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Causes Of Firsy Molar Caries in Children Aged 7-10 Years

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ABSTRACT

Dental caries is a multifactorial disease that remains a major dental health problem in children. The first permanent molars (M1) play an important role in chewing and occlusion but are often affected by caries due to poor oral hygiene, cariogenic food consumption, and low parental knowledge and supervision. This study aims to identify the factors that contribute to caries in the first permanent molars of children aged 7–10 years, so that it can be used as a basis for planning programs to promote and prevent dental caries in children. This study is a descriptive observational study with a cross-sectional approach. The sample consisted of 83 children aged 7–10 years. Data were obtained through clinical caries examinations and pretest–posttest questionnaires to assess children's dental health knowledge levels. Descriptive analysis was performed to examine the frequency distribution of caries and sociodemographic factors. Most respondents were male (55.4%) and aged 9 years (39.8%). The majority of fathers worked as laborers (49.4%), and 81.9% of respondents lived within 1 km of dental health facilities. The results showed an increase in dental health knowledge from 55.4% to 68.7% after health education. The highest frequency of first molar caries was found at the age of 10 years (13 children) with an average def-t index of 4.29, indicating a fairly high level of caries. First molar caries in children is influenced by socioeconomic factors, dental hygiene behavior, and the duration of tooth exposure to the oral environment.

Keywords: Dental Caries; First Permanent Molars; School-Age Children; Risk Factors; Dental Health Promotion

Introduction

Dental caries is an infectious disease affected by multiple factors that cause complex health risks. Environmental influences, habits, and maintenance of oral hygiene are important factors in the formation of caries, in addition to carbohydrates, microorganisms, time, and teeth as hosts [1], [2].

The demineralization process begins actively at a pH of <5.5.1 In some countries, 90% of children aged 3–5 years already have caries in their primary teeth. WHO data (2016) shows that the incidence of caries in children is 60–90%. According to the 2018 Basic Health Research (Riskesdas), dental problems in children reached 93%, and the DMF-T index in 12-year-old children increased from 1.4 in 2013 to

1.9 in 2018. The high degree of damage and premature tooth loss in children is largely due to a lack of ability to maintain oral hygiene, and a lack of knowledge and parental involvement in monitoring children starting from infancy [3]. Parents often bring their children to the dentist when their teeth are already in a severe condition and cannot be treated [4]. Premature loss of the first permanent molar (M1) has serious consequences because M1 is the tooth with the largest crown and root compared to other molars and is also key to occlusion and a guide for the growth of other teeth [3]. The premature loss of M1 can also cause malocclusion because the second permanent molar may shift or tilt to fill the space left by M1. In addition to malocclusion, narrowing of the space

can occur because the second and third permanent molars can grow faster and occupy the space of the M1 tooth, so that there is no space for the premolars to grow, causing crowding or embedded teeth [5].

Previous studies have shown that dental caries in children is associated with oral hygiene status, dietary habits, parental knowledge, socioeconomic factors, and access to dental services [6], [7], [8], [9], [10]. In addition, first permanent molars are among the teeth most vulnerable to caries because of early eruption, complex causal anatomy, and prolonged exposure to the environment [3], [5], [11], [12]. As a result, the condition of the first permanent molars is often considered an important indicator of oral health status among school-aged children [3], [10].

Despite the large number of studies on dental caries in children, most have assessed overall caries experience using dmft/DMFT [3], [5], [10], [11]. Relatively few studies have focused specifically on first permanent molar caries during the mixed dentition period, particularly among Indonesian children aged 7-10 years. Information regarding the distribution of first permanent molar caries according to sociodemographic characteristics and oral health-related factors in this age group is also still limited.

Children aged 7–10 years represent a critical stage in dental development because the first permanent molars have recently erupted and are highly susceptible to caries. Understanding the occurrence of caries in these teeth is important for developing preventive strategies at an early stage. Therefore, this study was conducted to provide information on first permanent molar caries among Indonesian children aged 7–10 years and to describe its distribution according to sociodemographic characteristics and oral health-related factors. The findings are expected to support the development of more targeted oral health promotion and caries prevention programs for school-aged children.

The specific objective of this study was to describe the occurrence of first permanent molar caries and to identify factors related factors associated with its occurrence.

Methods

The primary study employed a descriptive observational cross-sectional design to assess first permanent molar caries and characteristics. Following data collection, oral health education was provided as a community outreach activity. Pre-test and post-test questionnaires were administered

solely to evaluate the educational session and were not included as primary outcome variables of the study.

The sample in the study consisted of 83 children from Patran Public Elementary School with the following sample inclusion criteria: Aged 7-10 years, had permanent first molar caries, had no other systemic diseases, brushed their teeth twice a day, were willing to be research samples and their parents were willing to sign informed consent, did not wear orthodontic appliances, and exclusion criteria: aged 7-10 years did not have permanent first molar caries.

The type of data collection used was primary data, obtained directly from respondents through caries examinations, and secondary data, obtained from respondents at school in the form of addresses and parents' occupations.

Results and Discussion

The study involved 83 elementary school children from SD Negeri Patran. Table 1 shows the characteristics of the respondents, most of whom were boys (55.4%) and aged 9 years (39.8%). The majority of the parents, especially the fathers, were laborers (49.4%), while the distance between the respondents' homes and dental health services was mostly less than 1 km (81.9%).

Table 1. Distribution of respondents

No	Criteria	n	%
1	Gender		
	Male	46	55,4
	Female	37	44,6
2	Child's age		
	7 years old	3	3,6
	8 years old	27	32,5
	9 years old	33	39,8
	10 years old	20	24,1
3	Father's occupation		
	Laborer	41	49,4
	Entrepreneur	4	4,8
	Self-employed	29	34,9
	Civil servant/police officer	2	2,4
	Other	7	8,4
4	Distance from home to dental clinic		
	<1 km	68	81,9
	>= 1 km	15	18,1

Table 2. shows an increase the proportion of children with good oral health knowledge from 55,4% before the educational session to 68,7%

afterward. These findings suggest a positive change in knowledge following the educational activity. However, no inferential statistical analysis was performed to evaluate the significance of this change.

Tabel 2. Pretest and posttest results Respondents

No	Criteria	Pre-test		Post-test	
		n	%	n	%
1	Good	46	55,4	57	68,7
2	Fair	17	20,5	15	18,1
3	Poor	20	21,1	11	13,3

Based on Table 3, the average def-t index of respondents was 4.29, indicating a high level of caries severity. The highest frequency of permanent first molar caries was found in 10-year-old children (13 cases), while no cases of caries were found in 7-year-olds.

Table 3. Frequency of permanent first molar caries in respondents

No	Age	Index def-t	n	f caries M1
1	7 years old	3	3	0
2	8 years old	4,95	21	0
3	9 years old	5,04	25	6
4	10 years old	2,59	17	7
Total		4,29	66	13

Sociodemographic Characteristics and Caries Risk

Most respondents were boys. This study shows a tendency for higher caries prevalence in boys than in girls. These results are in line with the findings of [6], [7], which explain that boys have poorer dental hygiene habits and consume sweets more frequently than girls.

Socioeconomic factors also have a significant influence on dental health status. Most fathers worked as laborers, indicating that the family's economic status tended to be low. This condition resulted in limited resources to purchase toothbrushes, fluoride toothpaste, or visit the dentist. Groups with low economic status had a higher prevalence of caries due to limited access to dental health services and preventive information [8], [9].

Although most respondents' homes were located less than 1 km from dental health facilities, the caries rate remained high. This indicates that distance is not the main determinant of visits to health facilities.

Effectiveness of Dental Health Education

The 13.3% increase in knowledge from the pretest to the posttest results indicates the effectiveness of the counseling provided. This is in line with [10], [11] theory that health promotion is an important step in increasing knowledge and attitudes as a basis for behavioral change.

However, increased knowledge does not necessarily lead to immediate behavioral change [12]. According to [13], repeated interventions and support from the school and family environment are needed for consistent dental hygiene behavior to develop.

The Relationship Between Age and the Frequency of First Molar Caries

The highest frequency of first molar caries was found in 10-year-old children. This can be explained by the fact that the first molars usually erupt at the age of 6, so that by the age of 10, these teeth have been in the oral cavity for 3–4 years and have been exposed to risk factors such as plaque and cariogenic foods for a longer period [14].

The average def-t index of 4.29 indicates that the children's caries status is still high according to the WHO classification. This finding is consistent with the report by [15].

Factors Related to First Permanent Molar Caries

The causal factors of permanent first molar caries in this study can be categorized as follows:

1. Socioeconomic Factors
2. Behavioral Factors
3. Age and Plaque Exposure Factors.

The combination of these three factors creates ideal conditions for caries development [16], [17]. Therefore, prevention strategies must be multifactorial and continuous.

Public Health Implications

These findings emphasize the need for a strong promotive and preventive approach at the elementary school level [18], [19]. According to [20] school-based programs are an effective platform for instilling dental hygiene habits from an early age.

Conclusion

These findings of this study indicate that first permanent molar caries remains a common oral health problem among children at SD N Patran, with mean def-t index of 4,29, reflecting a relatively high level of caries experience. The highest frequency of

first permanent molar caries was observed among 10-year-old children, suggesting that prolonged exposure of erupted permanent molars to the oral environment may contribute to caries development. Most respondents came from laborers family and lived within 1 km of dental health facilities. Although an increase in oral health knowledge was observed following the educational session, these findings were presented as supportive information and were not included in the primary analysis of the first permanent molar caries. The results highlight the importance of strengthening school-based preventive and promotive oral health programs to support the maintenance of the first permanent molars during the mixed dentition period.

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