



Determinant Factors of Dental Caries in Indonesian Children Age 8-12 Years

Muhammad Harun Achmad¹, Sri Ramadhany², Susilowaty Mudjari³, Andi Mardiana Adam⁴

¹Lecturer, Pediatric Dentistry Department, Faculty of Dentistry, Hasanuddin University, Makassar, South Sulawesi, Indonesia.

²Lecturer, Community Medicine Department, Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, Indonesia.

³Lecturer, Orthodontic Department, Faculty of Dentistry, Hasanuddin University, Makassar, South Sulawesi, Indonesia.

⁴Lecturer, Periodontology Department, Faculty of Dentistry, Hasanuddin University, Makassar, South Sulawesi, Indonesia.

Author to whom correspondence should be addressed: Muhammad Harun Achmad, Pediatric Dentistry Department, Faculty of Dentistry, Hasanuddin University, Makassar, South Sulawesi, Indonesia. Phone: +62 85242739400. E-mail: harunachmader@gmail.com.

Academic Editors: Alessandro Leite Cavalcanti and Wilton Wilney Nascimento Padilha

Received: 06 March 2018 / Accepted: 18 May 2018 / Published: 29 May 2018

Abstract

Objective: To evaluate the determinant factors of dental caries in Indonesian children aged 8-12 years. **Material and Methods:** This study was observational and analytical with a cross-sectional design. A total of 114 children were selected using simple random sampling technique. Primary data was obtained from a questionnaire about tooth brushing habits, the use of toothpaste containing fluoride and cariogenic eating habits and data of dental caries obtained from direct observed by a dentist. Univariate data were analyzed using descriptive and bivariate data were analyzed using Chi-square tests. **Results:** The results obtained by 44.8% fair category of children who have tooth-brushing habits, use of toothpaste containing fluoride was 100%, and 71% middle category children who have cariogenic eating habits. The most consumed cariogenic food was ice cream with 76.3% participants consumed it one to three times a week. The most eaten cariogenic foods every day in this sample were syrup/pop ice soft drink (42.1%). No significant association between gender and dental caries incidence was observed ($p > 0.05$). **Conclusion:** There is significant association between tooth brushing habits with dental caries in Indonesian children aged 8-12 years at primary school in district of East Luwu Regency Tomoni.

Keywords: Toothbrushing; Diet, Cariogenic; Dental Caries.

Introduction

Puskesmas (Public Health Care) is one of the first type of health service facilities that has an important role in national health system, especially health effort subsystem. The community health effort of the puskesmas consists of first-level public health efforts and first-degree private health efforts. First-level public health efforts include essential community health efforts and community health development efforts. One of the community health development efforts is community dental health [1].

Dental and oral health is one of the public health issues that require comprehensive treatment because of its wide impact that needs immediate treatment before it is too late. One of the most common dental and oral diseases in oral health is dental caries. This caries problem often occurs in children [2]. Dental caries is a disease found throughout the world regardless of age, nation or economic status [3].

Based on the data of Basic Health Research (Riskesdas) in 2013 an increase in prevalence of active caries in Indonesia population compared to 2007, from 43.4% to 53.2%. The prevalence of dental caries in Indonesia by age 12 years was 42.6%. In Indonesia the DMFT index (Decayed, Missing and Filled Teeth) was equal to 4.6. This means the tooth decay of the Indonesian population of 5 teeth per person. Province with the highest DMFT index is Bangka Belitung, which is 8.5 and the lowest is West Papua, which is 2.6 [4].

Based on data from the National Health and Nutrition Examination Survey in the Center for Disease Control and Prevention (CDC) in 2011-2012 the prevalence of caries in children aged 6-11 years in the United States was 21%. The prevalence of dental caries in schoolchildren in Hawaii in 2014-2015 was 70.6% [5].

The results of research conducted in Saudi Arabia demonstrated a prevalence of dental caries in permanent teeth of children aged 10-12 years is 68%, while in India the prevalence was 61.5% [6]. In children of 12 years of age in Cilandak, South Jakarta, Jakarta, it was reported that 14.5% had moderate dental caries experience and 37.1% of children had poor dental caries experience. Children with a moderate consumption of foods with a sugar content corresponded to 69.4% and those who used fluoride toothpaste were 98.4% [7].

Another study conducted in children aged 10 to 12 years in Palembang (Indonesia) revealed that 56.5% of the children had dental caries and 38.7% did not have good brushing habits. Dental caries disease is important to be discussed because it does not only cause pain but also spreads infection to other body parts resulting in decreased productivity and disrupts the growth and development of children [8].

Therefore, the objective of this study was to evaluate the determinant factors of dental caries in Indonesian children aged 8-12 years.

Material and Methods

Study Design

This research was observational and analytical with a cross-sectional design and was conducted in five elementary schools in East Luwu District, Indonesia. The sample was composed by 114 children of both genders, ages ranging from 8 to 12 years old, taken by simple random sampling technique.

Data Collection

Primary data were obtained from questionnaires on tooth brushing habits, fluoride toothpaste use and dietary cariogenic habits and dental caries data obtained from direct examination by dentists using dental diagnostic tools. All the dentists involved in the research were paediatric dentistry specialists and general dentists that had been calibrated before the research was commenced. Paediatric dentistry specialists in this research were 5 specialists and the general dentists in this research were 10 dentists. Inter observer agreement was then calculated using the Cohen's Kappa statistic (0.92). The research was commenced from August 2017 to September 2017.

The rank for brushing teeth using Arikunto Method, the children fill the questionnaire consist 10 questions about how many times do they brush their teeth, the method, and parents participation. The questionnaires were made in Bahasa language and simple phrase. The sum of the scores was categorized as follows: Good (scores > 75%; total score 7,5), Fair (scores 60-75%; total score 6,0-7,5), and Bad (scores < 60%; total score 5,0).

The cariogenic eating habits were categorized as follows: High (score ≥ 21), Intermediate (score 11-20), and Low (score ≤ 10).

Statistical Analysis

For the analysis of data, the SPSS (Statistical Package for the Social Sciences for Windows, version 20.0) was used. Univariate data were analyzed descriptively and bivariate data were analyzed using Chi-square test. The statistical test performed has a significance level of 0.05 ($p = 0.05$) and confidence level of 95% ($\alpha = 0.05$).

Prevalence Ratio was calculated using this formula: $RP = A / (A + B) : C / (C + D)$, with A = Subject with risk factor of having tooth caries; B = Subject with risk factor of not having tooth caries; C = Subject without risk factor of having tooth caries and D = Subject without risk factor of not having tooth caries.

Ethical Aspects

This research has obtained a statement of feasible from the Ethics Commission of the Faculty of Medicine, Hasanuddin University. Informed consent was obtained from all of the parents/guardian of the participants.

Results

The proportion of dental caries in Tomoni Subdistrict East Luwu District is 80.7%. In Table 1 it can be seen that there were a greater number of female children (53.5%), with 11 years of age (52.6%) and that only 26% had good habits of oral hygiene.

Table 1. Distribution of children according to the presence of dental caries, gender, age and oral hygiene habits.

Variables	N	%
Dental Caries		
Yes	92	80.7
No	22	19.3
Gender		
Male	53	46.5
Female	61	53.5
Age (Years)		
10	26	22.8
11	60	52.6
12	28	24.6
Brushing Teeth Habits		
Good	30	26.3
Fair	51	44.8
Bad	33	28.9

Table 2 shows that they brushed their teeth in the morning (100%) and most of them answered “no” regarding brushing teeth with circular motion (77.2%).

Table 2. Distribution of children according to oral hygiene habits.

Oral Hygiene Habits	Yes		No	
	N	%	N	%
I brush teeth everyday	97	85.1	17	14.9
I brush teeth \geq 2x a day	74	64.9	40	35.1
I brush teeth every morning	114	100	0	0.0
I brush teeth after breakfast	60	52.6	54	47.4
I bursh teeth every night before going to bed	68	59.6	46	40.4
I brush teeth in a twist	26	22.8	88	77.2
I brush front teeth with from top to bottom repeatedly	33	28.9	81	71.1
I brush teeth inside to chew by going back and forth repeatedly on the upper and lower teeth	98	86.0	16	14.0
I cleaned tongue with a toothbrush after brushing teeth	44	38.6	70	61.4
I use my own brush	110	96.5	4	3.5

Based on kinds for cariogenic food consumed with frequency eating, we could see the most consumed cariogenic food was ice cream with 76.3% participants consumed it one to three times a week. The most eaten cariogenic foods every day in this sample were syroup/pop ice soft drink with 42% (Table 3).

Based on Table 4 it could be seen that caries proportion were more prevalent in female children (82%). The proportion of non-caries was more prevalent in female children (20.8%). No significant association between gender and dental caries incidence was observed ($p>0.05$). The highest caries proportion is found in children who have fair habits (100.0%).

Table 3. Distribution of the most consumed types of cariogenic foods.

Food Type Cariogenic	Everyday		4-5 times/week		1-3 times/week		Never	
	N	%	N	%	N	%	N	%
Chocolate	5	4.4	22	19.3	79	69.3	8	7.0
Ice Cream	5	4.4	16	14.0	87	76.3	6	5.0
Junk Food	16	14.0	23	20.2	71	62.3	4	3.5
Noodle / Noodle Meatballs	7	6.1	29	25.5	66	57.9	12	10.5
Soft Drink (Syrup / Pop Ice)	48	42.0	30	26.3	35	30.7	1	0.9
Candy	27	23.7	35	30.7	46	40.3	6	5.3
Biscuits	32	28.1	44	38.6	36	31.5	2	1.8
Donuts	7	6.1	27	23.7	70	61.4	10	8.8
Snack (Chiki, Wafer)	21	18.4	19	16.7	34	29.8	40	35.1

Table 4. Distribution of the children according to gender, teeth brushing habits, cariogenic eating habits and dental caries incidence.

Variables	Dental Caries Incidence				Total		p-value	RP (95%CI)
	Caries		Non-Caries		N	%		
	N	%	N	%				
Gender								
Male	50	82.0	11	18.0	61	100.0	0.713	1.05
Female	42	79.2	11	20.8	53	100.0		(0.86-1.24)
Teeth Brushing Habits								
Bad	32	97.0	1	30.0	33	100.0	0.000	3.23 (1.86-5.60)
Fair	51	100.0	0	0.0	51	100.0	0.393	0.97 (0.91-1.03)
Good	9	30.0	21	70.0	30	100.0		
Cariogenic Eating Habits								
High	4	66.7	2	33.3	6	100.0	0.616	0.85 (0.47-1.56)
Intermediate	67	82.7	14	17.3	81	100.0	0.304	0.80 (0.45-1.43)
Low	21	77.8	6	22.2	27	100.0		

PR = Prevalence Ratio.

Discussion

The prevalence of dental caries was high among children. Children have the highest risk of dental caries when their teeth just erupted [9]. At the age of 6-12 years there is a period of mixed teeth and the teeth most often affected by caries are molar teeth [1,10].

Complex carbohydrates such as wheat are relatively less harmful because they are not perfectly destroyed in the oral cavity, but low carbohydrate molecules easily unite with plaque and are metabolized rapidly by bacteria [10].

For the habit of brushing teeth that is bad when compared with good brushing habits. There is no significant relationship between bad habits of brushing teeth with the incidence of dental caries. This is in accordance with the results of research conducted in children in Gumpang Subdistrict Kartasura, Sukoharjo, in 2015 showed that there is a meaningful relationship between the habit of brushing teeth and dental caries incidence [11].

Most children brush their teeth every day but with the wrong procedures of brushing their teeth, as much as 77.2% of children brushing their teeth in an uncertain way. This suggests that there is a possibility that the child does not understand the correct brushing technique and the right time to brush the teeth, and there are also children who are lazy to brush their teeth thus children with fair habit of brushing teeth has high dental caries.

The results obtained in this research in Subdistrict Tomoni East Luwu District showed that 26.3% of children have good tooth brushing habits. The habit of brushing your teeth may be influenced by parents who have since childhood to teach their children to brush their teeth. A previous research conducted in children under five years showed that there was correlation between parental attitudes with dental caries incidence in children [11]. School teachers also have a role to teach and invite children to brush their teeth every day and parents who routinely ask their children to examine the teeth to the dentist or puskesmas is likely to have an influence on the child so that children have good habit of brushing teeth. Dental health education is very important in schools by health workers so that children from an early age understand the technique and time of brushing teeth is good and correct so as to reduce the risk for the occurrence of dental caries in children.

The most caries proportion were found in children who had the habit of eating cariogenic food which. In children with no caries the proportion was highest in children with a high cariogenic dietary habits. No significant association between eating habits cariogenic and dental caries was observed ($p>0.05$). In a similar way, no significant association between eating habits cariogenic and incidence of dental caries ($p>0.05$). The results are not related because caries factors not only seen from the habit of eating cariogenic foods. Cariogenic foods are sweet foods and sticky that can cause dental caries [10].

The most commonly consumed cariogenic food was the ice cream consumed 1-3 times a week and consumed daily at most is pop ice. Caricogenic foods often leave the remains in between teeth. Remnants of Food and beverage containing sugar will decrease plaque pH rapidly to levels that can cause demineralization of enamel [11,12]. Another possible factor causing caries is saliva. Saliva is the first defense against caries disease. In addition saliva function as well as lubricant, protector, buffer, cleaning, anti-solvent and anti-bacterial. A person with little or no saliva secretion, for example because aprialismus, malignant cancer radiation therapy and xerostomia, has a high percentage of dental caries [13-15].

This study has some limitations. First, the location of each school was far away, so that the researchers need to spend a lot of time travelling from one school to others. Furthermore, most of the children were reluctant to be examined by the researchers, sometimes for the younger children, we had to persuade for such a longer time.

Conclusion

There is significant association between tooth brushing habits with dental caries in Indonesian children aged 8-12 years at primary school in district of East Luwu Regency Tomoni.

References

1. Indonesia. Ministry of Health. National Institute of Health Research and Development. Basic Health Research. Jakarta. 2014.
2. Indonesia. Ministry of Health. National Institute of Health Research and Development. Regulation of the Minister of Health no. 75 Year 2014 on Puskesmas. School Age Children Becoming the Foundation of National

- Quality. Available at: http://www.aidsindonesia.or.id/uploads/20141210110659.PMK_No_75_Th_2014_ttg_Puskesmas.pdf. [Accessed on March 14 2017].
3. Tarigan R. Tooth caries. 2.nd. ed. Jakarta: EGC, 2013.
 4. Indonesia. Ministry of Health. Directorate General of Public Health. Available at: <http://www.gizikia.depkes.go.id/sekretariat/anak-usia-sekolah-menjadi-tumpuan-kualitas-bangsa/>. [Accessed on March 14 2017].
 5. Center for Disease Control and Prevention. Prevalence of Dental Caries. Available at: <http://www.cdc.gov/NCHS/dental>. [Accessed on March 14 2017].
 6. Farooqi FA, Khabeer A, Moheet IA, Khan SQ, Farooq I, ArRejaie AS. Prevalence of dental caries in primary and permanent teeth and its relation with tooth brushing habits among schoolchildren in Eastern Saudi Arabia. *Saudi Med J* 2015; 36(6):737-42. doi: 10.15537/smj.2015.6.10888.
 7. Karmawati IA, Tauchid SN, Harahap N. Risk differences of new caries occurrence at 12-year-old students of primary school of ukgs and non-ukgs element in cilandak district of south Jakarta in 2011. *J Health Quality* 2012; 2(4):223-33.
 8. Ibtiah F, Febry F. Factors associated with dental caries incidents in children 10-12 years old in elementary school 33 Palembang. *Jurnal Ilmu Kesehatan Masyarakat* 2011; 2(3):196-202.
 9. Pintauli S, Hamada T. Towards healthy teeth and mouth: Prevention and care. Medan: USU Press, 2008. p. 4-5.
 10. Nurhaliza C. Dental Caries. Jakarta: EGC, 2015.
 11. Nugroho A. Relationship patterns of cariogenic and tooth brushing habit against first permanent tooth decay in children aged 8-10 years 01 elementary school Sukoharjo. Skripsi Thesis, Universitas Muhammadiyah Surakarta, 2015.
 12. Arisman MB. Nutrition Science Book: Nutrition in the life cycle. Jakarta: EGC, 2004.
 13. Berg JH, Slayton RL. Early childhood oral health. NJ: Wiley-Blackwell, 2009.
 14. Achmad H, Ramadhany YF. Effectiveness of chitosan toothpaste from White Shrimp (*Litopenaeusvannamel*) to reduce number of streptococcus mutans in the case of early childhood caries. *J Int Dent Med Res* 2017; 10(2):358-63.
 15. Achmad H, Chandha MH, Harun S, Sudjarwo I, Yunus M, Rusdi RK, Khairunnisa P. Prevalence of medically compromised children regarding dental caries and treatment needs in Wahidin Sudirohusodo Hospital. *J Int Dent Med Res* 2017; 10(3):915-20.