Journal of Dentistry Indonesia

Volume 23
Number 1 *April*

Article 2

4-28-2016

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Recommended Citation

Adiatman, M., Yuvana, A. L., Nasia, A. A., Rahardjo, A., Maharani, D. A., & 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

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Journal of Dentistry Indonesia 2016, Vol. 23, No.1, 5-9
doi:10.14693/jdi.v23i1.982

ORGINAL ARTICLE

Dental and Gingival Status of 5 and 12-Year-Old Children in Jakarta and Its Satellite Cities

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ABSTRACT

Jakarta is the capital city of Indonesia which is surrounded by its satellite cities Bogor, Depok, Tangerang, Bekasi. Nonetheless, scarce information are available of the current oral health of children. **Objective:** The study aims to describe caries and gingival status among 5 and 12 years old children in Jabodetabek. Jabodetabek is an abbreviation of Jakarta, the capital city of Indonesia, and the satellite cities in its surrounding (Bogor, Depok, Tangerang, Bekasi). **Methods:** The survey was done in 2014 and had already got ethical approval. Design of this study was crosssectional**.** Subjects were 5-year-old and 12-year-old Indonesian children living in Jabodetabek, selected using cluster sampling method. One trained examiner performed the clinical examination. Caries experience was measured using DMFT index, severity of decayed teeth was assessed using PUFA index, gingival status and oral hygiene were measured by Loe and Sillness modified index. **Results:** A total of 390 5-year-old and 458 12-year-old children with balanced proportion between girls and boys participated in the survey. The prevalence of caries experience among the 5-year-old children and 12-year-old children were 90% and 84% respectively. The mean DMFT and DT scores among the 5-year-old children and 12-year-old children were 7.5±5.5 and 6.8±4.8; 3.2±2.2 and 2.9±2.1 respectively. Pulp involvement were apparent in 45% and 23% of caries in 5 and 12-year-old children respectively. Most children, 45% 5-year-old children and 92% 12-year-old children had substantial amount of plaque. Moreover, 68% 12-year-old children had gingivitis. **Conclusion:** Dental caries were prevalent among 5 and 12-year-old Indonesian children in Jakarta and its satellite cities. The oral health condition of most of the children were poor.

Key words: oral health, caries, periodontal, children, Indonesia

INTRODUCTION

Oral health plays a key role in general health. Although preventable, many people across the world still suffer unnecessarily from the pain and discomfort associated with oral diseases, especially dental caries. In addition, the costs of dental treatment are high.[1] Dental caries and periodontal disease have historically been considered the most important global oral health burdens. Dental caries is still a major health problem in most countries as it affects 60–90% of school-aged children.[2]

The implementation of the Indonesian universal health care scheme (UHCS) just began in January 2014. The UHCS policy implementation is expected to make impressive strides towards increasing the accessibility of oral health services among Indonesians, and is expected to improve the oral health status of the nation. It is a daunting task to provide dental care to millions of people living in diverse geographic regions. The incidence of dental diseases in the country is still considerably high, and previous government policies have yet to improve the dental health status of Indonesians.[3] With an estimated population of 237,641,326 in 2010, Indonesia might have to cope with oral health burdens. 49.79% of the Indonesian population live in urban areas, such as Jakarta. As the capital city of Indonesia, Jakarta has a heterogeneous

population hailing from numerous ethnicities and socioeconomic strata. This city could be considered as representative of the Indonesian population, and conducting a dental health study in Jakarta would likely represent Indonesia's dental health status.[4] Bogor, Depok, Tangerang, Bekasi are suburbs and serves as a commuter city for Jakarta.

The World Health Organization (WHO) has selected 5 and 12 years as the indicator age group for international benchmarking of children's oral health.[5] However, epidemiological data on the caries status of Indonesian children are scarce. One study, using a small sample size, surveyed the oral health of children aged less than 5-year-old, showing a prevalence of 70% with mean dmf-t of 3.7, consisting 100% of untreated decay.[6] In order to better understand the dental health of Indonesian children in Jakarta and its satellite cities, and also to serve as a baseline data of the implementation of the UHCS in Indonesia, a new survey on a representative sample was warranted. The study described the dental caries and gingival status of 5 and 12-year-old Indonesian children living in Jakarta and its satellite cities.

METHODS

This study was a cross-sectional survey carried out in 2014 with ethics approval from the Ethical Committee of the Faculty of Dentistry University of Indonesia. Sample of 5 and 12-year-old Indonesian children living in Jakarta and its satellite cities, Bogor, Depok, Tangerang, and Bekasi were selected using cluster sampling method. There were 9 clusters selected, which consist of North Jakarta, Central Jakarta, West Jakarta, East Jakarta, South Jakarta, Bogor, Depok, Tangerang, and Bekasi. One elementary school and one kindergarten in each cluster were randomly selected. All 12-year-old elementary school children, and all 5-year-old kindergarten students in the chosen schools were invited to participate in this study. Children with parental written informed consent, and in good general health were included. Children who were absent from school on the day of examination were not included in this study.

All of the children underwent a clinical examination, which was conducted by a trained dentist in the primary school and kindergarten using 0.5 mm ball-ended CPI probe and a disposable dental mirror and headlight. Dental caries status was assessed based on the methods and criteria recommended by the WHO.[5] The DMFT index was used to record the caries experience. 'D' represents decayed tooth. Only deciduous teeth and only permanent teeth were examined and recorded in 5-year-old and 12-year-old children respectively. 'M' stands for missing tooth due to decay and 'F' denotes filled tooth. The DMFT index was used to record the caries status in 12 years old children and the deft was used to record the caries status of the 5 years old children. Caries were detected mainly visually and recorded if a lesion had an unmistakable cavity, a shadow of discolored dentine visible through intact enamel, or a detectable softened floor or wall. Signs of early caries, such as white or brown spot lesions and rough surfaces or fissures that were sticky to probing but without a detectable softened floor or wall, were not diagnosed as dental caries. The 'PUFA' index, was used to record the clinical consequence of caries disease.[7] This index was used to record untreated carious tooth with visible pulp involvement. This was noted when the pulp chamber was visible or only the roots or root fragments were left. The index also represents an untreated carious tooth with a visible apical infection that can be in the form of an abscess or fistula.[8] PUFA was the indexed used for 12 years old and pufa was the indexed for the 5 year old children. Plaque Index (PI) and Gingival Index (GI) were employed to determine the oral hygiene and gingival status of the children.[9] Modified PI and GI were performed with scores as follows: PI = '0' no plaque, '1' plaque visible on probing only, '2' visible plaque; GI = '0' no bleeding, '1' minimal to moderate bleeding, '2' widespread or spontaneous bleeding.[10] GI was only recorded on 12-year-old children, as recommended by the WHO. Both in PI and GI recording, if the measurement was unable to be taken on the tooth, such as missing tooth, the measurement was not recorded.

The clinical examination was conducted by a single trained examiner. Duplicated examination was carried out on the same day at a different time. As recommended by the WHO's basic oral-health survey method, duplicate examinations were performed on 10% of the children to evaluate the intra-examiner agreement on assessment. Those children were re-examined at least one hour after the first examination so that the examiner was unlikely to remember the oral-health status of the child. Data processing and analysis were performed with SPSS 20.0. The distribution of the dependent variables were not normal. The Mann–Whitney U test was used to analyze the differences in the severity of the dental caries between boys and girls. The caries prevalence between groups was assessed with a chi-square test. The statistical significance level for all tests was set at 5%.

RESULTS

A total of 390 5-year-old children (202 boys and 188 girls) from 10 kindergartens, and 458 12-year-old children (227 boys and 231 girls) from 10 primary schools joined the survey. The kappa values representing the intra-examiner reliability for scoring DMFT, PUFA, PI and GI were 0.98, 0.95, 0.83, and 0.85 respectively. A total of 90% 5-year-old and 84% 12-year-old children

Table 1. Caries prevalence, caries experience, decayed teeth, missing teeth, filled teeth and severe untreated caries according to gender in 5 and 12-year-old children

	n (%)	% caries	% PUFA	Mean DMFT(SD)	Mean DT(SD)	Mean MT(SD)	Mean FT(SD)	Mean PUFA(SD)
Total (5 years-old)	390 (100%)	90%	40%	7.5 (5.5)	6.8 (4.9)	0.7 (1.9)	<0.1 (0.2)	1.4 (2.2)
Boys	202 (52%)	91%	38%	8.0 (5.7)	7.3 (5.1)	0.7 (1.9)	<0.1 (0.2)	1.5 (2.6)
Girls	188 (48%)	89%	43%	7.0 (5.3)	6.4 (4.7)	0.6 (1.7)	<0.1 (0.1)	1.3 (2.2)
p-values		0.392	0.749	0.112	0.126	0.449	0.705	0.638
Total (12-years-old)	458 (100%)	84%	19%	3.2 (2.2)	2.9 (2.1)	0.1 (0.6)	<0.1 (0.3)	0.3 (0.6)
Boys	227 (50%)	80%	16%	2.9 (2.3)	2.7 (2.1)	0.2 (0.6)	<0.1 (0.3)	0.2 (0.6)
Girls	231 (50%)	88%	33%	3.4 (2.2)	3.2 (2.1)	0.1 (0.5)	<0.1 (0.3)	0.3 (0.6)
p-values		0.852	0.008	0.004	0.002	0.227	0.095	0.130

Table 2. Prevalence of severity of plaque accumulation and gingival health according to gender in 5 and 12-year-old children

	Total	Boys	Girls	*p-values*
5-year-old children				
PI = 0	3%	4%	3%	0.593
PI = 1	24%	19%	29%	0.095
PI = 2	45%	50%	42%	0.099
12-year-old children				
PI = 0	1%	1%	1%	0.655
PI = 1	4%	3%	6%	0.108
PI = 2	92%	94%	90%	0.846
12-year-old children				
GI = 0	29%	27%	31%	0.384
GI = 1	15%	16%	15%	0.906
GI = 2	53%	55%	51%	0.653

PI = Plaque Index; GI = Gingival Index

examined had caries experience. The mean DMFT score was 7.5 (SD score of 5.5) and 3.2 (SD score of 2.2) in 5 and 12-year-old children respectively (Table 1). The mean number of restored teeth are only 0.02 (SD score 0.17) in the 5-year-old and 0.06 (SD score 0.31) in the 12-year-old children. Lower DMFT scores were found for the girls than for the boys (7.0 ± 5.3 vs. 8.0 ± 5.7; $p = 0.112$) in the 5-year-old children. On the contrary, in the 12-year-old children the boys have statistically lower DMFT than the girls (2.9 ± 2.3 vs. 3.4 ± 2.2; $p = 0.004$). Forty percent of the 5-year-old children and 19% of the 12-year-old children had carious teeth that has progressed to pulp infection (PUFA > 0). The mean pufa and PUFA score were 1.4 (SD score 2.2) and 0.3 (SD score 0.6) in 5 and 12-year-old children respectively (Table 1). These were similar to previous studies regarding the children's PUFA score.[7,8]

Table 2 showed that 45% and 92% of the 5 and 12-year-old children respectively had plaque score of 2 (plaque can be seen visually), whereas children who have zero plaque score were only 3% of the 5-year-old and 1% of the 12-year-old children. The prevalence of children who have good gingival health were only 29% of the 12-year-old children. While the others had gingival bleeding. Nonetheless there were no significant differences in the plaque score nor gingival health between girls and boys.

There are tendencies of dental caries prevalence in certain teeth which were similar between boys and girls. The most frequent dental caries in the 5-year-old children were found in the central incisors of the upper jaw, tooth 51 and 61 with its prevalence 67% and 66% respectively. The most commonly affected tooth due to dental caries on the lower jaw were tooth 75 and 85 with its prevalence 60% and 58% respectively (Figure 1). Furthermore, all four first molar in the 12-year-old children have high dental caries occurrence. Percentage of tooth element in 16, 26, 36, and 46 which were affected from caries were 48%, 47%, 73%, and 72% respectively. The caries in the first molar of the lower jaw were more prevalent than the upper jaw (Figure 2).

DISCUSSION

Disease levels are increasing rapidly in developing countries, particularly as a result of a growing consumption of sugars and inadequate exposure to fluorides.[2] To ensure effective delivery of interventions and optimal allocation of resources, an epidemiological survey in Jakarta and its satellite cities is crucial to identify oral health problems in children. The sample may not be representative of the Indonesian children, but the children who participated in this study was relatively adequate. In addition, the data was collected by a single examiner, and the value of intra-examiner reliability was good.

The caries experience found in 5-year-old children in this study, who were living in the capital city of Indonesia and the nearest surrounding cities, is alarming with decay prevalence of 90% and decay score of 6.8 teeth. It is similar to the caries prevalence and mean decay score of the minority living in China, who mostly live in rural areas.[11,12] Moreover the caries

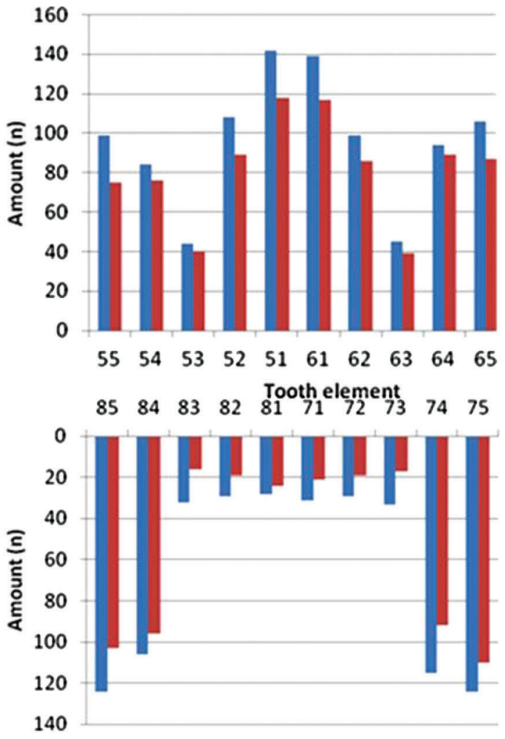

Figure 1. Caries experience in 5-year-old children based on tooth element (left bar=boys; right bar=girls)

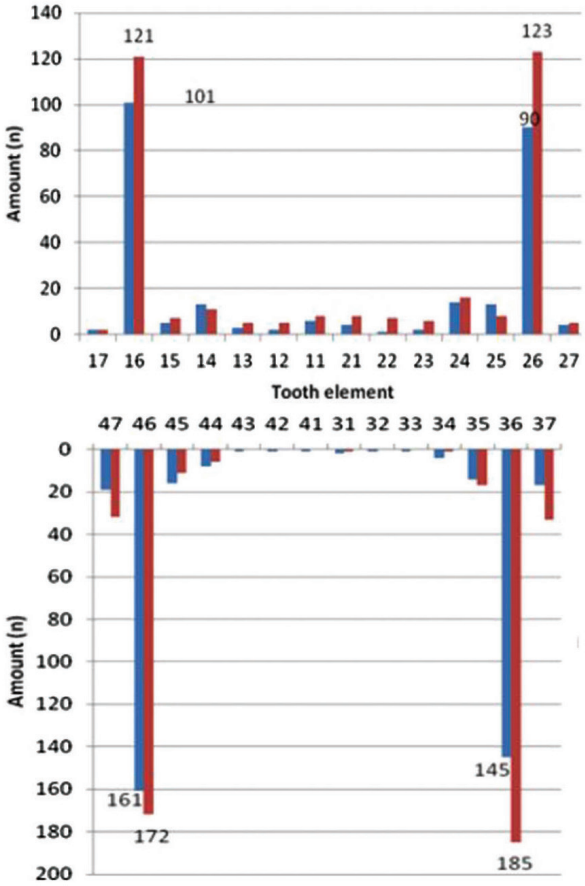

Figure 2. Caries experience in 12-year-old children based on tooth element (left bar=boys; right bar=girls)

prevalence of the 12-year-old children in this study (84%) with a mean decay of 2.9 teeth are far exceed those in Hong Kong with 21% prevalence and 0.16 of decay score and also the ethnic minority groups in China whom decay prevalence and mean decay score of 35% and 0.6 respectively.[13,14] The highest prevalence of caries in 5-year-old children was found in the maxillary incisors. Longer duration of exposure to cariogenic challenge according to the chronological tooth eruption sequence might be the cause of this prevalence.[15] Oral health promotion is crucial for prevention of dental caries in this community.

When dental caries rates are reported by gender, females are typically found to exhibit higher prevalence rates than males. This finding is similar with the study outcome in the 12-year-old children where girls have statistically higher prevalence of decay.[12] Higher caries prevalence among females might be explained due to earlier eruption of teeth in girls, hence longer exposure of girls' teeth to the cariogenic oral environment.[16] The biochemical composition of saliva and overall saliva flow rate are modified by hormonal fluctuations during events such as puberty, making the oral environment significantly more cariogenic for females than for male.[16] These results suggest that hormonal fluctuations can have a dramatic effect on the oral health of females, and constitute as an important causal factor in explaining gender differences in caries rates.

The WHO recognized that dental diseases are the most prevalent non-communicable diseases globally and that the treatment of dental diseases is expensive (WHO 2015). A recent review concluded that dental caries in children is one of the major health problems and is a burden for Indonesia.[3] This study showed that the DMFT score in 5 and 12-year-old children in the Jakarta and its sub-urban cities was high, and their oral hygiene condition were generally poor. While socio-economic status is one of the most important factors in dental inequalities, underlying cultural beliefs and practices can influence oral health status through diet and dental care-seeking behavior.[17]

Dental caries is a diet-mediated disease. There is extensive scientific evidence that free sugars are the primary factor in the development of dental caries.[18] Nonetheless this study's limitation is that the intraoral examination was not accompanied with a validated and reliable questionnaire to be able to analyze the dietary behavior of the sample examined in this study and relate. Further studies shall be conducted using a

questionnaire to understand participant's oral behavior and elaborate the possible underlying reasons for the serious caries situation.

Dental caries is prevalent among the children in this study and most were left untreated. This may be due to inequity in the use of dental care services that is caused by economic barriers.[19] Expansion of health insurance may reduce economic barriers to dental care. This study was conducted on the early time of the implementation of the Indonesian Universal Health Care Scheme, and might serve as the oral health status baseline data of the children living in Jakarta and its surrounding satellite cities. The UHCS may significantly reduce economic barriers to accessing dental care, which may result in improving Indonesia's dental health.[3] Uneven distribution of dental care services are reported to be geographic barriers causing limited access to dental care. Indonesian people who live in remote areas do not have sufficient access to dental care.[19] However, the sample of this study are children who live in and nearest to the capital city of Indonesia, where several dental schools are located and access to health care are without geographic barriers. Despite of this fact, the oral health of these children are still poor. Improving the oral health of the Indonesian citizens is thus a challenging issue.

CONCLUSION

Dental caries were prevalent among 5 and 12-year-old Indonesian children in Jakarta and its satellite cities. Many of the decayed teeth were left untreated, and some had odontogenic infections. The oral health condition of most of the children were poor.

CONFLICT OF INTEREST

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias the conduct and findings of this study.

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(Received February 3, 2016; Accepted April 5, 2016)