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Gingival Health Status of 12-Year-Old School Children in Jakarta: A Cross-Sectional Study

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Abstract

Background: Epidemiological data on gingival status in children is important because periodontal disease is one of the most prevalent diseases in Indonesia. This study aimed to assess the gingival health status and its associated factors among 12-year-old schoolchildren in Jakarta. **Methods:** This was a cross-sectional study of 12-year-old schoolchildren. There were 481 students who were recruited from 24 public and private junior high schools in Jakarta using multistage cluster proportional-to-size random sampling. Periodontal status was recorded using the community periodontal index (CPI) based on World Health Organization standards. A self-completed questionnaire was given to the parents to collect information on children's backgrounds and oral health-related behaviours. **Results:** Only 3 of 478 participating children had healthy gums (no bleeding gums and no calculus). 99% of the children had bleeding gums and 84% had calculus. The prevalence of calculus was higher in girls than in boys. Periodontal status was not significantly related to tooth brushing habits or dental check-ups. **Conclusions:** Poor periodontal conditions were highly prevalent among 12-year-old schoolchildren in Jakarta. Oral health promotion and prevention strategies are urgently required.

Keywords: children; epidemiology; gingiva; Jakarta; periodontal status

Introduction

Dental caries and periodontal diseases have historically been considered the most important global oral health burdens.¹ Data from the 2013 National Household Health Survey showed that only 2.3% of 12-year-old children brush their teeth correctly and regularly twice a day.² Brushing twice a day, compared to once a day, significantly decreases the prevalence of caries.¹ Similar beneficial effects of brushing twice daily have also been found in terms of gingival health.³ Despite this clear scientific evidence, a study conducted in Jakarta revealed that the mean daily tooth brushing frequency was below recommended levels.⁴ Therefore, all oral health stakeholders must address this issue and reach out to those who do not normally seek oral health care to help them brush effectively twice a day.

In terms of population, Indonesia (capital city, Jakarta) is the fourth largest country in the world, after China, India and the United States.⁵ The prevalence of periodontal diseases among children still remain high in Indonesia.⁶ Gingivitis is a periodontal condition that is a local response developed from dental plaque. It can be seen

on presence of clinical signs and symptoms, including gingival bleeding and dental calculus. Moreover, poor oral hygiene and behaviour impact on gingival status.⁷ However, there is limited epidemiological data on the gingival status among Indonesian children.

Gingival status is as part of periodontal health. The risk factors of periodontal health are socially patterned. The social gradient and inequalities in periodontal health exists all over the world.^{8,9} Children from disadvantage socio-economic status tend to have worse oral health. In Indonesia these inequalities are also persist.^{10,11,15} The present study aimed to examine gingival health status and its associated factors among 12-year-old school-children living in Jakarta. Based on The World Health Organization (WHO), 12-year-old are as the indicator for international benchmarking of children's oral health.¹²

Methods

This was a cross-sectional epidemiological study of 12-year-old children recruited through a multistage cluster proportional-to-size random sampling from 24 of the 1,346 junior high schools officially listed on the

Indonesian Department of Education’s website. All listed schools (public and private) had an equal opportunity to participate in this study, and all 12-year-old children were invited to participate.

Data were collected from September to October 2016 through a brief visual non-invasive clinical oral examination and interviewer-administered questionnaire. Ethical approval was obtained from the Ethical Committee of the Faculty of Dentistry, Universitas Indonesia (No: 6/Ethical Approval/FGUI/I/2016). Additionally, parents provided written consent for their children to participate in the study and interview as well as undergo a clinical dental examination.

Sample size was calculated by dividing $Z\alpha^2PQ$ with d^2 ; P the prevalence of gingivitis, d is precision, Q: 1 – P, $Z\alpha$: 0.05. The prevalence of gingivitis was 68% that used from a population study in Jakarta.¹³ In order to considering 10% for nonresponse, the minimum sample was 479 children. Therefore, 481 students in this study met the minimum required sample.

This study involved a dentist and an interviewer who were trained and calibrated. Clinical examination was performed at the schools using a 0.5-mm ball-ended community periodontal index (CPI) probe, a disposable

dental mirror and a headlight. Periodontal status was recorded using the CPI index based on World Health Organization standards.¹² Parents were given a question-naire to collect information on their children’s backgrounds and oral health-related behaviours.

Data were checked, cleaned, entered in Excel (Microsoft Corporation, Redmond, WA, USA) and analysed with SPSS. Non-parametric was tested in the analysis. Mann Whitney test analyse the relationship between gingival status and gender. Kruskal Wallis test analyse the relationship gingival status with tooth brushing frequency, chewing gum habit, and dental check-up.

Results

Of the 481 participating children, 403 (83.8%) had calculus, 478 (99.4%) had bleeding gums and only one had healthy gums (no bleeding gums and no calculus). The prevalence of bleeding gums and calculus was 99% and 84%, respectively. The prevalence of calculus was higher in girls than in boys. However, the prevalence of gingival bleeding was higher in boys than in girls (Table 1). Parents were a factor significantly related to periodontal status ($p < 0.01$; Table 2). Periodontal status was not significantly related to tooth brushing frequency, chewing gum frequency or dental check-ups (Table 3).

Table 1. Average Numbers of Teeth with Gingival Bleeding and Dental Calculus According to Sex

Variable	Mean (SD)	Median (min–max)	p
Dental calculus			0.772
Boys (n = 207)	4.5 (3.6)	4 (0–15)	
Girls (n = 274)	4.6 (4.2)	4 (0–21)	
Gingival bleeding			0.052
Boys (n = 207)	14.5 (6.4)	15 (1–28)	
Girls (n = 274)	13.5 (6.9)	13 (0–28)	

Table 2. Prevalence of Sociodemographic Characteristics of Participants

Variable	N (%)	Median (min–max)	p
Area			
Central Jakarta	94 (19.5)	16.5 (3–28)	
West Jakarta	76 (15.8)	15.5 (2–28)	
East Jakarta	160 (33.3)	14 (1–27)	0.000*
South Jakarta	67 (17.5)	12 (0–27)	
North Jakarta	84 (13.9)	10 (0–28)	
Category of school			
Public	288 (59.9)	14 (2–28)	0.589
Private	193 (40.1)	13.5 (0–28)	
Father’s education			
Elementary school or not going	46 (9.6)	17 (2–28)	
Junior high school	92 (19.1)	15.5 (2–28)	0.000*
Senior high school	240 (49.9)	14 (0–28)	
Undergraduate or more	103 (21.4)	10 (0–28)	
Mother’s education			
Elementary school or not going	66 (13.7)	16 (2–28)	
Junior High school	99 (20.6)	16 (2–28)	0.000*
Senior High school	225 (46.8)	14 (0–28)	
Undergraduate or more	91 (18.9)	11 (0–28)	

* $p < 0.05$

Table 3. Tooth Brushing Habit and Dental Visit Behaviour Among 12-Year-Old Children

Variable Behaviour	N (%)	Median (min-max)	p
15 Tooth brushing frequency			
Never	11 (2.3)	6 (0-15)	0.251
Once a day	46 (9.6)	3 (0-12)	
Twice a day	328 (68.2)	4 (0-21)	
Three times or more a day	96 (20)	4 (0-21)	
Chewing gum frequency			
Every day	24 (5)	4 (0-15)	0.648
Three times a week	60 (12.5)	4 (0-21)	
Once a week	106 (22)	4 (0-15)	
<1 a day or never	291 (60.5)	4 (0-21)	
Dental check-ups every year			
Yes	95 (19.8)	3 (0-21)	0.065
No/never	386 (80.2)	4 (0-21)	

Discussion

Gingivitis and dental calculus are prevalent among children in this study. This may be due to economic barriers, leading to inequity in dental care.¹⁰ Health insurance expansion could potentially reduce economic barriers to dental care. This study was conducted after implementation of the Indonesian Universal Health Care Scheme, which may significantly reduce economic barriers to accessing dental care and may improve dental health in Indonesia.¹⁴ Indonesian people who live in remote areas do not have sufficient dental care access.¹⁰ However, the study sample includes children who live in the capital city of Indonesia with access to health care. Despite this fact, the oral health of these children remains poor.¹⁵ Thus, improving oral health of Indonesian citizens is challenging.¹⁵

It is crucial to identify oral health problems in children to ensure effective planning and delivery of interventions. This epidemiological survey in Jakarta revealed that the oral health of 12-year-old schoolchildren was unsatisfactory and most had gingivitis. However, most of the children claimed to brush their teeth at least once a day. This inconsistency between reported dental hygiene practice and actual oral health could be due to children over-reporting their tooth brushing habits or improper brushing techniques.^{4,16} Gingival health can be restored through adequate oral hygiene practice. Motivation and regular reinforcement to maintain good oral health are essential in promoting children's oral health. Proper school-based oral health programmes, which are feasible and effective in promoting gingival health in Indonesia, should be implemented.

Conclusions

Gingivitis and dental calculus were prevalent among 12-year-old Indonesian schoolchildren who live in Jakarta, the capital city. These oral health conditions were left

untreated. Nearly all of the 12-year-old schoolchildren in this study had poor periodontal condition, indicated by calculus and gingival bleeding. Therefore, strategies to promote oral health and prevent periodontal disease are urgently required.

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Conflict of Interest Statement

Authors declare no conflicts of interest in this research.

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