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ORIGINAL RESEARCH

THE INCIDENCE OF DENTAL CARIES IN 7TH GRADE STUDENTS IN REMBANG, CENTRAL JAVA

Kejadian Karies Gigi Pada Siswa Smp Kelas 7 di Kabupaten Rembang, Jawa Tengah

Putu Ayu Widyary Dewanti[1], Retno Adriyani[2]
[1]Department of Environmental Health, Faculty of Public Health, Universitas Airlangga, widyary.putu47@gmail.com
[2]Department of Environmental Health, Faculty of Public Health, Universitas Airlangga, retnoadriyani@fkm.unair.ac.id
Corresponding Author: Putu Ayu Widyary Dewanti, widyary.putu47@gmail.com, Faculty of Public Health, Universitas Airlangga, Mulyorejo St Campus C UNAIR, Surabaya City, East Java, 60115, Indonesia

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ABSTRACT

Background: Dental caries in children is a common multifactorial dental health problem. There are some important risk factors in the incidence of dental caries in children. **Purpose:** The aim of this study was to determine the incidence of dental caries and the relationship between risk factors and dental caries in 7th grade students in Rembang, Central Java. **Method:** An observational research design was applied, through the use of a cross-sectional study. The study population was 574, with a total sample of 75 respondents. The research sample was determined using a random sampling method. The locations of this research are SMPN 1 Lasem and SMPN 2 Rembang, Rembang, Central Java. This study was conducted between May and August 2018. Data collection techniques included dental examination for dental caries and a questionnaire to determine the risk factors. Analysis of the study was conducted via a chi-square statistical test. **Results:** Of the respondents, 46.67% had active caries. There was a relationship between a history of caries and a current caries incidence (p = 0.01) and between the time of toothbrushing and caries incidence in grade 7 junior high school students in Rembang Regency, Central Java (p = 0.01). **Conclusion:** A previous history of caries and the time of toothbrushing have a relationship with the incidence of dental caries in 7th grade junior high school students in Rembang Regency, Central Java.

ABSTRAK

Latar Belakang: *Karies gigi pada anak merupakan masalah kesehatan gigi umum multifaktoral. Ada beberapa faktor risiko yang penting dalam kejadian karies pada anak.* ***Tujuan:*** *Penelitian ini bertujuan untuk mengetahui kejadian karies gigi dan hubungan faktor risiko penyebab karies gigi pada siswa SMP kelas 7 di*

Kabupaten Rembang, Jawa Tengah. ***Metode:*** *Penelitian ini merupakan penelitian observasional dengan pendekatan cross sectional-study. Populasi penelitian sebesar 574 dengan total sampel sebesar 75 responden. Penentuan sampel penelitian dengan menggunakan metode random sampling. Lokasi penelitian ini adalah di SMPN 1 Lasem dan SMPN 2 Rembang, Kabupaten Rembang, Jawa Tengah. Penelitian ini dimulai dari bulan Mei hingga Agustus 2018. Teknik pengumpulan data adalah dengan pemeriksaan gigi ke dokter gigi untuk variabel karies gigi dan dengan kuisioner untuk riwayat karies dan higiene mulut. Analisis penelitian menggunakan metode analitik untuk menganalisis hubungan antar variabel riwayat karies sebelumnya dan waktu menggosok gigi dengan kejadian karies gigi menggunakan uji statistik chi-square.* ***Hasil:*** *Ada responden yang memiliki karies aktif sebesar 46,67%. Hasil penelitian menunjukkan adanya hubungan antara riwayat karies sebelumnya dengan kejadian karies [p = 0,00] dan antara waktu menggosok gigi dengan kejadian karies pada siswa SMP kelas 7 di Kabupaten Rembang, Jawa Tengah [p = 0,01].* ***Kesimpulan:*** *Riwayat karies sebelumnya dan waktu menggosok gigi memiliki hubungan dengan kejadian karies gigi pada siswa SMP kelas 7 di Kabupaten Rembang, Jawa Tengah.*

INTRODUCTION

Dental caries are one of the common preventable dental problems. Dental caries are known as a primary cause of dental problems and tooth loss. Dental caries are a major oral disease and a public health problem that inhibits the achievement and maintenance of oral health in all age groups. Dental caries are the damage that occurs in the hard tissue of the teeth caused by by-products or acidic materials and the fermentation of food carbohydrates by bacteria in the mouth (Sumiok, Pangemanan, & Niwayan, 2015). Caries are a chronic disease. In most people, this disease will develop slowly and cause imbalances in the mouth, in oral minerals and plaque. Plaque is characterized by the activity of microorganisms that cause pH values to fall and lead to enamel demineralization (Yadav & Prakash, 2016).

Oral health is important in children's development. If a child has an oral disorder caused by caries, the child's teeth will become porous and hollow (due to bacterial activity and demineralization). The chewing ability of children will be reduced or lost, which can interfere with the digestion and absorption of food and nutrients by children. This results in suboptimal growth and development (Widayati, 2014).

A study in Japan found that a previous history of caries influences the future incidence of caries (Sonoda, Ebisawa, Nakashima, & Sakurai, 2017). Based on the 2013 National Basic Health Research data, it is said that the Decay Missing Filled-Teeth (DMF-T) index of Central Java Province is 4.33. This value is below the national DMF-T index, which is 4.67. Based on the explanation in Indonesia basic health research in 2013, the DMF-T Index increases with age (Ministry of Health RI, 2013). The prevalence of a history of caries in Rembang Regency was 52.30%, with the proportion of active caries being 33.80%. The Basic Health Research data for Central Java Province in 2013 stated that the prevalence of people with a history of dental caries in Rembang Regency was 63.4%, with the proportion of active caries in Rembang Regency amounting to 32.70%. Based on Basic Health Research data for Central Java Province in 2013, the percentage of population aged 10-14 years who brush their teeth after breakfast was 2.70% and at bedtime was 16.70% (Ministry of Health RI, 2013). Based on Basic Health Research data for Central Java Province in 2013, the proportion of the total population of Central Java Province who brushed their teeth after breakfast was 1.67% and at bedtime was 8.50% (Ministry of Health RI, 2013). Data for the Rembang Regency in 2017 shows that

dental health disorders are one of the top 10 diseases in Lasem and children aged 10 to 14 display risk factors for dental caries, including not commonly brushing their teeth after breakfast and before going to sleep (Central Bureau of Statistics (BPS) Rembang Regency, 2017).

Based on the background that has been described, this study aims to determine the incidence of caries in 7th grade junior high school students in Rembang Regency, Central Java, and the impact of a history of caries and time of toothbrushing on caries incidence.

METHOD

This study used quantitative observational research, through the use of a cross-sectional study. The population for this study included students of SMPN 1 Lasem and SMPN 2 Rembang, totaling 574 students. The researcher determined the inclusion criteria for this study as being born and domiciled in Rembang Regency and the willingness to be a research respondent with the consent of a parent or guardian. The sample size was determined through the use of a sample size statistical formula, leading to a total sample of 75 respondents. The sample was determined using the random sampling method. Data collection for a history of previous caries and the time of toothbrushing was conducted via interview with a questionnaire. Data collection for current dental caries was conducted via a dental examination. Before conducting the interviews and the dental examinations, parents or guardians were asked to complete a consent form.

The locations of this research were SMPN 1 Lasem and SMPN 2 Rembang, Rembang Regency, Central Java. The study was conducted between May and July 2018. This study was approved by the Health Research Ethics Committee of the Faculty of Public Health, University of Airlangga, with number 240-KEPK.

Analysis of the data occurred via chi-square testing. The variable of toothbrushing time was examined through five options to answer the relevant interview question—when taking a shower in the morning, when bathing in the afternoon, after breakfast, after lunch, and before going to bed at night. Respondents chose the times they brushed their teeth in accordance with what they did every day. The answers from each respondent were then grouped into two categories—those who brushed their teeth after breakfast and/or before going to bed at night, and those who answered other than after breakfast and before going to bed at night. The statistical test used to analyze the relationship between the variables was the chi-square test.

RESULTS

Caries data was collected by examining the respondents' teeth at the dental office at the local Puskesmas. The respondent group at SMPN 1 Lasem was examined at the Lasem subdistrict Puskesmas, while the respondent group at SMPN 2 Rembang was examined at the Rembang subdistrict Puskesmas. Of the total 75 respondents, 35 (46.67%) had dental caries (Table 1).

Table 1
Caries Status of 7th Grade Junior High School Students in Rembang Regency, June 2018

Status of Caries	Numbers of Respondents	
	n	%
Have Caries	34	45.33
No Caries	41	54.67
Total	75	100.00

Characteristic variables examined in this study included sex and age. The results showed that 52.08% of the respondents with dental caries were female and 66.67% of the respondents with no caries were male (Table 2). Most respondents with caries were 13 years of age (20 respondents). The results showed that the age group with the least dental caries were those aged 14 years (5 respondents).

The risk factor variables examined in this study included a previous history of caries and the time of toothbrushing. The results showed that most respondents with dental caries had a previous history of caries (32 respondents, 57.14%). Of the respondents with no caries, 17 (89.47%) had no previous history of caries. Most respondents with dental caries brushed their teeth other than after breakfast and/or before going to bed at night (25 respondents, 56.81%). Of the respondents with no caries, 22 (70.96%) brushed their teeth after breakfast and/or before going to bed at night (Table 2).

Relationship between a Previous History of Caries and the Occurrence of Dental Caries

Statistical testing to determine the relationship between a history of previous caries with dental caries incidence in 7th grade junior high school students in Rembang, Central Java, obtained a p-value of 0.00 (Table 3). The α value

used in this study was 0.05. This means that there is a relationship between a history of previous caries and caries incidence in 7th grade junior high school students in Rembang Regency, Central Java.

Relationship between Toothbrushing Time and Dental Caries

A chi-square test was used to determine whether there was a relationship between the time of toothbrushing and the incidence of dental caries in 7th grade junior high school students in Rembang Regency, Central Java. The Pearson chi-square test value was 0.01, with an α of 0.05 (Table 3). This means there is a relationship between toothbrushing time and dental caries in 7th grade junior high school students in Rembang Regency, Central Java.

DISCUSSION

Caries is a disease of the teeth that, if allowed to continue, can destroy all parts of the dental crown. Developmental risk factors can be categorized as microbiological, food, and environment. Most of these risk factors can be prevented, but caries in children is still a common problem. Oral health is an important factor in maintaining the function of the mouth and teeth in children (Anil & Anand, 2017). Caries in children is a preventable disease, but remains a major public health problem. Caries can be reduced by instilling oral hygiene habits in children, reducing the intake of foods that are high in sugar or cariotic, gargling after eating, and having parents and teachers who are actively involved in helping to prevent caries in children (Vaghela, Mankar, Pai, & Acharya, 2018).

Children who have a history of previous caries have a three times greater risk of experiencing caries in their permanent teeth than children with no history. Oral and dental health conditions in childhood can affect dental health in adulthood. Children aged 12 to 14 years (junior high school students) in a period of growth and development. Parents are responsible for supervising and guiding their children in maintaining oral hygiene and health, so that children can become accustomed to maintaining this on their own. Prevention of caries at an early age is very important because if a child experiences dental caries, will spend more money to treat their child's dental caries and the costs associated with caries treatment and healing are greater than the costs of caries prevention (Mukhbitin, 2015).

Table 2
Characteristics of 7th Grade Junior High School Students in Rembang Regency, June 2018

Variables	Caries		No caries		Total	
	n	%	n	%	n	%
Sex						
Female	25	52.08	23	47.91	48	64.00
Male	9	33.33	18	66.67	27	36.00
Age						
12	13	56.52	10	43.47	23	30.67
13	20	43.47	26	56.52	46	61.33
14	1	16.67	5	83.33	6	8.00
Total	34	45.33	41	54.67	75	100.00

Table 3
Relationship between Risk Factors and Caries Occurrence in 7th Grade Junior High School Students in Rembang Regency, June 2018

Risk Factors	Caries		No Caries		Total		*p*-value
	n	%	n	%	n	%	
Previous Caries History							
Cavities history	32	57.14	24	42.85	56	74.67	0.00
No cavities history	2	10.52	17	89.47	19	25.33	
Teeth Brushing Time							
Other Answers	25	56.81	19	43.18	44	59.67	
Answered after Breakfast or before going to bed	9	29.03	22	70.96	31	41.33	0.01
Total	34	45.33	41	54.67	75	100.00	

A high incidence of caries in primary teeth is mostly found in children who do not receive good dental care. A history of dental caries can influence the incidence of caries in children. A history of previous caries can be a risk factor in the development of new carious lesions in children in the growth period of their teeth (Corrêa-Faria, Paixão-Gonçalves, Paiva, & Pordeus, 2016). One study of dental caries in junior high school students found that the experience of caries differed between female and male students. The female students in the study had a higher caries experience than the male students. The average caries experience measured using the DMF-T index for women and men in the study was 4.80 ± 3.35 and 3.67 ± 2.31. Eating patterns are directly proportional to caries experiences, as the worse a child's eating patterns, the higher the caries experience. A healthy diet with balanced nutrition is important in preventing dental caries in children (Adrien, 2017).

Keeping the oral cavity free of pathological conditions that can affect oral health is referred to as oral hygiene. Dental problems are caused by pathological conditions, such as gum disease, cavities, mouth sores, and sores or ulcers. The most important personal hygiene care is brushing and cleaning the teeth properly every day. Brushing teeth and rinsing properly are actions that can prevent and eliminate plaque formation on teeth, which can increase the risk of dental caries (Yadav & Prakash, 2016).

Based on a quantitative study, the use of mouthwash shows clear benefits in reducing the risk of plaque on teeth, gingivitis, and dental caries. The use of mouthwash does not have major side effects, such as an increased risk of oral cancer even though the mouthwash used contains alcohol. The use of topical fluoride (mouthwash, gel, and varnish), used to supplement the use of fluoride toothpaste, provides a greater caries reduction effect compared to the use of toothpaste alone. The use of fluoride mouthwash, in addition to the use of fluoridated toothpaste, is useful for reducing caries in children (Boyle, Koechlin, & Autier, 2014).

A lack of oral hygiene provides an opportunity for plaque to grow and attach to the surface layer of teeth. Plaque is formed from microorganic activity on the surface of the teeth, coupled with carbohydrates and other elements in saliva. Carbohydrates in plaque provide a substrate for bacteria or microorganisms producing acids that cause demineralization in the teeth (Bebe, Susanto, & Martini, 2018).

A study that examined the factors associated with the incidence of caries found that there was a relationship between toothbrushing behavior and the incidence of dental caries in elementary school students. Poor toothbrushing behavior leads to a 2.90 times greater chance of experiencing caries compared to adequate toothbrushing behavior. Proper toothbrushing behavior can reduce the incidence of caries in children, although there are also other factors, such as the shape and surface of teeth, that are different for each person (Alini, 2018).

Someone who often eats cariogenic foods will have a higher risk of caries because many cariogenic foods contain carbohydrates. Cariogenic foods are sticky and are easily destroyed when chewed, so they have the potential to enter through crevices of the teeth. Therefore, it is important to clean teeth and mouth after consuming cariogenic foods. Gargling after eating, especially after eating sweet foods or foods that are cariogenic, is also recommended to prevent dental caries (Reca, 2018).

A study in the Xiulin Township in Taiwan found that cleaning teeth after eating sweet foods, brushing teeth after eating, and brushing teeth at least three times a day can reduce the risk of caries in school children. Increased access to dental care in the form of dental health professionals in schools is needed to help children to develop good oral hygiene behaviors (Cheng, Huang, Wu, Chen, & Yeh, 2014)

Other studies have found that a person with dental caries can have a sufficient oral hygiene status. High rates of caries can be due to a lack of knowledge about proper and correct brushing techniques. Appropriate prevention, such as comprehensive dental care, is an important requirement. Early identification of caries and appropriate guidelines for the maintenance of oral hygiene should be provided to parents, guardians, and teachers (John, Daniel, Paneerselvam, & Rajendran, 2017). Other studies have found that there is a significant relationship between clean living behavior related to oral hygiene and dental caries (Suratri, Tjahja, & Setiawaty, 2018).

The research that conducted by Hujoel, Hujoel, & Kotsakis (2018) have found that oral hygiene has no impact on the level of dental caries. Tissue meta-analysis results showed that fluoridated toothpaste and oral cleaning fluid were equally effective in preventing coronal dental caries. Personal oral hygiene is not very effective for the mechanism of delivering pharmaceutically active fluoride into the body to prevent dental

caries. That research also explained that increasing personal oral hygiene without fluoride cannot reduce the risk of dental caries. The lack of effectiveness in the use of fluoride (in toothpaste and oral and dental cleaning fluids) cannot be associated with poor water fluoridation or with oral hygiene. Removal and cleaning of plaque can reduce gingivitis, but not dental caries.

A study in Zhejiang, China, showed that caries rates in students aged 12-14 were low, but were at risk of increasing. The increase in caries prevalence every year is 3.00% with age. There are several factors that significantly influence the increased risk of caries, including poor dental healthcare, poor dental health history, increased sugar intake, sex, older age, and living in rural areas with lack of oral care (Hu et al., 2018).

A study in Saudi Arabia found the prevalence and severity of dental caries in female students (aged six to nine) in Al-Kharj City was high. The caries experience of these female students had a significant correlation with dental plaque deposits. Saudi Arabia has implemented several preventive programs for oral health. Prevention in oral health programs should start from the pre-school age to reduce the incidence of caries and promote better oral hygiene (Al Hazzani, Alanazi, Al Bejadi, & Al Wabil, 2019).

Eating patterns have an influence on the risk of oral and dental diseases. If someone has a good diet, their oral hygiene will initially be good. Choosing good food and snacks, as well as establishing a good diet, will help prevent disease and mouth and tooth problems. Brushing teeth properly and regularly is an important way to maintain oral and dental hygiene, as it cleans the mouth and teeth of dirt that sticks to teeth and gums after eating. It is also important to have routine checkups with a doctor or dentist to determine the condition of an individual's oral and dental health (Rahmayani & Sofya, 2016). Getting children to brush their teeth from an early age is a very important task for parents. Generally, after the age of nine, children can brush their own teeth; however, parents should still check the activity and time taken to brush teeth and remain focused on helping children develop good toothbrushing skills (Ministry of Health RI, 2012).

Tooth replacement occurs between the age of six and 14. In this period, parents should be careful to monitor their child's dental health. Often parents do not know that their children's teeth have problems, such as caries or porosity. Permanent teeth cannot be replaced or regrown. Permanent teeth will be used for life and must be treated and maintained as well as possible (Ministry of Health RI, 2012), An individual's confidence is also important in terms of maintaining oral hygiene. One study found a relationship between encouragement from parents and caries prevention measures. Encouragement from parents has a great influence on children undertaking caries prevention measures (Setiari & Sulistyowati, 2018), so the encouragement and attention of parents is very important for caries prevention.

Research Limitation

One limitation in this study was the difficulty in collecting informed consent from the parents or guardians of prospective respondents. The researchers did not examine food patterns or the consumption of sweet foods (which are cariotic in nature), which might also be a factor in caries incidence in junior high school students in Rembang Regency, Central Java.

CONCLUSION

There is a relationship between a history of previous caries and the time of toothbrushing and the incidence of dental caries in 7th grade junior high school students in Rembang Regency, Central Java. A previous history of caries and the time of toothbrushing influenced the incidence of caries in this population. Toothbrushing in the morning after breakfast and at night before going to bed are factors that need to be considered to prevent the incidence of caries.

CONFLICT OF INTEREST

The authors declare that no conflict of interest in this study.

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