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Research Report

Dental caries status among elementary students at Medowo III Elementary School, Kandangan, Kediri, East Java

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ABSTRACT

Background: Dental caries is frequently observed in children. Increasing the awareness of oral health among school-age children is anticipated to decrease the occurrence of dental caries. **Purpose:** The aim of this study was to determine the prevalence of dental caries among students in Medowo III elementary school using dmft/DMFT index. **Methods:** A cross-sectional descriptive study was carried out among the entire student at Medowo III elementary school. The dental caries of each student were assessed using the dmft and DMFT indices. The assessment of variable distribution was conducted using the Shapiro-Wilk test. The dmft/DMFT values were compared between different age groups and genders using either the Student's t-test or the Mann-Whitney test. The data was processed using a significance level of $p < 0.05$. **Results:** The study included a total of 43 students. The average caries index in primary dentitions was markedly greater than in permanent dentitions. According to WHO, the prevalence of dental caries was very high in the primary dentition of students aged 7-9 years. No notable disparities were detected between female and male students in relation to the caries index of both primary and permanent teeth. However, the average caries index of primary teeth was considerably higher in middle-childhood students compared to preadolescence students. **Conclusion:** The dental caries prevalence among students in Medowo III elementary school were still high. Therefore, oral health prevention program was needed in order to enhance the community's awareness toward dental caries.

Keywords: dental caries; school-age children; dmft/DMFT index; gender; age groups.

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INTRODUCTION

Oral and dental health is a crucial factor that can influence the overall health of the body.[1] Moreover, dental and oral diseases could result in elevated financial hardships in numerous countries and consequently lead to a substantial decrease in quality of life.[2] Dental caries left untreated often leads to permanent tooth destruction, a prevalent oral condition affecting both males and females.[3] The research conducted by Kassebaum et al.[4] stated that dental and oral health issues, particularly dental caries, are highly prevalent and impact nearly half of the global population. Indonesia is experiencing a similar situation, as indicated by the findings of the 2018 Basic Health Research (Riskesdas), which showed that the most prevalent dental and oral diseases in Indonesia are dental caries.[5]

Low oral hygiene status and high rate of dental caries are dental and oral health problems that are common in children.[6] The dental and oral health state significantly impacts the child's overall health, growth, and future. Dental caries can result in a decline in the nutritional health of children, as it causes a decrease in appetite and difficulty in eating due to impaired tooth function as a part of digestive system.[7] School age is crucial for establishing a strong basis for the development of qualified human beings and health has a significant role in determining the quality of human resources.

Dental caries is a preventable dental and oral disease that can be avoided by lowering the intake of high-sugar foods, enhancing oral hygiene practices, and optimizing the fluoride concentration in drinking water and toothpaste.[8] Consequently, the acquisition of greater knowledge and consciousness regarding dental and oral health among children of school age is expected to reduce the prevalence of dental caries and enhance their overall quality of life.

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Medowo III elementary school is located in Ringinagung, Kandangan, Kediri and is located far from city center. Based on data acquired from the Central Statistical Agency of Kediri District, the availability of dental and oral health services in Ringinagung district is insufficient. Kandangan does not have any public hospitals, and the distance between Kandangan public health center and Medowo III elementary school is quite far, which is 12 kilometres. Therefore, some efforts are needed to be able to improve dental and oral health of students in Medowo III elementary school by conducting a dental caries examination as an initial screening measure to avoid the progression of the disease. The aim of this study was to determine the prevalence of dental caries among students in Medowo III elementary school using dmft/DMFT index.

MATERIALS AND METHODS

This cross-sectional descriptive study was conducted at Medowo III Elementary School, Kediri, East Java in June 2023. The samples for this study consisted of all students in grades I-VI, aged between 7 and 13 years old, of both genders. These students attend Medowo III Elementary School during the academic year of 2022–2023, reside in Kandangan, and have obtained consent of parents for oral clinical evaluation. Any disagreement from parents at any stage of the research resulted in their exclusion from the study. The sample size for our studies consisted of 42 children.

A dental caries examination was conducted by an experienced dentist, using a dental mirror, under a flashlight, in an unoccupied classroom. The examinations were conducted in accordance with infection control protocols. The examiner used disposable gloves and masks, and used single-use dental diagnostic instruments for each sample. The dental caries of each student were evaluated by quantifying the number of decayed (d) teeth, missing teeth due to caries (m), and filled (f) teeth (t). The average dmft and DMFT indices were calculated for deciduous and permanent teeth, respectively.[9] The WHO dmft/DMFT index calculation criteria were classified as follows: very low for values ranging from 0.0 to 1.1, low for values ranging from 1.2 to 2.6, moderate for values ranging from 2.7 to 4.4, high for values ranging from 4.5 to 6.5, and very high for values over 6.6.

Data analysis was performed using GraphPad Prism 9.0 (GraphPad Software, Inc., La Jolla, CA, United States). The distribution of variables was assessed using the Shapiro-Wilk test. The means of dmft/DMFT among distinct age groups (students in middle-childhood, aged 7-9 years, and students in preadolescence, aged 10-13 years) and sexes were compared using either the Student's t-test or the Mann-Whitney test. The data underwent processing using a 95% confidence interval (CI) and a significance level of $p < 0.05$. The data are shown as box plots, which include the mean and standard deviation (SD).

RESULTS

The study included a total of 43 students from Medowo III Elementary School in Kediri, East Java. Out of these, there were 13 males (30%) and 30 females (70%). The mean age was 9.76 ± 1.72 years old, with 48.8% in the age range of 7–9 years old and 51.2% in the age range of 10–13 years old. The mean caries index was 4.79 ± 3.74 in primary dentitions (dmft), which was significantly higher than the mean caries index in permanent dentitions (DMFT = 1.25 ± 1.4, with $p<0.01$). According to WHO, the prevalence of dental caries was very high in the primary dentition of students aged 7-9 years (deft =6.62 ± 4.03) and high in female students (deft = 5.2 ± 4.01). Conversely, both male and female students had low dental caries in their permanent teeth, with an average DMFT index value of 1.54 ± 1.33 and 1.13 ± 1.43, respectively (Table 1).

There were no significant differences observed between female and male students in relation to the caries index of both primary and permanent teeth (Figure 1). Nevertheless, the mean caries index of primary teeth was significantly greater in middle-childhood students compared to preadolescence students ($p < 0.01$) (Figure 2).

Table 1. Frequency distribution of dental caries scores based on dmft/DMFT index among students at Medowo III Elementary School, classified by gender and age groups

Gender	**n (%)**	**d**	**e**	**f**	**deft**	**deft index average value**
Male	13 (30)	27	23	0	50	3.85 ± 2.94
Female	30 (70)	111	45	0	156	5.2 ± 4.01
Age groups	**n (%)**	**d**	**e**	**f**	**deft**	**deft index average value**
7-9 years old	21 (48.8)	97	42	0	139	6.62 ± 4.03
10-13 years old	22 (51.2)	41	26	0	67	3.05 ± 2.44
Total deft					206	4.79 ±3.74**
Gender	**n (%)**	**D**	**M**	**F**	**DMFT**	**DMFT index average value**
Male	13 (30)	20	0	0	20	1.54 ± 1.33
Female	30 (70)	34	0	0	34	1.13 ± 1.43
Age groups	**n (%)**	**D**	**M**	**F**	**DMFT**	**DMFT index average value**
7-9 years old	21 (48.8)	19	0	0	19	0.9 ± 1.34
10-13 years old	22 (51.2)	35	0	0	35	1.59 ± 1.4
Total DMFT					54	1.26 ± 1.4**

n: number of participants, d/D: decayed, m/M: missing, f/F: filling, t/T: teeth. **Total deft vs total DMFT was compared using Mann-Whitney test, with $p < 0.01$.

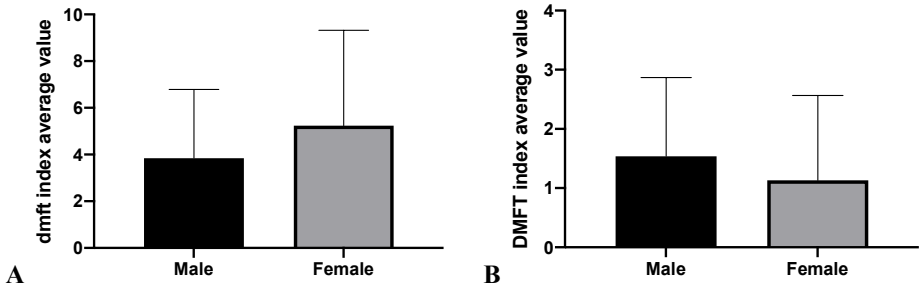

Figure 1. Comparative analysis of the average dmft (A) /DMFT scores (B) among male and female students.

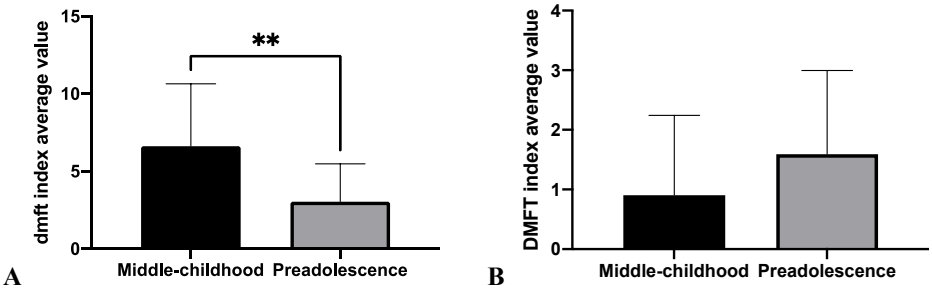

Figure 2. Comparative analysis of the average dmft (A) /DMFT scores (B) among middle-childhood and preadolescence students. **dmft index average value of middle-childhood students vs preadolescence students was compared using Mann-Whitney test, with $p < 0.01$.

DISCUSSION

The findings of our study indicate a significantly elevated prevalence of dental caries in both the primary and permanent teeth within the sample we analysed. The general prevalence of tooth decay in primary teeth was 86%, while in permanent teeth, it was 53%. The caries indices for each individual were likewise elevated. The average deft index for children aged 7-9 years was 6.62, while for the 10–13-year-old group, the average DMFT was 3.05. The study groups exhibited a remarkably low rate of restoration, with an average of zero filled f/F teeth in all groups. Regrettably, these results have remained unchanged in comparison to the previously published data by Basic Health Research (Riskesdas) in 2018. The data indicated that the prevalence of dental caries (DMFT/dmft) in Indonesia was 67.3%. Moreover, the incidence of dental caries in young children is significantly elevated, reaching approximately 93% in 2018, with a dmft score exceeding 6.5.[5] Furthermore, there were multiple studies indicating a high prevalence of dental caries in children from various provinces in Indonesia. Approximately 61% of 12-year-old children in Jakarta had experienced dental caries, with a DMFT score of 1.58.[10] Furthermore, a study conducted by Lia et al.[11] revealed that dental cavities were found in 75.6% of primary school students in Bandar Lampung. Meanwhile, in Puger, Jember, it was discovered that the prevalence of dental caries in primary teeth was 97%, with an average def-t value of 10.03.[12] The prevalence of dental caries in 6–8-year old children in Cimahi was found to be quite high, with a rate of 96.93%. The mean values for dmft and DMFT were 7.86 and 0.37, respectively.[13] The resemblance may be attributed to shared cultural and geographical proximity. However, the incidence of dental caries seen in wealthier nations was predominantly lower compared to the findings of this study.[14–16] On the contrary, developing countries continue to have a high prevalence of dental caries.[17–19] This could be attributed to the fact that socioeconomic situations have been recognized as crucial determinants impacting dental caries.[20,21]

Our study found no correlation between gender and either the deft or DMFT score. The findings on the association between gender and dental caries were inconsistent. Our results were consistent with those of Papadaki et al.,[22] who reported that there were no gender disparities in the prevalence of dental caries among children aged 5 and 8 years. Gupta et al. (2018)[23] also concluded that no correlation existed between gender and dental caries. However, according to Nazir et al.,[24] female students had a greater prevalence of dental caries compared to male students. Furthermore, Mallineni et al.[25] found that female students had considerably higher scores of dmft compared to male students. In contrast to global patterns, Sathiyakumar et al.[26] discovered that male children exhibited a higher prevalence and associated risk of dental caries compared to female children over the entire duration of the survey (2016-2019). In accordance with Shaffer et al.,[27] young females between the ages of 6 and 11 had 1.5 fewer tooth decays compared to boys. Dental caries is a complex disease influenced by multiple factors, including the host, cariogenic biofilm, fermentable carbohydrates, and time. Fluctuations in sex hormones, alterations in biochemical composition,

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variations in salivary flow rate, delays in tooth eruption time, and a propensity for consuming sugary foods also played a role in the occurrence of dental caries.[28–30] Thus, all of the aforementioned factors may have contributed to the contradictory findings on the correlation between gender and dental caries.

Many studies have shown that there is a strong correlation between a child's age and the occurrence of dental caries. The findings of our study indicate that the mean caries index of primary teeth was considerably higher in middle-childhood students as compared to preadolescence kids. Consistent with Goenka et al.,[31] the dmft scores decreased gradually as age increased. Furthermore, the prevalence of dental caries was seen to be greater in children aged 6 compared to those aged 12.[32] The decrease in the caries rate due to increasing age may be attributed to the heightened awareness of oral hygiene, as well as the younger child's limited capacity to effectively brush their teeth. Hence, it is vital to initiate endeavors to uphold dental and oral well-being from a young age. The optimal period to develop a child's motor skills, such as teeth brushing, is during their elementary school years. It is anticipated that acquiring knowledge will enhance their consciousness and ultimately influence their behavior in alignment with their knowledge.[33–35]

CONCLUSION

The dental caries prevalence among students in Medowo III elementary school were still high both in primary and permanent teeth. The high caries burden identified in our study necessitates the implementation of more rigorous approach for oral health prevention program in order to enhance the community's understanding and awareness of dental caries.

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