Research Article

Dental and Oral Health Status of Elementary School Children in Central Lampung

Lia Hapsari Andayani[1§], Abdul Gani Soulissa[2], Sri Lestari[1]

[1] Department of Preventive and Public Health Dentistry, Faculty of Dentistry, Trisakti University, Indonesia
[2] Department of Periodontics, Faculty of Dentistry, Trisakti University, Indonesia

ABSTRACT

Introduction: Dental caries and gingivitis are the most prevalent oral health problems in Indonesian elementary school children. Predictors that are significantly associated with dental caries and gingivitis in children are the parents' socioeconomic status and children's oral health behavior. Terbanggi Besar district is the largest area and population in Lampung Province. The lack of updated dental and oral health data needs to be refined to address oral health disparities and achieve improvements. **Objectives**: This study aimed to assess the dental and oral health status of grade V and VI elementary school children in Terbanggi Besar district, Central Lampung. **Method:** This cross-sectional study elected 410 students from 5 public elementary schools using convenience sampling. Sociodemographic and oral health behavior data were retrieved from a self-administered questionnaire. In addition, a clinical examination consisted of the Decayed, Missing, and Filled Teeth (DMFT) index, the Gingival Index (GI), and the Simplified Oral Hygiene Index (OHIS). The Mann-Whitney statistical test was used to analyze the differences in dental caries severity and gingival status between selected variables. **Results:** Dental caries was present in 75.6% of children, while gingivitis was present in 52% of children. The mean DMFT score was significantly higher in children with poor oral hygiene (2.80 + 2.67, p = 0.001). The mean GI score was significantly higher in children aged 12 years old or above (0.37 + 0.48, p = 0.025) and in those that had unemployed fathers (0.25 + 0.29, p = 0.030) and poor oral hygiene (0.31 + 0.40, p = 0.000). **Conclusion:** Improving dental and oral health promotion with regard to elementary school children is highly recommended. The dental and oral health status of grade V and VI elementary school children in Terbanggi Besar district in Central Lampung was found to be moderate, with a high prevalence of dental caries.

INTRODUCTION

Indonesia has the largest population of all countries in southeast Asia and encounters dental and oral health problems in both adults and children. National Basic Health Research (RISKESDAS) found that Indonesia had an average Decayed, Missing, and Filled Teeth (DMFT) index of 4.6 in 2013,[1] which increased to 7.1 in 2018. RISKESDAS also declared that 74.1% of the Indonesian population had periodontal disease, while 51.9% of 10 to 14-year-old children were observed to have dental and oral problems.[2]

RISKESDAS stated that 57.2% of the population in Lampung Province had dental and oral health problems, while only 6.2% received treatment from dental practitioners. According to the data, the same proportions for the Central Lampung population were 57.7% and 6.4%, respectively.[2] Gultom et al. found that the prevalence of dental caries in Bandar Lampung elementary school children was 80.9%, with an average DMFT index of 1.39.[3] These findings show that oral health care remains one of the major public health problems in Lampung and that successful oral health promotion has not been completely achieved yet.

According to the National Coordinating Agency for Surveys and Mapping (Bakosurtanal), the Central Lampung area covers 13.57% of the total Lampung Province, and Terbanggi Besar district is the largest area and population. With a population growth rate of 1.27%, the total population of Central Lampung increased from 1.208.261 people in 2012 to 1.271.566 people in 2018. This was not accompanied by improvements in oral health care. The ratio of dentists to the population in Central Lampung in 2018 was only 1.7:100.000. This figure is far below from the sufficient ratio target of 12:100.000. Structural barriers to oral health care have also been observed because of a decrease in the number of private dental practices from 29 in 2015 to 12 in 2018.[4]

Dental caries was found to be a major oral health problem in Indonesia in 2018, with higher prevalence (88.8%) being compared with periodontal disease (74.1%), or other oral mucosa lesions (5.3%).[2] It is a multifactorial disease caused by physical, biological, environmental, behavioral, and lifestyle-related factors.[5] Elementary school children in Indonesia are very prone to caries due to their poor oral health behavior and economic barriers.[6] Dental caries prevalence among 12-year-old children in Indonesia was found to be 72% with an average DMFT index of 1.9 (95% CI = 1.7-2.1).[2] Epidemiological data on dental caries in children are important for identifying the risk factors, as this disease may hinder child development and lead to negative impacts on children's quality of life.[7]

Gingivitis is a reversible inflammation of the gingival tissue, marked by several clinical signs, such as gingival bleeding, discoloration, and deformation. Gingival alteration consists of changes in contour, texture, size, and consistency. Gingivitis that is found in early childhood and not treated properly will develop into a severe periodontal disease.[8]

As teeth and saliva play an important role, there is also a significant correlation between children's oral health behavior and their oral hygiene status.[9] Poor oral hygiene influences the number of dental caries and gingivitis incidences in children.[7] Oral hygiene is measured by the presence of debris and calculus using the Simplified Oral Hygiene Index (OHIS). This method evaluates six teeth that represent all the posterior and anterior teeth of each segment in the oral cavity.[10]

The aim of this study is to assess the dental and oral health status of elementary school children, especially those in grades V and VI in Terbanggi Besar district, Central Lampung. The findings are expected to be useful for identifying determinants of and disparities in oral health problems, as well as for attaining dental and oral health improvements in children in Central Lampung.

MATERIALS AND METHODS

This cross-sectional study was conducted in five elementary schools in Terbanggi Besar district, Central Lampung. Two of the elementary schools were located in the Karang Endah area, and the other three were located in the Bandar Jaya area. This study was carried out by the Faculty of Dentistry, Trisakti University in August 2019 in Central Lampung. Ethics approval was obtained from the Ethics Review Board of the Faculty of Dentistry at Trisakti University (No.268/S2/KEPK/FKG/8/2019).

Samples of students in grades V and VI were taken using convenience sampling in each school. All the 410 students with parental written informed consent agreed to undergo an oral clinical examination. The oral health data were collected using a dental mirror, probe, and headlight, in an empty classroom. All examinations were conducted according to infection control standards. 11 Each examiner wore disposable gloves and masks, while the instruments were disinfected with antiseptic solution after every use for each student. The measurement of each student's oral health status included the use of the following: the DMFT index, the OHIS, and the Gingival Index (GI).

All the students filled out the questionnaire form under the researcher's supervision. The questionnaire included age, gender, parental occupation status, parental education level, daily toothbrushing times and frequency, as well as their experiences in terms of receiving dental and oral health education. The children's ages were categorized into below 12 years old and 12 years old or above.[12] Correct toothbrushing times were defined as after breakfast and before bedtime. Correct toothbrushing frequency was defined as a minimum of twice per day. Parental occupations and education levels were also matched with the data from the schools.

Statistical Analysis

The statistical analysis was performed using Statistical Product and Service Solutions (SPSS) version 24.0 software (IBM, USA). Descriptive data analysis was applied to see the distribution of the variables and is presented in a tabular form and described. The Mann-Whitney statistical test was used to analyze the differences in dental caries severity and gingival status between selected variables.

RESULTS

Based on the individual characteristics in Table 1, most of the children were under 12 years old (79.3%). Regarding gender, there was a higher number of females (54.6%). The majority of their fathers worked in various fields (96.1%), while most of their mothers were housewives (68.5%). The parental education level revealed that 62.4% of the fathers and 59.5% of the mothers had completed high school or higher educational level, while 37.6% of the fathers and 40,5% of the mothers only completed junior high school. The majority of the children brushed their teeth at least twice a day (62%) but at the incorrect times (68.8%). Most children acknowledged that they had received dental and oral health education (78.3%).

The children's dental and oral health statuses are shown in Table 2. The index measurements showed that a higher number of children experienced dental caries (75.6%) when compared to those with healthy teeth (24.4%). Poor oral hygiene with the presence of debris and calculus was found in more than half of them (52.2%), as well as signs of gingivitis (52%).

The mean DMFT scores based on selected variables are shown in Table 3. There was a significant difference between the mean DMFT score based on oral hygiene status (p = 0.001). The mean DMFT score was higher in children with poor oral hygiene (2.80 + 2.67) compared to children with good oral hygiene (2.41 + 3.54). There was also a significant difference between the mean

DMFT score based on the mother's educational level (p = 0.016). The mean DMFT score was higher in children with mothers with a lower educational level (3.07 + 3.68) compared to in children with mothers with a higher educational level (2.30 + 2.63).

The mean GI scores based on selected variables are shown in Table 4. There was a significant difference between the mean GI score in children based on age (p = 0.025), father's occupational status (p = 0.030), and oral hygiene status (p = 0.000). Children aged 12 years old or above had a higher mean GI score (0.37 + 0.48) compared to younger children (0.18 + 0.29). Children with employed fathers had a lower mean GI score (0.21 + 0.35) compared to children with unemployed fathers (0.25 + 0.29). Children with good oral hygiene had a lower mean GI score (0.11 + 0.23) compared to children with poor oral hygiene (0.31 + 0.40).

Table 1. Sociodemographic profile and oral health behavior of grade V and VI elementary school children in Terbanggi Besar district, Central Lampung

Variables	N	%
Gender		
Male	186	45.4
Female	224	54.6
Age (years)		
< 12	325	79.3
≥ 12	85	20.7
Father's occupational status		
Employed	394	96.1
Unemployed	16	3.9
Mother's occupational status		
Employed	129	31.5
Unemployed	281	68.5
Father's education level		
High school or higher	256	62.4
Junior high school or below	154	37.6
Mother's education level		
High school or higher	244	59.5
Junior high school or below	166	40.5
Tooth brushing time		
Correct	128	31.2
Incorrect	282	68.8
Tooth brushing frequency		
Correct	254	62
Incorrect	156	38
Have received dental and oral health education		
Yes	321	78.3
No	89	21.7

Table 2. Dental and oral health status of grade V and VI elementary school children in Terbanggi Besar district, Central Lampung

Variables	N	%
Dental status		
Sound teeth	100	24.4
Caries	310	75.6
Oral hygiene status		
Good	196	47.8
Poor	214	52.2
Gingiva status		
Healthy gingiva	197	48
Gingivitis	213	52

DISCUSSION

In this study, the mean DMFT score of elementary school children in grades V and VI in Terbanggi Besar district was found to be higher for the students who were female and aged 12 years old or above, and who had unemployed fathers and whose parents both had low education levels. The diversity of dental health statuses between males and females has been documented considerably in many epidemiological studies. A higher prevalence of caries and larger numbers of missing teeth were found in female children compared to in male children in South Asia.[13] Other findings in Indonesia also declared that female children had higher DMFT scores and caries prevalence compared to male children.[14] Several global studies of sex differences in oral health revealed associations with many factors, such as behavioral aspects (eating frequency), gender-based dietary preferences (aversions and cravings), physiological elements (saliva flow and composition), and hormonal determinants (high level of estrogen).[15]

Sex differences in terms of dental caries are also related to the early eruption of female teeth, which causes them to be exposed to the cariogenic oral environment for longer. This also clarifies why caries prevalence and DMFT scores were found to be higher in older children.[9,16] The risk of caries can be up to 4.3 times higher in children aged 8 years old or above compared to in younger ages.[16]

Although not statistically significant, the mean DMFT score was the highest in children with unemployed fathers (3.31+2.06). In this study, 96.1% of the fathers were employed, but there was no information about the occupation type or the amount of income. An employee does not necessarily have a high or above average monthly income. Several studies found that dental caries

in children is related to parents' educational level and socioeconomic status.[5,7,15,16] Children with low socio-economic statuses and whose parents both have low education levels are at greater risk of experiencing dental caries.[7,17] The risk of caries may increase up to 2.9 times in children of fathers with a low education level, and up to 6.1 times in children of mothers with a low education level. Children from low income families had a caries risk that was up to 9.9 times higher than that of children from medium-high income families.[16]

RISKESDAS stated that 98.7% children aged 10 to 14 years old in Central Lampung brush their teeth every day but that less than 1% did it at the correct times.[2] In this study, although 62% of the children brushed their teeth at least twice a day, only 31.2% did it at the correct times. Children with incorrect toothbrushing times and frequencies had a higher mean DMFT score compared to children with correct toothbrushing times and frequencies, though the difference was not statistically significant. In this study, there was no information regarding the toothbrushing method or toothpaste usage. Good dental health can be attained not only from the correct toothbrushing times and frequency, but also from the correct toothbrushing method. People who brush their teeth at least twice a day using toothpaste have a lower caries status.[18] Elementary school children with poor toothbrushing habits have up to a 1.3 times higher risk of experiencing dental caries.[19]

The mean DMFT score was higher in children who never received dental and oral health education (3.01+3.25). Elementary school children who had obtained dental and oral health education had better knowledge with regard to maintaining their oral hygiene.[10] Less knowledge about dental health may lead to a higher risk in terms of oral diseases and their severity. The mean DMFT score was significantly higher in children with poor oral hygiene (2.80 + 2.67, p=0.001). This result is similar to other findings that found that children with poor oral hygiene had up to a 1.7 times higher risk of developing dental caries.[19]

In this study, the mean GI score was statistically significantly higher in children aged 12 years old or above who had unemployed fathers and poor oral hygiene. As with dental caries, age is widely known as one of the predisposing factors for periodontal disease.[20] The mean GI score for students aged 12 years old or above was also statistically significantly higher (0.37 + 0.48, p = 0.025) than for the younger group (0.18 + 0.29). A study of children aged 7 to 12 years old found that for each year, the chance of developing calculus increased 1.53 times (p = 0.002), while the chance of developing gingival bleeding increased 1.44 times (p<0.001).[21] Other studies also found that 12-year-old

Table 3. Mean DMFT score according to sociodemographic variables and oral health behavior of grade V and VI elementary school children in Terbanggi Besar district, Central Lampung

Variable	Mean (SD)	Min – Max	P-Value
Gender			
Male	2.47 ($\pm$ 2.87)	0 – 28	0.393
Female	2.73 ($\pm$ 3.31)	0 – 26	
Age (years)			
< 12	2.55 ($\pm$ 2.78)	0 – 25	0.845
$\geq$ 12	2.85 ($\pm$ 4.18)	0 – 28	
Father's occupational status			
Employed	2.58 ($\pm$ 3.15)	0 – 28	0.066
Unemployed	3.31 ($\pm$ 2.06)	0 – 7	
Mother's occupational status			
Employed	2.67 ($\pm$ 2.92)	0 – 26	0.416
Unemployed	2.58 ($\pm$ 3.21)	0 – 28	
Father's education level			
High school or higher	2.44 ($\pm$ 2.96)	0 – 28	0,079
Junior high school or below	2.90 ($\pm$ 3.36)	0 – 26	
Mother's education level			
High school or higher	2.30 ($\pm$ 2.63)	0 – 28	0,016*
Junior high school or below	3.07 ($\pm$ 3.68)	0 – 26	
Tooth brushing time			
Correct	2.44 ($\pm$ 2.20)	0 – 9	0.887
Incorrect	2.69 ($\pm$ 3.45)	0 – 28	
Tooth brushing frequency			
Correct	2.58 ($\pm$ 3.26)	0 – 28	0.452
Incorrect	2.67 ($\pm$ 2.89)	0 – 26	
Have received dental and oral health education			
Yes	2.50 ($\pm$ 3.07)	0 – 28	0.104
No	3.01 ($\pm$ 3.25)	0 – 24	
Oral hygiene status			
Good	2.41 ($\pm$ 3.54)	0 – 26	0.001*
Poor	2.80 ($\pm$ 2.67)	0 – 28	

*Mann Whitney Test, p <0,05

Table 4. Mean number of GI according to sociodemographic variables and oral health behavior of grade V and VI elementary school children in Terbanggi Besar district, Central Lampung

Variable	Mean (SD)	Min – Max	P-Value
Gender			
Male	0.24 ($\pm$ 0.38)	0 – 2.0	0.769
Female	0.20 ($\pm$ 0.31)	0 – 1.33	
Age (years)			
< 12	0.18 ($\pm$ 0.29)	0 – 1.46	0.025*
$\geq$ 12	0.37 ($\pm$ 0.48)	0 – 2.0	
Father's occupational status			
Employed	0.21 ($\pm$ 0.35)	0 – 2.0	0.030*
Unemployed	0.25 ($\pm$ 0.29)	0 – 1.0	
Mother's occupational status			
Employed	0.19 ($\pm$ 0.32)	0 – 1.33	0.419
Unemployed	0.23 ($\pm$ 0.35)	0 – 2.0	
Father's education level			
High school or higher	0.19 ($\pm$ 0.32)	0 – 2.0	0,499
Junior high school or below	0.26 ($\pm$ 0.38)	0 – 1.46	
Mother's education level			
High school or higher	0.18 ($\pm$ 0.31)	0 – 1.08	0,168
Junior high school or below	0.26 ($\pm$ 0.39)	0 – 2.00	
Tooth brushing time			
Correct	0.19 ($\pm$ 0.32)	0 – 1.46	0.464
Incorrect	0.23 ($\pm$ 0.35)	0 – 2.0	
Tooth brushing frequency			
Correct	0.22 ($\pm$ 0.34)	0 – 2.0	0.534
Incorrect	0.21 ($\pm$ 0.34)	0 – 1.33	
Have received dental and oral health education			
Yes	0.20 ($\pm$ 0.33)	0 – 2.0	0.111
No	0.27 ($\pm$ 0.40)	0 – 1.46	
Oral hygiene status			
Good	0.11 ($\pm$ 0.23)	0 – 1.17	0.000*
Poor	0.31 ($\pm$ 0.40)	0 – 2.0	

*Mann Whitney Test, p <0,05

children had a higher gingival bleeding index and calculus index compared to younger age groups.[22,23] This may be related to the mixed tooth period, which can increase the risk of gingivitis due to the absence of protection from the coronal contours of the teeth during the early stage of active eruption. Debris and plaque accumulation may cover the erupted tooth crown and trigger gingival inflammation. A study of primary and mixed dentitions found that a generalized plaque index (PI) was significantly associated with mixed dentition (p = 0.025) and higher simplified periodontal record (PSR) scores (p < 0.001).[24] The risk of gingival inflammation might also increase around puberty, and this can lead to significant differences in gingivitis between younger and older age groups.[22]

Many studies found that socioeconomic status, including family income level, parent occupational status, and parent educational level, were significantly related to the periodontal health of the family member. Children with a lower socioeconomic status are at greater risk of having periodontal disease.[25] In this study, the mean GI score of children with unemployed fathers (0.25 + 0.29) was statistically significantly higher than that of the children with employed fathers (0.21 + 0.35, p = 0.030). Parent occupational status may increase the severity of caries and gingivitis as a result of the lack of health services for those with low socioeconomic levels. Children who live in poverty are rarely able to get proper health services due to the high cost of such care.[7]

The mean GI score was significantly different (p = 0.000) for children with good oral hygiene (0.11 + 0.23) and poor oral hygiene (0.31 + 0.40). This finding is similar to those of other studies, which confirmed that the OHIS score was related to the incidence of gingivitis.[8] Poor oral hygiene is a potential risk factor for gingivitis, but it can be prevented through regular plaque control as well as maintaining oral health as part of one's lifestyle. Children's cognitive and functional skills for performing oral hygiene behaviors still need to be stimulated by their parents or guardians,[25] while teachers could be another source of information and knowledge in promoting dental and oral health.

There are several limitations to this study. One of them is the sampling method. Convenience sampling, as the other non-probability sampling methods, may not included all individuals in the population. Children were included because they have volunteered or available in classroom, so that the results cannot be generalized to the total survey population. Other limitation is lack of information about behavioral and lifestyle-related factors among the children. The questionnaire does not explore the fluoride exposure, dietary behavior, or appropriate tooth brushing method. Despite the limitations, this study can be beneficial to the epidemiological studies of dental and oral health status of elementary school children in Central Lampung. Our findings can be used as the baseline data for the government to escalate the promotive-preventive program in dental and oral public health.

CONCLUSION

Within the limitation of this study, it was concluded that dental caries, gingivitis, and poor oral hygiene were still found to be prevalent among grade V and VI elementary school children in Terbanggi Besar district, Central Lampung. It is essential for the government to collaborate with health care professionals to improve children's dental and oral health. Further study may be required to elaborate other possible underlying risk factors for dental caries and gingivitis in children.

CONFLICT OF INTEREST

The authors declare that there are no conflict of interest regarding the publication of this paper.

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