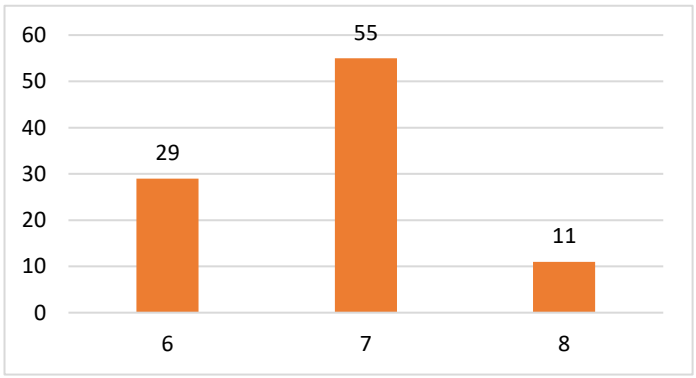

Figure 3. The illustration of dental caries among 1st grade students aged 6-8 years old in *Sekolah Dasar Negeri* Padasuka Mandiri I Kota Cimahi

Figure 3 of this study indicates that most of the students who have caries are 7 years old. There are 55 students who have missing teeth due to caries and have them filled. The calculation of the prevalence of caries is the number of children with dental caries (decay), teeth lost due to caries (missing), and teeth being filled because of caries (filled) divided by the number of children examined multiplied by 100%. The results of this study indicate that the prevalence of caries in this school is 96.93%. The caries features of the first permanent molars in children aged 6-8 years can be seen in the following Table 3.

Table 3. The description of dental caries and sound teeth among 1st grade students aged 6-8 years old in *Sekolah Dasar Negeri* Padasuka Mandiri I Kota Cimahi (n=98)

Age	Sound teeth (n)	%	One or more molars with caries (n)	%
6	23	29	7	37
7	44	56	12	63
8	12	15	0	0
Total	**79**	**81**	**19**	**19**

Dental caries can occur in a variety of teeth including the first permanent molars. Table 3 displays that 19% of children with their first permanent molars have dental caries. This study also reveals that 79% of children with their first permanent molars are free of dental caries and are in good health.

Table 4. The description of dental caries of first permanent teeth among children (n=98)

Age	One molar carious (n)	%	Two molar carious (n)	%	Three molar carious (n)	%	All molar carious (n)	%	Total (n)	%
6	7	23	0	0	0	0	0	0	30	100
7	6	11	3	5	0	0	3	5	56	100
8	0	0	0	0	0	0	0	0	12	100
Total	**13**	**13**	**3**	**3**	**0**	**0**	**3**	**3**	**98**	**100**

According to Table 4, first molar caries in children aged 6-8 years mostly occurred in one tooth, amounting to 13%. However, some children have caries in four permanent molars, both in the upper and lower jaws, left and right.

DISCUSSION

Dental caries is a disease caused by various risk and supporting factors (multifactorial). Dental caries can occur in the primary teeth, mixed teeth, and permanent teeth. The first permanent tooth that erupts in the oral cavity is called First Permanent Molar (FPM). The prevalence of dental caries in children has increased every year, including in Indonesia. Previous research conducted in rural and urban areas of Cimahi City aimed to describe the status of oral dental health of groups of children aged 5-6 years, 12 years, and 15-19 years. The results showed that caries in children aged 5-6 years was the highest prevalence in the city of Cimahi.[13]

The results showed that the incidence of caries in first permanent first molars was 19%. Even at the age of 6 years old, 23% of children had dental caries affecting their first permanent molars. This is different from previous studies, which revealed that the occurrence of caries in the first permanent molars was 50.4%.[9] This study showed that the healthy teeth in the first permanent molars were 79%. Other studies have shown that the incidence of caries in the first permanent molars in the group of children aged 9-12 is 75%, while the incidence with healthy molar teeth is 25%. A study conducted in Sudanese showed that 61% of children aged 6-14 years had dental caries in their first molars, while 39% were caries free.[1415,16.]

The low prevalence of caries in the molar teeth is assumed to be due to a good dental health service program. One of the dental health service programs carried out at the Puskesmas Padasuka is a regular dental health check up, and there is a dental health report at school by the Dental health school program.

The first permanent molars are most commonly affected by dental caries in Indian children. Previous study showed that 52% children had caries in their first permanent molars, and 48% were caries free in first permanent molars.[17] Another study showed that 51,2% patients had at least one carious tooth in permanent first molars.[18] This study shows caries activity continues throughout life and is not limited to anything, although the incidence decreases with increasing age.[15] This study proved that 63% of the occurrence of caries was mostly at the age of 7 years. These results indicate that with increasing age, the incidence of dental caries increases.

This study showed the incidence of caries in the first molar was 13%, and caries in two teeth and four teeth was 3%. This is similar to a study conducted in Saudi Arabia where there was 26% caries in the first permanent molars of one tooth.[14] The incidence of caries in the first permanent molar is still low. It is assumed that most children aged 6-8 years have experienced an eruption of these teeth. Apart from this, good behavior in maintaining oral dental health is another contributing factor. However, this requires further research.[15] Caries susceptibility of the first permanent molar can be related to early eruption, age, anatomical features, large crown size, and its posterior location in the mouth. The time between initial eruption and complete occlusion of a tooth is the most critical period for maintaining the health of FPM teeth; thus, the risk of developing caries is the highest at 6–9 years of age.[19]

Various studies in several countries have shown that high level of caries in the first permanent molars is partly due to the fissure pits on the occlusal surface of the teeth, so it is easy to accumulate bacteria on the tooth surface. Early prevention, such as fissure sealants, is necessary to prevent caries in molars. Using sealants and restorative materials is an effective strategy to increase tooth resistance to caries.[20]

First permanent molars are the first tooth to erupt in the oral cavity. The first permanent molar also served as a key to the occlusion of the maxilla and mandible. Although there have been attempts to do the prevention of dental caries in a sustainable manner, the prevalence of dental caries remains high. The occurrence of caries is caused by tooth morphology, eruption stage and position in the arch of the jaw where it is a disadvantage or advantage of controlling plaque bacteria as a cause of dental caries. Special care is required in case of damage to permanent molars, as this is very important both anatomically and in the occlusion of the maxilla and mandible. This research was conducted as a basis to describe the occurrence of caries in the first permanent molar, and the need to do preventive measures immediately. [5] Limitations in this study are the difficulty and completeness of taking photos during research.

CONCLUSION

A very high prevalence of caries are found in primary teeth of children aged 6-8 years. The caries index of primary teeth is in a very high category, while the permanent teeth is in a very low category. The incidence of dental caries in the first permanent molars was 19%. Based on this, it is necessary to increase promotional efforts as early as possible by intervening according to the characteristics of each child to prevent dental caries.

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