The Correlation Between Dietary Habits and Dental Hygiene Practice with Dental Caries among Elementary School Children at Urban Area in Semarang

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Abstract

Dental caries is a major cause of tooth loss in children and young adults. Dental caries have been linked to the situation of underprivileged families, nutritional imbalance, and poor oral hygiene techniques, including lack of tooth brushing or flossing the teeth, and also have a genetic etiology. Dietary habits and dental hygiene practice can result in high caries in school children. This research aimed to explore the correlation between dietary habits and dental hygiene practice with dental caries among school children in urban area of Semarang. The subjects of this research were the elementary students 7 – 9 years old enrolled in schools located at urban area in Semarang in 2016 and their mother of a student who became the study sample. Data were statisically analyzed using bivariate analysis and multivariate analysis. Based on the research result, it can be concluded that: there was no correlation between total carbohydrate intake, refined carbohydrate intake, fiber intake, dental hygiene practice with dental caries, bottle feeding and duration of bottle feeding were assosiated with dental cariest-score. Overall, def-t score in the study was very bad with high median of dental caries score and many children have dental caries t-score more than 6.

How to Cite

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INTRODUCTION

Diagnose of dental caries started in1883 by WD Miller who found bacterial involvement in the development of caries. Although a century has passed and advances in medical techniques and technology have evolved, significant reduction in dental caries prevention has not yet reached. Tyas (2000) defined dental caries as microbial disease which is irreversible tissue calcification of teeth, is marked by the emineralization of inorganic and organic materials from the destruction of the tooth, which often causes cavitation (Raajendran et al., 2005).

Dental caries is a major cause of tooth loss in children and young adults. Dental caries, also known as tooth decay, is one of the most common chronic disease of people around the world; individuals who are susceptible to this disease throughout their lives. Dental caries is one of the most common childhood illnesses can be prevented; people vulnerable to the disease throughout their lifetime (Pitts, 2004; Axelsson, 2000; Fejeskov et al., 2008). This is the main cause of painful mouth and teeth. It can be arrested and potentially reversed in the early stages, but often do not limit themselves and without proper care, dental caries can progress until the teeth are destroyed (Fejeskov et al., 2008). Dental caries form through complex interactions over time, between acid-producing bacteria and fermentable carbohydrates, and many host factors including the teeth and saliva. The disease develops in both the crown and root of the tooth, and can arise in early childhood as aggressive tooth decay that affects the primary teeth of infants and toddlers. Caries risk include physical, biological, environmental, behavioral, and lifestyle-related factors such as the high number of cariogenic bacteria, inadequate saliva flow, sufficient exposure to fluoride, poor oral hygiene, appropriate methods of infant feeding, and poverty (Robert et al., 2007).

Dietary factors associated with the occurrence of caries is the amount of fermentation, concentration and physical form (liquid, powder, solid) of carbohydrates consumed, retention in the mouth, frequency of meals and snacks as well as the length of the time interval meal (Fejeskov et al., 2008). Children with high caries risk often consume sugary drinks between meals (Pereira et al., 2004).

Dental caries have been linked to the situation of underprivileged families, nutritional imbalance, and poor oral hygiene techniques, including lack of tooth brushing or flossing the teeth, and also have a genetic etiology (Brown & Poon, 2005). Recently reported that an adequate supply of nutrients from vitamin D and calcium (Ca) are important for the health of the mouth, and several authors have recommended fluoride supplements along with optimal supply of vitamin D. Tooth decay associated with the intake of sugar and acid in drinks and food. pH saliva has also been associated with caries (Domenick et al., 2009).

Children are very susceptible to tooth decay; parents must: provide a good diet of all time; children brushing their teeth until they mature enough to do a thorough job himself (usually by age 6 or 7 years); supervise brushing teeth twice a day and flossing after brushing the teeth. Based from Riskesdas data, the people who care about oral health in Indonesia increase from 29.6% (2007) to 31.1% (2013). Therefore, in Central Java the people that care with oral health also increase from 28.3% (2007) to 31.0% (2013) and especially in Semarang increase from 28.3% (2007) to 30% (2013). Based from Riskesdas data year 2013, people with more than 10 years old that brushing the teeth every day in Indonesia was 93.8%, Central Java 94.6% and in Semarang was 98%. However, there is no data about the corretences of brushing teeth. Giving babies sugary drink during sleep day or night is very dangerous because the flow of saliva decreases during sleep. Although baby bottle tooth decay usually occurs in the upper front teeth, other teeth may also be affected (Brown & Poon, 2005).

There has been no reported study about dental caries and dental hygiene practice. Therefore, this is important to do research to analyze correlation between school dietary habits and dental hygiene practice with dental caries among school children in urban area of Semarang.

Research benefits are to know the effect of dietary habits and dental hygiene practice to reduce the dental caries. Also this research was expected to provide an understanding of the relationship dietary habits and dental hygiene practice with dental caries and can be a benchmark reference for further research that can stimulate better research in the future.

METHODS

Design of Study

This research was an analytic observational study with a *cross sectional* research design. The correlation study to representation of the information obtained in the study. Data obtained during the study presented in the form of numbers, statistics are then analyzed and summari-

zed to determine the correlation between dietary habits with dental hygiene practice with dental caries among school children in urban area in Semarang. Statistics used were univariate, bivariate and multivariate analysis.

Population and Sample

The population in this study was all students in second grade student of Elementary School who are in urban area (SDN Rejosari 01 Semarang). The research subject was the elementary student age 7 – 9 years old enrolled in schools located in urban area in Semarang in 2016 and their. There were 80 respondents.

Inclusion Criteria: Second grade students (age 7 – 9 years old) and Informed consent from parents. Exclusion Criteria: sickChildren.

Data Collection Procedure

Data meal consumption habits of school age children by taking the data with Food Frequency Questionnaire (FFQ). Data was obtained by using the dental caries health checks and dental mouth mirrors on directly to see whether or not dental caries in children. Dental caries measurement using def score. The def index is applied to the primary dentition and is expressed as the total number of teeth or surfaces that are decayed (d), extraction (e), or filled (f) in an individual. For measurement def (decayed extraction filled) t-scores using modified WHO: ≤2:good; >2: bad. The procedure to get the data from respondents, used questionnaires.

Data Analysis

The data in this research was categorical data and then analyzed byUnivariate analysis. Univariate analyzes performed for each variable of the research results in the form of distribution of variables: gender, body weight, severity of dental caries, dietary habits. Bivariate analysis, the analysis was performed to determine whether or not the correlation between variable independent and dependent variables. Multivariate analysis also used to analyze the relationships between variables were tested with multiple regression analysis. Another multivariate analysis used is logistic regression.

RESULT AND DISCUSSION

The subjects in this study were 80 primary school students in SDN 01 Rejosari Semarang. Characteristics of research respondents or subjects can be seen in Table 1. The age of the research subjects were 7-9 years old, the average of age is 7.88 with percentage of 7 years old is 35%, 8 years old is 42.5% and 9 years old is 22.5%. The percentage characteristic of male is 52.5% and female is 47.5%. This showed that majority of respondents are male with age 8 years old.

Mother's educationed backgrounds are 8.8 %, junior high school at 13.8 %, senior high school at 58,8% and academic/bachelor degree at 18,8 %. At this indicated that majority of respondents has mother education Senior high school (58.8%). So they have good experience in dental caries and also with standard of education in Indonesia they are assumed to have good knowledge about that.

From Table 2. showed that frequency of teeth brushing majority respondents is 2 times (66.3%). Time of teeth brushing majority when bath time (52.5%). Mother teaching, majority respondents is Correct 100 % (51.2%). How children know of teeth brushing, majority of respondents

Table 1. Frequency distribution of age, sex, mother education

Parameter N = 80		n	%	Mean	SD	Min	Max
Age (years)	7	28	35.0				
	8	34	42.5				
	9	18	22.5				
Total		80	100.0	7.88	0.753	7	9
Sex	Male	42	52.5				
	Female	38	47.5				
Total		80	100.0	2.87	0.81	1	4
Mother Education	Elementary school	7	8,8				
	Junior high school	11	13,7				
	Senior high school	47	58,8				
	Academic / Bachelor degree	15	18,7				
Total		80	100.0				

Table 2. Frequency distribution of teeth brushing frequency, time of teeth brushing, mother teaching on teeth brushup , How children know of teeth brushup, mother reminding.

Parameter		N	%	Mean	SD	Min	Max
Frequency of Brushup	1 Times	4	5				
	2 Times	53	66.3				
	3 Times	23	28.7				
	4 Times	0	0				
Total		80	100.0	2.24	0.53	1	3
Time of teeth Brushing	Before Breaksfast (Wrong)	18	22.5				
	After Breakfast (Right)	9	11.2				
	Bath Time (Wrong)	42	52.5				
	Night Before Sleep (Right)	11	13.8				
Total		80	100.0	2.58	0.99	1	4
Mother Teaching	Correct 100 %	41	51.2				
	Little False	33	41.3				
	False 100 %	6	7.5				
Total		80	100	1.56	0.63	1	3
How Children Know of Teeth brushing	Parents	18	22.5				
	Parents and School	38	47.5				
	Parents,School,Dentist	23	28.2				
	TV	0	1.2				
	Nothing Teach	1	0.6				
Total		80	100	2.1	0.78	1	5
Mother Reminding	Always	52	65				
	Sometimes	23	28.8				
	Never	5	6.2				
Total		80	100	1.41	0.61	1	3

showed that from Parents and School (47.5%). Mother Reminding, majority of respondents stated Always (65%).

Table 3 showed that dietary intake has median and standard deviation (138.5±60.8). Majority of respondents has normal total Carbohydrate (73.8%) meanwhile 26.2% has low % total Carbohydrate. Carbohydrates are food components which become the main energy source and a source of dietary fiber. Table 2. also showed the result of average and standard deviation of fiber intake is 3.42 ± 2.704. This indicate that dietary intake and score of dental hygine practice was not good because the scores is higher than 11.

Table 4 showed that from 10 snacks that consumed by subjects, the most snacks that consumed is dry snack (28.8%) and from 5 drinks. The most consumed by subjects is Sweet Ice Tea (73.8 %) Dental Caries, also known as tooth decay, cavities, or caries, is a breakdown of the tooth due to bacterial activity. The cavity may be a different color from yellow to black. Symptoms may include pain and difficulty with eating.

Based on the result of analysis in this study, dental caries t-score is very bad and this study take place in urban area that is Semarang city, because urban area children in school like to consume snacks and drinking that a lot sweeteners and make dental caries, most of them consumed dry snack (28.8%), followed by rice fried (11.2%) and also chocolate (8,8%) that make dental caries (Table 5). Majority of subject also drinks sweet ice tea (73.8%) and milk (8.8%), these also make them to severe dental caries. Compared to another study done by Worotitjan et al. (2013), with study sample in sixth grade elementary school students in the village of North Kawangkoan Kiawa district of 60 samples, the result found the pattern of eating and drinking in primary school children in rural North Kawangkoan Kiawa District,it also showed that primary school students in Kiawa village having caries experience

Table 3. Frequency Distribution and Description of Dietary Intake and Dental Hygiene Practice

Parameter	N = 80					
	N= 80	%	Mean	SD	Min	Max
Dietary Intake						
% Total CHO	80	100.0	138.50	60.876	70	384
Low (< 254)	21	26,2				
Normal (> 254)	59	73,8				
% Refined CHO	80	100.0	153.50	124.8	6	622
Low (< 154)	39	48,8				
High (> 154)	41	51,2				
% Fiber	80	100.0	3.42	2.704	0	14
Low < 20	80	100				
Normal > 20	0	0				
Dental Hygiene Practice						
Score Dental Hygiene	80	100.0	11	2.314	9	19
Not Good (> 11)	56	70				
Good (≤ 11)	24	30				

Table 4. Frequency distribution of snack and drink consumpsion

Parameter	N = 80					
	N	%	Median	SD	Min	Max
Snack	80	100	6	3.112	1	11
Sausage	16	20				
Rice Fries	9	11.2				
Bread Fries	7	8.8				
Ball Noodle	6	7.5				
Dry Snack	23	28.8				
Candies	4	5				
Nugget	1	1.2				
Biscuits	4	5				
Chocolate	7	8.8				
Cake	3	3.8				
Drink	80	100	2	1.014	1	6
Mineral Water	6	7.5				
Sweet Ice Tea	59	73.8				
Milk	7	8.8				
Soft Drink	2	2.5				
Juice	4	5				
Colouring Drink	2	2.5				

caries being the average DMF-T (Dental Missing Filled-Teeth) 3.71 it means each one of children having four caries teeth. Highest frequency diet of elementary school chldren who consumed foods cariogenic carbohydrate snack at a frequency that is the most time 2-3 times per day and drinking patterns in elementary school children who consume isotonic drinks cariogenicie at a frequency of 1-3 times per week. So this reseach result was different with previous study because different place or area and also different life pattern.

Table 5. Frequency distribution and description of dental caries

| Parameter | N = 80 | | | | | |
	N	%	$\bar{x}$	SD	Min	Max
Score DEF-T	80	100.0	8.6	3.40	0	15
Good (≤ 2)	16	20				
Bad (>2)	64	80				

Table 6. Correlation between dietary intake and dental hygiene practice with dental caries (def.t 0 -14)

| Variables | Dental Caries (0 -14) | |
| | Spearman's | |
	correlation	P
% Total CHO Intake	0.044	0.697
% Refined CHO Intake	-0.019	0.846
% Fiber Intake	-0.061	0.304
Dental Hygiene Practice	0.11	0.331
Mother Education	-0.196	0.081

From Table 6. the Correlation Between Dietary Intake and Dental Hygiene Practice with Dental Caries were not significantly correlated between % total Carbohydrate intake with Dental Caries (r=0.044, p=0.697). There was no significant correlation between % Refined Carbohydrate Intake with dental caries (r= -0.019, p=0.846). There was no significant correlation between % Fiber Intake and Dental Caries (r=-0.061, p=0.304). There was no significant correlation betwen Dental Hygiene Practice and Dental Caries (r=0.11, p=0.331). There was no significant correlation betwen Mother Education and Dental Caries (r=-0.196, p=0.081).

From Table 7. showed that regression analysis, only Bottle Feeding duration has significant effect on Dental Caries score with p-value 0,002 < 0,05 this indicated that there is significant relationship between Bottle Feeding duration and Dental Caries score with OR Exp (B) = 8.6 , 95 % CI = 2.19-34.12. Another factors such as night bottle feeding and bottle feeding has no significant effect on dental caries score.

Logistic regression analysis was performed on three variables. The analysis showed that the variables associated with Dental caries that duration of breast feeding bottles. Based on logistic regression analysis then obtained the following equation:

$y = constanta + a1x1 + a2x2 + ... + aixi$

Caries (y) = -1.281 + 2.157 = 0.8760

Based on these equations, it can be used to predict the probability of a subject to experience the Dental caries can be calculated using the following equation:

$P = 1/(1+exp(-y))$

Information:

p = Probability for the occurrence of an event

y = Constanta +a1x1 +a2x2 +........ aixi

a = Coefficient value of each variable

x = The value of the independent variable

$1+ e^{-z} = 1,4164$

$P = 1/(1+exp(-1,4164))$

= 0.7060

The probability of the subject to experience the Dental Caries if a children Bottle Feeding more than two years is likely to experience Dental caries is 70.6% (Angela, 2005).

There was no significant correlation between night Bottle Feeding and Dental Caries score. Another findings of this research showed that Bottle Feeding duration has significant effect on Dental Caries score (p< 0.05) this because more higher for Bottle Feeding duration the Dental Caries will be more higher also because saliva and sugar will be a lot in children's teeth. The higher Bottle Feeding duration will affecting the Dental Caries because more sugar in mouth of children, this condition will cause the Dental Caries score.

CONCLUSION

Based on the research that has been described previously, it can be concluded that: there was no correlation between total carbohydrate intake with dental caries (p> 0.05), there was no correlation between refined carbohydrate intake with dental caries (p> 0.05), there was no correlation between fiber intake with dental caries (p> 0.05), and There was no correlation between Dental Hygiene practice with Dental Caries, (p>

Table 7. Multivariate Analysis (Regression) of bottle feesing duration toward dental caries

| | Coeff | S.E | Wald | Df | P value | OR | CI 95% | |
							MIN	MAX
Bottle Feeding duration	2.157	0.701	9.479	1	0.002*	8.6	2.190	34.120

0.05). Bottle feeding and duration of bottle feeding were assosiated with DEF-T Score. Overall, def-t score in the study was very bad with high median of def-t and many children have def-t score more than 6.

RECOMMENDATION

Based on the conclusion of this study so the recommendations as follows: Mother should pay attention of Bottle Feeding duration because will affecting dental caries, and also still keep implementing Dental Hygine practices in their children.In the future research can add another variables of factors that affecting Dental Caries.

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