Correlation between dental health maintenance behavior with Dental Caries Status (DMF-T)

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ABSTRACT

Background: The maintenance of oral and dental health is closely related to the people's behavior. Behavior or habits that may influence the development of dental caries is the eating habits as well as oral hygiene such as brushing the teeth regularly and adequately. Dental caries status is a condition that describes a person's experience of dental caries which is calculated by the index DMF-T.

Objective: The study aims to determine the relationship between the behavior or habit of maintaining the teeth and mouth with dental caries status of communities in Indonesia.

Methods: It was an observational study with cross-sectional study design. The samples were household members aged $\geq$ 15 years with the number of 173,828 people. Data were collected by interview and examination of the teeth and mouth.

Results: The result showed that the respondents with dental caries more than the respondent without dental caries (92.60%). There was a significant relationship between hygienic behavior with dental caries status (P = 0.004; OR = 1.426; 95% CI = 1.123-2.810). However, there was no significant relationship of behaviors/habits of eating fruits and vegetables with dental caries status (P = 0.145; OR = 1.107; 95% CI = 0.966-1.270). But, there was a significant relationship between habitual physical activity with dental caries status (P = 0.000; OR = 1.443; 95% CI = 1.350-1.543).

Conclusion: There is a significant relationship between physical activity and hygiene behavior with dental health maintenance related to dental caries status. However, the behavior of eating fruits and vegetables has no significant relationship with dental caries status.

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INTRODUCTION

The prevalence of dental caries in developed countries is decreasing, while in underdeveloped and developing countries, the prevalence is on the rise.[1] Dental caries status is a condition that describes a person's dental caries experience and calculated by the DMF-T Index (Decayed, Missing, Filled).[2] Dental caries is one of the teeth and mouth problem that caused by demineralization of enamel and dentine which closely related to the consumption of cariogenic foods.[3] Dental caries is a multifactorial problem, and to be the occurrence of a process of dental caries; it needs the interaction of four factors such as the host, microorganisms, substrates, and period of time. These four factors must work together to make the process of dental caries. The process of dental caries begins with the presence of plaque on the tooth surface.[4]

The severity degree of dental caries in Indonesia is very high. The National Basic Health Research (Riskesdas) in 2013 described the prevalence of the Indonesian population who has problems with the dental and the mouth is 25.9%. The average dental caries as measured by the DMF-T index is 4.6 which means an average population of Indonesia has experienced tooth decay as much as 5 teeth and who received dental care from dental medical personnel by 31.1%.[5] The highest proportion of people with dental and oral problems is in the 35-44 years and 45-54 years age group (30.5% and 31.9%, respectively). This situation shows that the dental and oral problems may occur in the productive age group.[5]

World Health Organization (WHO) in 2010 has been targeting the DMF-T index is 1.0 while developing countries set caries index was 1.2. Various indicators have been determined by WHO for dental caries. Among others, 90% of 5 years old children should be free of caries, children aged 12 years have index DMF-T for 1, people aged 18 years have no extracted tooth (M = 0), and people aged 35-44 years have at least 20 teeth function by 90%.[6]

According to Bahar in Warni L. (2009), one of the main factors that influence dental and oral health population in developing countries is the behavior or habit. Behaviors that can affect the development of dental caries is the eating habits such as eating fruits and vegetables and maintenance of dental and oral hygiene, for example, regular brushing.[7] The 2013 National Health Research reported that people's behavior on the maintenance of dental health in the population groups $\geq$ 10 years with daily tooth brushing proportion was 93.8%, but the habits of the Indonesia population brush their teeth correctly (after breakfast and before bedtime) was only 2.3%.[5]

Dental and oral health status is very closely related to the behavior or habits of the dental and oral health maintenance. According to Antisari in Wahyu et al. (2013) behavior plays a major role in influencing dental and oral health status. Therefore, the importance of influencing behavior in dental and oral health status can affect both poor dental and oral hygiene including the scores of caries and periodontal disease.[8] This study aims to determine the relationship between behavior or habits with dental caries status in the Indonesia community.

METHODS

It was an observational study by using cross-sectional design. The data of dental and oral examinations were collected from the National Institute Health Research and Development (NIHRD), Ministry of Health of the Republic of Indonesia through the National Basic Health Research in 2013. The study population was the Indonesia population from 33 provinces and 497 district/cities.[4] The samples criteria were all members of the household with aged ≥ 15 years (because since the age of 15 years permanent teeth have grown up until the second molar teeth). Total sample size was 173.828 respondents. The selection of the sample was using census block sample frame from the National Institute Central of Statistics (BPS).

Inclusion criteria included all members of households aged ≥ 15 years and has signed an agreement to be the respondents. Exclusion criteria were the subject of severe pain and incomplete data.

In this study, the age was divided into two groups, ≤ 30 years of age and > 30 years of age. Furthermore, the education was divided into two groups, higher and lower (higher > junior high school; lower ≤ junior high school). Socio-Economic Status was divided into two groups, poor and not poor. The National Basic Health Research 2013 was approved by NIHRD Ethics Committee, Ministry of Health, Republic of Indonesia No. 01.1206.207.[9]

The data samples were complex with include strata (variable age, education, and socioeconomic status) and Primary Sampling Units (dental caries, hygienic behavior, eating fruits and vegetables, and physical activity). Analysis techniques were performed using univariate, bivariate, then followed by logistic regression.[10]

The implementation of data collection of dental and oral health through interviews (for the behavior or habits) and observations (Index DMF-T) by using the mouth mirror instruments with the help of sunlight lighting (flashlight).

RESULTS

The study showed that about 92.60% of respondents with age ≥ 15 years has Dental Caries (Table 1). In addition, table 1 also shows that the number of respondents without dental caries who had aged ≥ 30 years are more than < 30 years (12.602 vs 188), and the male respondents without the dental caries are more than female respondents (7.033 vs 5.757). Furthermore, the analysis of the education respondents without dental caries found that lower education had more dental caries than higher education (11.535 vs 1.255). Besides, the respondents with dental caries who work are more than not work (6.773 vs 6.017)

In table 2, the study shows that there is a significant relationship between Hygienic behavior and dental caries (P = 0.004; OR = 1.426; 95% CI = 1.123-2.810). The hygienic behavior has a significant relationship with dental caries where the absence of hygienic behavior was contributed 1.43 times higher for dental caries.

However, there is no significant relationship between the behavior of eating fruit and vegetables with dental caries status based on Table 3 (P = 0.145). This situation indicated that there is no significant relationship between the behavior of eating fruit and vegetables ≥ 5 portions/day and < 5 portions/day with dental caries status (OR = 1.107; 95% CI = 0.966-1.270)

In addition, Table 4 shows a significant relationship between physical activity behavior and

Table 1   Characteristics of Respondent

Variable	N	%	Dental Caries	
			No	Yes
Age				
< 30 years (young)	62.445	35.90	188	62.257
≥ 30 years (old)	111.383	64.10	12.602	98.781
Total	173.828	100	12.790	161.038
Gender				
Male	85.917	49.40	7.033	80.878
Female	87.911	50.60	5.757	80.160
Total	173.828	100	12.790	161.038
Education				
Higher	55.789	32.10	1.255	54.534
Lower	118.039	67.90	11.535	106.504
Total	173.828	100	34.504	161.038
Occupation				
Work	104.189	59.90	6.773	97.415
Not Work	69.639	40.10	6.017	63.623
Total	173.828	100	12.790	161.038
Socioeconomic				
Poor	58.085	33.40	5.889	52.146
Not Poor	115.743	66.60	6.901	108.842
Total	173.828	100	34.505	161.038

Table 2 Relationship of Hygienic Behavior with Dental Caries Status

| | Dental Caries | | | | | |
| | No | | Yes | | OR | |
Hygienic Behavior	n	%	n	%	(Odds Ratio)	p Value
Yes	153	4.0	3.679	96.0	1,426	0,004
No	10.859	8.7	114.009	91.3		
Total	11.012	8.6	117.688	91.4		

Table 3 Relationship Behavior of Eating Fruits and Vegetables with Dental Caries Status

| | Dental Caries | | | | | |
| | No | | Yes | | OR | |
Behavior of Eating Fruits and Vegetables	n	%	n	%	(Odds Ratio)	p-Value
≥ 5 portions/day	10,081	94.1	631	5.9	1.107	0.145
< 5 portions/day	140,434	92.9	10.775	7.1		
Total	150,515	93.0	11.406	7.0		

Table 4 Relationship of Physical Activity Behavior with Dental Caries Status

| | Dental Caries | | | | | |
| | No | | Yes | | OR | |
Physical Activity Behavior	n	%	n	%	(Odds Ratio)	p-Value
Adequate	3,807	6.9	51,747	93.1	1,443	0,000
Inadequate	8,983	7.6	109,291	92.4		
Total	12,790	7.4	161,038	92.6		

Table 5 The Logistical Regression Analysis of Dental Caries Status by Behavior or Habits Hygienic, Eating Fruits and Vegetables, and Physical Activity

	OR (Odds Ratio) (95% CI)	p Value	OR (Odds Ratio) p Value (95% CI)	p Value
Behavior or Habits	Initial Model		Final Model	
Hygienic	1.402 (1.096-1.793)	0.007	1.426 (1.123-1.810)	0.004
Eating Fruits and Vegetables	1.107 (0.966-1.270)	0.145	-	-
Physical Activity	1.434 (1.334-1.541)	0.000	1.443 (1.350-1.543)	0.000

dental caries status (P = 0.000; OR = 1.443; 95% CI = 1.350-1.543). Physical activity behavior has a significant relationship with dental caries status, where the inadequate of physical activity behavior was having 1.44 times higher risk for dental caries.

In Table 5, the hygienic behavior and physical activity have a significant relationship with dental caries status (P < 0.05), meanwhile the behavior of eating fruits and vegetables has no significant relationship with dental caries status (P > 0.05)

DISCUSSION

About 161.038 of 173.828 respondents (92.60%) had dental caries where the number of respondents who aged ≥ 30 years were more than age <30 years.

In addition, the female respondents also encountered more than male respondents, as well as the lower education respondents, have more dental caries than the highly educated respondents.

Costa SM et al. reported the study results in adults that the socioeconomic, education, and occupation effect on dental caries, whereas people with low socioeconomic found that having more severe dental caries.[11] In low-income families, the severity of dental caries greater than high-income.[12]

Zemaitiene M et al. in 2016 conducted a study in Lithuania found that the prevalence of dental caries was relatively high, and the different experiences in dental caries between people in urban and rural areas were influenced by their socioeconomic differences. In rural areas, the DMF-T was higher

than urban areas, whereas the DMF-T according to the gender were higher in male compared with female.[13]

The results of this study showed a significant relationship between hygienic behavior with dental caries status ($P = 0.004$; $OR = 1.426$; 95% $CI = 1.123$-2.810). The respondents with hygienic behavior showed having a lower incidence (4.0%) for dental caries in compared with unhygienic behavior (8.7%).

The study which was conducted in India about the positive attitudes and behaviors of dental and oral hygiene associated with the positive outcome for a dental and oral health condition.[14] Bozorgmehr E et al. reported that the behavior of the dental and oral health of parents like brushing is essential, due to as a determinant of behavior in their children. So by increasing the knowledge, attitudes and behavior of parents can also influence the behavior and status of dental and oral health in their children.[15]

The relationship between behaviors/habits of eating fruits and vegetables with dental caries status is not significant, with a value of p> 0.05 (p = 0.145). Accordingly, it means there is no relationship between behavior/habit of eating fruits and vegetables with dental caries status ($OR = 1.107$; 95% $CI = 0.966$-1.270). Decker et al. (2003) reported that eating raw fruits or vegetables can increase saliva flow; to reduce the risk of erosion and dental caries, and included in foods that can prevent the influence of Acidogenik.[16] The results of the study from Sari, RD et al. found that there was no difference in plaque pH between those who consume fruits with a group that did not consume fruits. Plaque is the cause of dental caries. Plaque control can be overcome by eating foods that are clean the teeth, that is fruits and vegetables.[17] In addition, this study also showed a significant relationship relationship between behaviors/habits of physical activity with dental caries status ($P = 0.000$; $OR = 1.443$; 95% $CI = 1.350$-1.543). A similar study from Alswat K et al. (2015) also reported a positive correlation between physical activities (exercise) with dental caries status.[18] Physical activity in the long term can be influential in dental caries.[19,20]

CONCLUSION

From these results, it can be concluded that the behavior or habits of hygienic and physical activity have a significant correlation with the dental caries status, while the behavior or habit of eating fruits and vegetables was not associated with dental caries status.

COMPETING INTERESTS

The authors declare that there are no competing interests.

AUTHORS' CONTRIBUTIONS

Made Ayu Lely Suratri, and Indirawati Tjahja N participated in the design and data collection and participated in data analysis and interpretation. Vivi Setiawaty also participated in the data analysis, interpretation, and drafting of the manuscript. All authors read and approved the final manuscript.

ACKNOWLEDGMENTS

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