Fluoride Level of Well Water and Dental Caries Status of Children in Surabaya

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ABSTRACT

Dental caries is a dental hard tissue disease that attacks almost all people in the world. Fluoride in water is very important for dental health, especially for children, this is because the right amount of intake can support the formation of tooth enamel that is resistant to damage caused by mouth. This study aims to determine the correlation of fluoride level in well water with the number of dental caries in elementary school children in the city of Surabaya in 2017. This research was analytic observational with a cross-sectional approach, located in four State Primary Schools in Surabaya City, representing North Surabaya, East Surabaya, South Surabaya and West Surabaya. The mean value of DMF-T of the study subjects was 1.58 (low category), the mean fluoride level in well water was 0.457 mg / L (low category). The results showed that the presence of fluoride in well water did not contribute to the low DMF-T value in this study.
Keywords: Caries status, Well water, Fluoride levels

INTRODUCTION

Background

Dental caries is a dental hard tissue disease that attacks almost all people in the world. Caries attacks the hard tissue of the teeth caused by the work of microorganisms on carbohydrates that can be distributed. Caries is characterized by the demineralization of enamel and dentin, followed by the crushing of organic matter. Caries causes changes in the form of reactionary dentine and pulpitis when approaching the pulp and can result in the occurrence of pulp death. Theearliest symptoms of a enamel caries seen macroscopically are colored white patches that look very different than the surrounding healthy enamel. Detection with sonde cannot be carried out at this stage because the six surrounds are still hard and shiny. The lesion will appear brown because the material around it is absorbed into the pores, but the surface that was intact will break (cavitation and cavities) if the enamel lesion has developed.[1]

Factors that cause caries are risk factors and modification factors. Risk factors for caries include bacteria, saliva, diet, oral hygiene, and fluoride. While the modification factor itself is a factor that indirectly causes caries, but the effect is related to the development of caries, these factors are age, sex, social factors, genetic, work and general health.[2] Based on Riskesdas (Basic Health Research of Indonesia),[3] the national dental caries index, which is 4.6. Whereas in East Java the cavity index itself was 5.5. Whereas according to age groups in the national data age 1-4 reached 10.4 and ages 5-9 reached 28.9 and data of East Java province age 1-4 group reached 12.1 and ages 5-9 reached 32.4.[3]

The prevalence of caries is related to the condition of tooth enamel. Email teeth that contain enough fluoride will make teeth more resistant to caries because they are not easily dissolved by acids. The presence of fluoride in acidic conditions in the oral cavity encourages the formation of flourhydroxyapatite so that remineralization occurs on the surface of the enamel. Flourhydroxyapatite is less soluble compared to hydroxyapatite and this prevents demineralization of tooth enamel. Important advantages of fluoride include helping to reduce the metabolic activity of bacteria. This advantage is obtained from the presence of fluoride in small amounts in the oral cavity. Fluoride is accepted as an effective method for preventing caries, but excessive consumption of fluoride can cause fluorosis to form.[4]

The higher the area, the lower the level of fluoride in the water, while the lower the area, the higher the fluoride level. Epidemiological studies have reported that areas with high fluoride levels in drinking water have a low percentage of dental caries. Residents with the different geographical location of residence have different caries risk if it is associated with fluoride levels in water consumed from well water.[5] Fluoride in water is very important for dental health, especially for children, this is because the right amount of intake can support the formation of tooth enamel that is resistant to damage caused by mouth. Fluoride is absorbed during the formation of teeth until the age of six years, the new tooth erupts enamel also absorbs more fluoride than the mature enamel , so that in those days it is necessary to have sufficient fluoride intake.[5]

Purpose

Based on the background and the existing problems, the aims of this study is to know the correlation between fluoride levels with the number of dental caries in elementary school children in Surabaya City in 2017.

METHODS

Type of Research

The type of research used Cross-Sectional Analytical research. Cross- sectional was a study to study the correlation dynamics between risk factors and effects, with a model of approach or observation at one time.

Sample

The sample in this study was class V students who met the following conditions:
1) An original resident residing in the city of Surabaya
2) Consuming water that came from well water either directly or processes
3) Willing to check the condition of his teeth
4) Techniques for taking respondents
5) The technique of taking respondents used purposive sampling.
6) The study sample was taken from four elementary schools in Surabaya, representing the North, East Surabaya, South Surabaya and West Surabaya regions of 10 students. The total was 40 students.

Location and Time

The location of this research was Surabaya City, while time needed in this study was February to October 2017.

Variables

The independent variable of this study was the level of Fluoride in well water, while the independent variable was caries number.

Data Collection

Data collection techniques used to obtain fluoride level data on treated or unprocessed well water were:
1) Prepared the equipment that was used for water sampling
2) Visited the respondent's house
3) Took a sample of water then put it in a plastic bottle
4) Labeled the respondent's identity on the bottle
5) Stored in boxes or cardboard
6) The sample was sent to the Health Laboratory of the Health Office of Surabaya City.

The instrument used in collecting data on fluoride levels used clean plastic bottles or pots of ointment, and then was sent to a health laboratory to the government health office in Surabaya. The instruments used in collecting data about dental caries status were examination sheets and hand instrument instruments: mouth glass, sonde, excavator, tweezers. The materials were hand scoen, mask, alcohol and cotton.

Data Analysis Techniques

All data collected was categorical data so that it was presented descriptively in terms of frequency and percentage,[6] then analyzed using chi-square test.

RESULTS

Characteristics of Respondents

Table 1 showed the gender of respondents as many as 18 students (45%) were male, as many as 22 students (55%) were female. The average DMFT was very low as many as 26 students (65%), low as many as 6 students (15%), moderate as many as 7 students (17.5%), and high category as many as 1 student (2.5%). The lowest fluoride level obtained was 0.00 mg / L and the highest fluoride level was 2.67mg/L. Fluoride level in the low category was 34 students (85%), moderate category was 4 students (10%), high category was 2 students (5%).

Table 1. Distribution of Respondent Characteristics

No	Primary school	Frequency	Percentage
1.	Elementary School Name		
	• Pacar Kembang I/169 Surabaya	10	25
	• Bendul Merisi 408 Surabaya	10	25
	• Sukomanunggal IV/108 Surabaya	10	25
	• Perak Utara II Surabaya	10	25
2.	Gender		
	• Male	18	45
	• Female	22	55
3.	AverageDMF-T		
	• VeryLow	26	65
	• Low	6	15
	• Medium	7	17.5
	• High	1	2.5
	• Very high	-	-
4.	Averagefluoridelevel		
	• Low	34	85
	• Medium	4	10
	• High	2	5
	Total	40	100

The Correlation between the Level of Fluoride in Well Water and the Number of Dental Caries

The results of the analysis of the correlation between the fluoride level in well water and the number of dental caries in elementary school children in Surabaya in 2017 were as follows:

Table 2. Correlation between the Fluoride Level in Well Water and the Number of Dental Caries in Elementary School Children in Surabaya in 2017.

Variable		Fluoride level			
		Low	Medium	High	Total
DMF-T	Very low	21	3	2	26
	Low	5	1	0	6
	Medium	7	0	0	7
	High	1	0	0	1
Total		34	4	2	40

The results of the analysis of the correlation between dental health status (DMFT level) and fluoride level were obtained as many as 21 students with low fluoride level obtained in the dental health status (DMFT level) in the very low category. Statistical test results obtained p-value = 0.871, it could be concluded that there was no correlation between the level of fluoride in well water and the number of dental caries in elementary school children in Surabaya in 2017.

DISCUSSION

The average fluoride level of well water students from four elementary schools in Surabaya as a respondent is 10.475 mg / L. The lowest average fluoride level in Bendul Merisi 408 Surabaya was 0.01 mg / L and the highest was 2.67 mg / L. The average of the lowest fluoride water level in Pacar Kembang I / 169 Surabaya is 0.00 mg / L and the highest is 1.17 mg / L. The average low fluoride water level in Sukomanunggal IV / 108 Surabaya is 0.00 mg / L and the highest is 0.92 mg / L. The lowest average fluoride water level in Perak Utara II Surabaya is 0.00 mg / L and the highest is 0.72 mg / L.

The concentration of fluoride in water is closely related to the type of water source. Generally fluoride concentrations in groundwater and surface water exceed the above conditions. Its concentration in groundwater is usually higher than surface water. In some places even very high. High levels of fluoride in water can

endanger dental health if there is no processing (defluoridation). In contrast to other types of drinking water sources such as rainwater, the fluoride level is low under the above conditions.[7]

The average DMF-T was in the high category because it exceeds the WHO standard which should have an average DMF-T number of less than 1, but this figure was still below the average National DMF-T based on the results of the Basic Health Research conducted by the Ministry of Health in 2013 that is equal to 4. The high rate of DMF-T is likely to be influenced by food and tooth brushing factors. Food and dental hygiene have a strong influence on tooth decay.[8]

The same study conducted by Listrianah and Malacca in junior high school students in the city of Palembang in 2011 showed the caries status of students included in the low category. Epidemics of caries events in each country or region vary.[9] According to Chandra (2007) caries epidemic is influenced by three factors, one of which is environmental factors such as geographical location and food or nutrition. Geographical location of an area can affect the caries status of people living in the area.[10]

Provision of drinking water is very important in meeting the needs of human life. In the Health Act No. 23 of 1992 paragraph 3 contains the meaning that drinking water consumed by the community must meet the quality and quantity requirements, where the quality requirements are contained in the Minister of Health Regulation (Permenkes) No. 416 of 1990 concerning Water Quality Requirements and Monitoring. The parameters of the quality of drinking water / clean water stipulated in Permenkes No. 416/1990 consists of physical parameters, bacteriological parameters, radioactive parameters and chemical parameters. Some chemical parameters are thought to affect dental health, including elements of fluoride, potassium, calcium, and acidity (pH) of water.

The concentration of fluoride in water is closely related to the type of water source. Generally fluoride concentrations in groundwater and surface water exceed the above conditions. Its concentration in groundwater is usually higher than surface water. In some places even very high. High levels of fluoride in water can endanger dental health if there is no processing (defluoridation). In contrast to other types of drinking water sources such as rainwater, the fluoride level is low under the conditions above. The low fluoride level in water can also cause dental caries so it needs fluoridation.

The most carious status of primary schools in the city of Surabaya is in the very low category, while fluoride testing shows the highest results in the low category. This is a contradiction and makes the author assume how many things are related to this research.

There are several factors that influence caries status. One factor is knowledge. The author believes that many school children get information about how to maintain the health and cleanliness of teeth from electronic media. Today there is a lot of information about how to maintain and care for teeth that are broadcast on television or radio. Other media that can be used to find information about the health of teeth is the internet. Information about the internet can be accessed by anyone and anywhere including via mobile phone. Knowledge of how to brush your teeth properly and correctly can also be obtained from their parents. The role of parents here is very important in providing knowledge about the health of teeth. The authors assume the parents of the respondents often reminded to maintain the health of their teeth and mouth and not forget to brush their teeth before going to bed. Parents also often change their child's toothbrush on time, and the toothpaste used will be replaced as soon as the toothpaste has run out.[11]

Dental caries is an infectious disease that damages the tooth structure. This disease causes cavities, which if not treated immediately can cause pain, tooth loss, infection, various dangerous cases, and even death. Factors that cause dental caries are host factors (saliva and teeth), agent factors (microorganisms, sugar-containing diets) and time.[12] Other factors that contribute to the occurrence of dental caries include tooth brushing habits, smoking habits, nutritional status and history of illness.

Dental caries can be caused by brushing behavior, wrong eating habits, and some behaviors such as the community's preference for sweet snacks, less fibrous, and easy stickiness, the public perception that dental disease does not cause death so that people are less concerned about maintaining healthy teeth and mouth.[13]

In this study, researchers did not directly examine the existence of other factors besides fluoride which could affect caries. However, the possibility of several other factors influencing caries incidence in the sample, including the behavioral factors. Positive dental and oral health behaviors, one of which is the habit of brushing teeth. Conversely, negative dental health behaviors, for example, do not brush your teeth regularly, so the dental and oral health conditions will decrease with the impact of easily perforating teeth.[14]

The ability to brush your teeth properly and correctly is a factor that is quite important for the maintenance of dental and oral health. The success of dental and oral health maintenance by brushing teeth can be influenced by the frequency and timing of proper brushing, as well as the factors of use of brushing teeth and methods.[14]

CONCLUSION

Based on this study, we can conclude that the average fluoride level of well water in the city of Surabaya was low, the DMF-T number of elementary school students in Surabaya was very low and the fluoride level in well water were not related to the rate of dental caries of elementary school children in the city of Surabaya.

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