

Dental Caries Experience and Associated Factors Among 12-year-old Schoolchildren in East Jakarta, Indonesia

Armasastra Bahar^{1*}, Herialdi Hardan Permana¹, Risqa Rina Darwita¹, Febriana Setiawati¹, Atik Ramadhani¹, Anton Rahardjo¹, Diah Ayu Maharani¹

1. Department of Preventive and Public Health Dentistry, Faculty of Dentistry, Universitas Indonesia.

Abstract

Oral health plays an important role in general health. Many studies have reported various risk factors that are associated with the incidence of dental caries. The objective of this study is to assess the prevalence of dental caries and analyze factors associated with dental caries experience among 12-year-old schoolchildren in Cilangkap, East Jakarta, Indonesia. A cross-sectional study was conducted examining 146 schoolchildren aged 12 years old. Dental caries experience was assessed using the DMF-T index. A self-administered questionnaire was used to measure the risk factors related to dental caries. The dental caries prevalence was 71% with the mean DMF-T index of 2.27 ± 2.53 . The highest occurrence of dental caries was in the lower first permanent molar. Dental visit within the last 12 months was associated with a lower caries risk (OR= 0.128; 95% CI, 0.054 – 0.303). The prevalence of dental caries experience among 12-year-old schoolchildren in Cilangkap, East Jakarta was high. Dental visit within the last 12 months was associated with dental caries.

Clinical article (J Int Dent Med Res 2021; 14(2): 666-670)

Keywords: Dental caries, schoolchildren, risk factor, Indonesia.

Received date: 27 February 2021

Accept date: 03 March 2021

Introduction

Oral health plays a significant role and integral in general health.¹ The 2017 Global Burden of Disease Study estimated that oral disease affects nearly 3.5 billion people worldwide, with permanent dental caries being the most common condition. Globally, it is estimated that 2.3 billion people suffer from permanent dental caries, and more than 530 million children suffer from primary tooth caries.² Public knowledge and awareness regarding dental caries in Indonesian has increased in recent years but remains a common health problem.³ Dental caries is a prevalent childhood disease in Indonesia.⁴ In Jakarta, the capital city of Indonesia, the caries prevalence among 12-year-old children was 84% with an average DMFT-index of 3.2.⁵

Dental caries is a multifactorial and dynamic disease. The initiation and progression

of the disease influenced by the balance of pathological and protective factors.⁶ Many studies showed that dental caries is associated with poor quality of life for children.^{7,8} Untreated dental caries leads to severe pain, infection, and interfere children's physical and psychological development because of poor nutrition.⁹ Several associated risk factors-related to dental caries are frequency of toothbrushing, presence of dental plaque, dietary, and dental visit.^{10,11} Sociodemographic background is also associated with the caries experience among the children.¹² Twelve-year-old-children represent a very important study group in an epidemiological survey. The World Health Organization (WHO) has determined children aged 12 years old as the primary international indicator of children's oral health.¹³

Indonesia has the largest population in Southeast Asia and is the fourth largest populated country globally. Jakarta has a diverse population with numerous ethnic groups and socioeconomic strata.¹⁴ Therefore, it is necessary to carry out regular oral health surveillance to evaluate the prevalence and severity of dental caries and to take preventive measures as early as possible. The World Health Organization

*Corresponding author:

Armasastra Bahar
Department of Preventive and Public Health Dentistry,
Faculty of Dentistry, Universitas Indonesia. Jakarta, Indonesia.
E-mail: armsbah@hotmail.com

(WHO) guidelines recommend that epidemiological surveys should be able to assess the dental health status of 12-year-old-children and its associated risk factors, including the dietary habit, tooth-brushing behavior, frequency of dental visit, and self-reported of dental pain.¹³ Therefore, the aim of this study was to assess the prevalence of dental caries and to analyze the risk factors related to dental caries experience among 12-year-old-children in East Jakarta.

Materials and methods

A cross-sectional study was conducted from September 2020 to January 2021 among 12-year-old children at a public elementary school in Cilangkap, East Jakarta. Non-probability sampling method was employed with 146 students as study participants. The instrument used a self-administered questionnaire consisting of sociodemographic characteristics and an oral health questionnaire adapted from WHO oral health survey. The oral health questionnaire included the frequency of consumption of sugary foods and drinks, toothbrushing behavior (in the morning dan before going to sleep), regular dental visit within the last 12 months, and self-reported dental pain. Dental caries experience was measure using the DMF-T index.¹³

Descriptive analysis was conducted to obtain an overview of the independent and dependent variables. The relationship between the dependent and the independent variable was analyzed using categorical comparative test (chi-square). The research data were analyzed using Microsoft Excel and the odds ratio along with 95% CI are calculated with the Odds Ratio Online Calculator at https://www.medcalc.org/calc/odds_ratio.php. This research was conducted in full accordance with the World Medical Association Declaration of Helsinki. The principal investigator is responsible for ensuring the confidentiality of the study documents and protecting the anonymity of all respondents. Informed written consent was provided by the parents and only participants with signed consent form were recruited.

Results

Seven respondents were excluded due to

incomplete data. A total of 139 respondents were analyzed. Table 1 shows the descriptive characteristics of the study participants. Seventy-one percent of the participants had decayed teeth, 2 (1%) had missing due to caries, and only 4 (3%) had filled teeth. The frequency of consumption of sugary foods and drinks 2 times per day in between meals was 43%. Almost all children (96%) brush their teeth in the morning and only 31% did not brushed their teeth before going to sleep. The proportion of schoolchildren who attended the dentist within the last 12 months was 29%. A total of 86% of participants reported currently having dental pain.

Variables	N (%)
Gender	
Male	70 (50.1%)
Female	69 (49.9%)
Frequency of consumption of sugary foods/drinks	
1	25 (18%)
2	60 (43%)
3	46 (33%)
4	2 (1%)
5	4 (3%)
6	1 (1%)
7	1 (1%)
Brush teeth in the morning	
No	6 (4%)
Yes	133 (96%)
Brush teeth before going to sleep	
No	43 (31%)
Yes	96 (69%)
Dental visit within the last 12 months	
No	100 (71%)
Yes	39 (29%)
Currently having dental pain	
Yes	129 (86%)
No	10 (14%)
DMF-T	
Decay	95 (71%)
Missing	2 (1%)
Filling	4 (3%)

Table 1. Descriptive analyses of respondents (N=139).

The mean DMF-T score of the participants was 2.27 ± 2.53 with the highest proportion was decayed teeth (2.22 ± 2.24). The mean and standard deviation of missing and filling teeth were 0.01 ± 0.12 , 0.03 ± 0.17 respectively. Figures 1 and 2 show the highest DMF-T score on the maxilla and mandible was

on the right first permanent molars, respectively. Odds ratio analysis was used to assess the association between associated variables and decayed teeth. The analyzed variables were gender, frequency of consumption of sugary foods and drink, brush teeth in the morning and before going to sleep, dental visit within the last 12 months, and suffering from a toothache caused by dental caries (DMF-T ≥ 1) (Table 2).

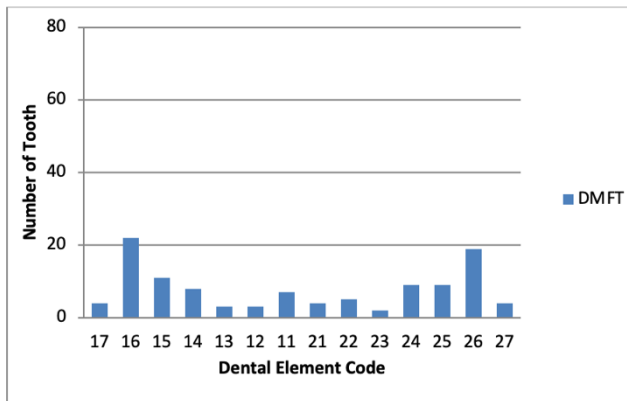


Figure 1. DMF-T score in maxilla.

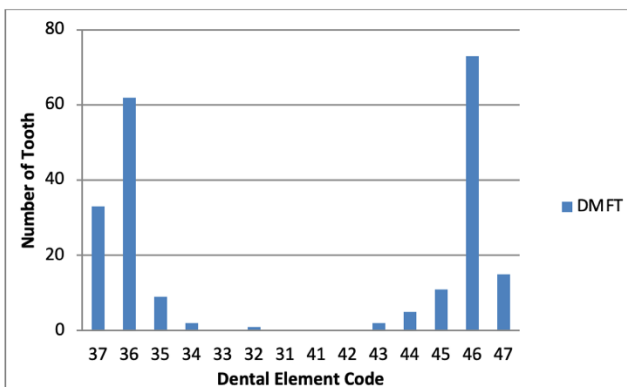


Figure 2. DMF-T score in mandible.

Variables	Free Caries		Caries	OR (95% CI)	p-value
	No	Yes			
Gender					
Male	20	50		1.052 (0.502-2.206)	0.892
Female	19	50			
Sugary foods/drinks consumption frequency					
1	10	15		0.195 (0.791-4.827)	0.146
>1	29	85			
Brushing teeth in the morning					
Yes	38	95		2.000 (0.226-17.688)	0.533
No	1	5			
Brushing teeth before going to sleep					
Yes	30	66		1.717 (0.732-4.026)	0.213
No	9	34			
Dental visit within the last 12 months					
Yes	9	30		0.128 (0.054-0.303)	0.001*
No	70	30			
Currently having dental pain					
Yes	3	7		1.107 (0.271-4.517)	0.887
No	36	93			

Table 2. Factor associated with dental caries among 12-year-old children in East Jakarta. OR (Odds Ratio), CI (Confidence Interval), *p < 0.05

Children who visited the dentist more likely had a higher chance of being free dental caries than those who did not (OR= 0.128; 95% CI, 0.054 – 0.303). The result estimates the significance of visiting the dentist while other variables were found statistically insignificant. Table 3 indicates the comparative analysis using chi-square test between males and females on risk factor-related to the presence of dental caries. There were no significant results, indicating similarity in behavioral causes of dental caries between the groups.

Variables	Female	Male	p-value
Sugary foods/drinks consumption frequency			
1	13	12	0.795
>1	56	58	
Brushing teeth in the morning			
Yes	67	66	0.415
No	2	4	
Brushing teeth before going to sleep			
Yes	53	43	0.050
No	16	27	
Dental visit within the last 12 months			
Yes	19	20	0.892
No	50	50	
Currently having dental pain			
Yes	6	4	0.498
No	63	66	

Table 3. Comparison between male and female based on related variables.

Discussion

Dental caries remains a common problem in society. Unless being treated promptly, dental caries can progress, which later can cause pain and affect the quality of life of children. The prevalence of dental caries experience in Cilangkap, East Jakarta (71%) shows a relatively higher number than the result of research conducted in Jakarta in 2018 (61%),¹⁴ but lower than the 2016 study in Jakarta and its satellite cities.⁵ The toothbrushing behavior in the study population should be improve substantially. This issue should become a concern as the ubiquity of dental caries in Cilangkap is relatively high, thus preventive programs are needed. Although the prevalence of dental caries experience among 12-year-old children in this study was still relatively high, according to WHO, the DMF-T index in Cilangkap (2.27) falls into the low category, which is between 1.2-2.6.¹³ Compared to the previous research in Jakarta where the DMF-T index value for 12-year-old children was 1.58, this research shows a relatively higher score.¹⁴

Moreover, this study also reveals that the highest prevalence of caries is in the lower first permanent molars. The prevalence is high because the lower first molars are the first permanent teeth to grow so they are exposed longer to acid and have deep pits and fissures. In addition, deep pits and fissures provide good food retention so that plaque is easy to stick on rough tooth surfaces and can cause the development of dental caries. According to previous research, pit and fissure sealants should be done as early as possible to have high effectiveness in preventing caries.¹⁵ The strong predictor for the presence of caries in the first permanent molar is diet cariogenic, the presence of dental caries in deciduous teeth, toothbrushing frequency, and molar incisor hypomineralization.¹⁶

The study aimed to analyze the risk factors related to the dental caries experience. The results show no association between the frequency of consumption of sugary foods or drinks between meals and dental caries experience. However, previous research in Padang in 2019 showed that the consumption of sweet foods plays an important role in developing caries.¹⁷ Another study also showed a positive relationship between the consumption of sugary foods and dental caries experience.¹⁸

The children who visited the dentist within the last 12 months were children who had caries. This reveals that children tend to go to the dentist only if they have a toothache, and not for preventive care purposes. This is in accordance with previous research that the reason children visit the dentist is due to caries and its complications. Children in Poland did not visit the dentists in accordance with the medical recommendations (between 6 and 12 months). This indicates the parents' low awareness of children's oral and dental health.¹⁹ In another study, there is a correlation between health insurance ownership and visits to dentists.²⁰ However, this study did not take socioeconomic data or insurance ownership, thus the inability to analyze other factors related to visits to the dentist.

This study has limitations: The first is the cross-sectional design, which only can analyze association not causality. Thus, our results may underestimate the associations between dental caries and associated factors. In addition, the convenience sampling may reduce statistical

representativeness. Further, the relative low number of respondents limits the generalizability of the study findings. Despite these limitations, the study was warranted to add data on Indonesia's oral health.

The comparative analysis of oral health behavior between males and females showed no statistically significant difference. This is consistent with previous research conducted in Croatia.²¹ The study explained that there is no difference in the oral health behavior between male and female. The study explained that the oral health status and oral health behavior differed at different ages. However, other studies showed different results that the status of oral health behaviors differs between gender.²² It is important to identify dental and oral health problems in children and the risk factors associated with these variables to determine an effective and efficient intervention program. Further studies should be performed in a greater sample size and a longitudinal study should be conducted to evaluate the associated factors of dental caries in children. Moreover, from previous studies, relationships with other risk factors including socioeconomic status, family income, educational level, occupation, and age of parents should be considered.²³⁻²⁵

Conclusions

Dental caries is a common health problem among 12-year-old schoolchildren in Cilangkap, East Jakarta, Indonesia. This study revealed that the prevalence of dental caries experience was high even though the DMFT index was low according to WHO Oral Health Survey. The lower first permanent molar was the highest occurrence of dental caries. Dental visit was the associated factor for dental caries. Moreover, toothbrushing behavior should be improved. Community-based dental programs are urgently needed for the prevention and promotion of oral health among schoolchildren.

Declaration of Interest

The authors report no conflict of interest.

References

1. Baiju RM, Peter E, Varghese NO, Sivaram R. Oral Health and Quality of Life: Current Concepts. *J Clin Diagn Res* 2017;11(6):ZE21-ZE26.

2. James SL, Abate D, Abate KH. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 2018;392:1789–8583.
3. Darwita RR, Rahardjo A, Andreas P, Setiawati F, Adiatman M, Maharani DA. The behavior changes on brushing teeth of children by mothers using a periodic dental health evaluation card. *J Int Dent Med Res* 2016;9(S):277–281.
4. Suryanti S, Bahar A, Rahardjo A, Seniati ANL, Maharani DA. Validity and Reliability of the Indonesian Version of Oral Hygiene Behavior Index Questionnaire: A Cross Sectional Study among Young Adolescents in Junior High School in Bandung, Indonesia. *J Int Dent Med Res* 2019;12(2):633-639.
5. Adiatman M, Yuvana AL, Nasia AA, Rahardjo A, Maharani DA, Zhang S. Dental and Gingival Status of 5 and 12-Year-Old Children in Jakarta and Its Satellite Cities. *J Dent Indones* 2016;23(1):5-9.
6. Pitts NB, Zero DT, Marsh PD, Ekstrand K, Weintraub JA, Ramos-Gomez F, Tagami J, Twetman S, Tsakos G, Ismail A. Dental caries. *Nat Rev Dis Primers*. 2017;3:17030.
7. Wong HM, McGrath CP, King NM, Lo EC. Oral health-related quality of life in Hong Kong preschool children. *Caries Res*. 2011;45:370–376.
8. Eid SA, Khattab NMA, Elheeny AA. Untreated dental caries prevalence and impact on the quality of life among 11 to14-year-old Egyptian schoolchildren: a cross-sectional study. *BMC Oral Health*. 2020;20(1):83.
9. Chu CH, Chau AM, Lo EC, Lam A. Planning and implementation of community oral health programs for caries management in children. *Gen Dent*. 2012;60:210–215.
10. Obregón-Rodríguez N, Fernández-Riveiro P, Piñeiro-Lamas M. et al. Prevalence and caries-related risk factors in schoolchildren of 12- and 15-year-old: a cross-sectional study. *BMC Oral Health*. 2019;19(1):120.
11. Mulu W, Demilie T, Yimer M, Meshesha K, Abera B. Dental caries and associated factors among primary school children in Bahir Dar city: a cross-sectional study. *BMC Res Notes*. 2014;7:949.
12. Youssefi MA, Afroughi S. Prevalence and Associated Factors of Dental Caries in Primary Schoolchildren: An Iranian Setting. *Int J Dent*. 2020;2020:8731486.
13. World Health Organisation. Oral health surveys: basic methods. 5th ed. Geneva, Switzerland: World Health Organization; 2013.
14. Maharani DA, Zhang S, Gao SS, Chu CH, Rahardjo A. Dental Caries and the Erosive Tooth Wear Status of 12-Year-Old Children in Jakarta, Indonesia. *Int J Environ Res Public Health*. 2019;16(16):2994.
15. Wright JT, Crall JJ, Fontana M, Gillette EJ, Nový BB, Dhar V, Donly K, Hewlett ER, Quinonez RB, Chaffin J, Crespín M, Iafolla T, Siegal MD, Tampi MP, Graham L, Estrich C, Carrasco-Labra A. Evidence-based clinical practice guideline for the use of pit-and-fissure sealants: A report of the American Dental Association and the American Academy of Pediatric Dentistry. *J Am Dent Assoc*. 2016;147(8):672-682.
16. Llana C, Calabuig E, Sanz JL, Melo M. Risk Factors Associated with Carious Lesions in Permanent First Molars in Children: A Seven-Year Retrospective Cohort Study. *Int J Environ Res Public Health*. 2020;17(4):1421.
17. Lendrawati L, Pintauli S, Rahardjo A, Bachtar A, Maharani DA. Risk Factors of Dental Caries: Consumption of Sugary Snacks Among Indonesian Adolescents. *Pesquisa Brasileira em Odontopediatria e Clínica Integrada*. 2019;19(1):e4488.
18. Utami U, Agustanti A, Rachmawati YL, Setiawati F, Yavuz Y, Cavalcanti AL, Maharani DA. Food Consumption Frequency and Dental Caries Status among Adolescents in Jakarta. *J Int Dent Med Res*. 2020;13(3):1054-1058.
19. Mika A, Mitus-Kenig M, Zeglen A, Drapella-Gasior D, Rutkowska K, Josko-Ochojska J. The child's first dental visit. Age, reasons, Oral Health Status and Dental Treatment Needs among Children in Southern Poland European. *J Paediatric Dent*. 2018;19(4).
20. Yu ZJ, Elyasi M, Amin M. Associations among dental insurance, dental visits, and unmet needs of US children. *J Am Dent Assoc*. 2017;148(2):92-99.
21. Reic T, Galic T, Milatic K, Vranig DN. Influence of nutritional and oral hygiene habits on oral health in Croatian island children of school age. *Eur J Paediatric Dent*. 2019;20(3).
22. Leary SD, Do GL. Changes in oral health behaviours between childhood and adolescence: Findings from a UK cohort study. *Community Dent Oral Epidemiol*. 2019:1–7.
23. Ayele FA, Taye BW, Ayele TA, Gelaye KA. Predictors of dental caries among children 7-14 years old in Northwest Ethiopia: a community based cross-sectional study. *BMC Oral Health*. 2013;13:7.
24. Shaffer JR, Polk DE, Feingold E, et al. Demographic, socioeconomic, and behavioral factors affecting patterns of tooth decay in the permanent dentition: principal components and factor analyses. *Community Dent Oral Epidemiol*. 2013;41(4):364-373.
25. Jamieson LM, Roberts-Thomson KF, Sayers SM. Dental caries risk indicators among Australian Aboriginal young adults. *Community Dent Oral Epidemiol*. 2010;38(3):213-221.