

**The Relation between Frequency of Toothbrush Replacement in a Year and Dental Caries Prevalence of Grade IV and V Students of Jember Kidul 04 Elementary School**

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**Abstract**

**Introduction:** The most common dental and oral disease of human is caries. It is suffered by adults as well as children. Toothbrush is mechanical tool that is considered to be the most effective way to clean the plaque. However, the effectiveness of brushing teeth depends on the shape of toothbrush as well as its methods, regularity, and duration. One of the most important things in brushing teeth of children is replacing the toothbrush regularly every three months in order to maintain its ability to clean the teeth. Frequency and regularity of toothbrush replacement is a behavior affecting the condition of oral hygiene, the quantity of caries, and periodontal disease. **Objective:** This research was conducted to observe the relation between the frequency of toothbrush replacement in a year and the caries prevalence of students of grade IV and V SDN at Jember Kidul 04 Elementary School. **Methods:** The method used in this research was Observational Research Analysis with cross-sectional approach. The sample of this research was the students of grade IV and V SDN Jember Kidul 04, Kaliwates Jember. Caries examination was conducted on deciduous as well as permanent teeth by using def-t and DMF-T index, and OHI-S index for oral hygiene examination. Data of frequency of the student's toothbrush replacement in a year was collected by filling in questionnaire. **Result and Conclusion:** There is a relation between toothbrush replacement frequency and oral hygiene and caries of deciduous teeth, but there is no relation between toothbrush replacement frequency and caries of permanent teeth.

**Keywords:** Caries, def-t, DMF-T, OHI-S, Toothbrush

## Introduction

Health is a very important factor in human life including oral and dental health. It indirectly becomes an important part that can not be separated from general health, thus it is a lifetime investment. Dental and oral disease mostly found in community is dental caries. Caries occurs not only in adults but also in children [1].

The results of basic health research conducted by the Ministry of Health in 2007 stated that in Indonesia 75 % of population suffer from caries, but only 1.6 % were motivated to have dental treatment and medication e.g. filling the cavities, and 43 % had no treatment. This condition shows the low awareness of the people to maintain oral health because 43 % of Indonesian population has untreated cavities. Data from the Executive Board of Indonesian Dentists Association (IDA) state that 89 % of caries sufferers are children under 12 years [2] i.e. the age of preschool to elementary school.

A survey conducted by the Family Health Department in 2001 exhibited that the prevalence of active caries was child population aged 10 to 12 years, and 52 % out of 71.2 % of the population suffered from dental caries had not obtained proper treatment [2]. Children aged 10 to 12 years are generally in the grade IV to VI of elementary school.

Dental caries is caused by several factors, micro organisms, substrate, dental and time. Caries occurs when those four factors are present [3]. Other factors that may favor to the incidence of caries are age, snacks and drinks consumption, gender, lifestyle, and oral hygiene [4]. Oral hygiene can be improved by maintaining regular tooth cleaning.

Brushing teeth is a routine procedure carried out to maintain oral health and hygiene, especially the teeth and gingival providing freshness in the mouth by adding toothpaste, to prevent caries and periodontal disease, to prevent the accumulation of food remains on the teeth, and to perform massage on the gingival [5]. A toothbrush is a mechanical device that is considered most effective for removing plaque on the teeth. The effectiveness of tooth brushing mainly depends on the shape of a toothbrush, method, frequency and duration of tooth brushing [6]. One of the important things in tooth brushing is regular replacement of toothbrush conducted every three months in order maintain its ability to clean the teeth well [1].

In connection with the above opinion, the frequency of toothbrush replacement in cleaning teeth and mouth is a behavior that will affect the condition of oral hygiene, which will also affect the number of caries and periodontal disease. Every individual is necessary to know the importance of dental and oral hygiene as it plays a role in efforts to prevent the incidence of caries [7]. Many researchers prove that tooth brushing effectiveness mostly depends on the shape of a toothbrush, as a result, new forms of toothbrush created to be more effective in the removal of plaque [6].

Research on the frequency of replacing toothbrush is rarely conducted, thus the researchers are interested to observe the relation between the frequency of toothbrush replacement in a year on oral hygiene and dental caries prevalence of children. Jember Kidul 04 State Elementary School is chosen as research site by reason that the school has never been addressed as location to study on caries status, oral hygiene, and has no School Dental Health Program. Jember Kidul 04 Elementary School is located in the downtown area nearby the Public Health Center, but it has not been covered by an adequate health care. The research was conducted on the students aged 10-12 years grades IV and V of Academic Year of 2015-2016.

## Methods

The research was an analytic observational with cross - sectional approach. The research was conducted at Jember Kidul 04 State Elementary School of Kaliwates District of Jember Regency during November 2015 up to January 2016. Total sampling or saturated sampling technique was used in the research. The total sample of the research was 99 students i.e. the students of grade IV and V of Jember Kidul 04 State Elementary School.

The tools used in the study were mouth mirror number 3 and 4, tweezers, bent explorers, tampons, bins, trays, Deppen glass, head lamp, stationery and white cloth. Materials used in the study were alcohol (70%), masks, handsocon, tampons, tissue, hand sanitizer or soap, water, card status and informed consent.

The research was initiated with a permission letter of research from the Faculty of Dentistry, University of Jember, the Board of National and Political Unity of Jember Regency, the Education

Department of Jember Regency, and the Education Office of Kaliwates District for Jember Kidul 04 State Elementary School. Furthermore, informed consent was distributed to students of grade IV and V of Jember Kidul 04 State Elementary School to be approved by their parents. The implementation stage of this research was conducted by examination of dental caries, oral hygiene, and the distribution of questionnaires.

Examination of dental caries was carried out by having the students sit on the chairs provided. The operator filled in proofing sheet by the identity of students. A student being examined was asked to gargle using plain water and to open their mouths. The operator positioned the student as comfortable as possible in order to get adequate lighting of the head lamp. The operator examined the students to see decays on the permanent and deciduous teeth, missing or indications of extraction, and fillings using a mouth mirrors number 3 and 4. Mouth mirror number 3 was used to retract the cheek of the student allowing the operator to see clearly, while the mouth mirror number 4 was used to observe the condition of teeth with caries, or formed cavities. The teeth suspected to have caries lesion but cavities not yet clearly visible were examined using a bent explorer for example in the pits, fissures, approximal, buccal, and cervical marked by the explorer catching them.

The examinations were performed on all teeth, starting from the region of the right and left maxillas, and then continued to the region of left and right mandibles. The results of the observations were noted on the sheet provided (status cards). Calculation was conducted using the index of DMF-T and def-t. The results obtained were subsequently put into categories according to WHO i.e. 0.0 to 1.1 are very low score; 1.2 to 2.6 are low score, 2.7 to 4.4 are moderate scores; 4.5-6.5 are high score, and > 6.6 is very high score [8].

Dental and oral hygiene examination was carried out by using OHI-S index in students consisting of the examination of *Debris Index-Simplified* (DI-S) and *Calculus Index-Simplified* (CI-S). Examination was carried out on 6 permanent teeth, i.e. the tooth 16 on the buccal surface, tooth 11 on the labial surface, tooth 26 on the buccal surface, the tooth 36 on the lingual surface, the tooth 31 on the surface of labial, and tooth 46 on the lingual surfaces. The results obtained were then put into categories according to WHO's i.e. clinical criteria of score from 0.0 to 1.2 is good, and 1.3 to 3.0 is moderate, 3.1 to 6.0 is poor [9]. The last stage was to distribute the questionnaires to every student and instructed to bring them home to be filled out by parents of students at home.

The data were analyzed using the *Kolmogorov -Smirnov* test for normality, and Levene's test for homogeneity. The result showed that data were not normally distributed and the variance of the data was not homogeneous. Subsequently, the non-parametric *Spearman* correlation test was performed.

## Results

The research data obtained from the examination results of deciduous and permanent teeth were calculated using an index DMF-T and def-t.

Table 1. Cross distribution of dental caries based on DMF-T and def-t indices to the number of students

Criteria	DMF-T	%	def-t	%
Very Low	49	49,49	44	44,44
Low	20	20,20	13	13,13
Moderate	23	23,23	21	21,21
High	3	3,03	11	11,11
Very High	4	4,04	10	10,10
Total	99	100	99	100

Source : Primary data processed by the researchers in 2016

The students with caries in permanent teeth with very low criteria were 49.49 %, low criteria were 20.20 % , moderate criteria were 23.23 %, high and very high criteria were 3.03% 4.04 %. Students who caries in deciduous teeth with very low criteria of 44.44 %, 13.13 % lower, were 21.21 % , 11.11 % high and very high 10.10% .

The research data obtained from the examination of debris and calculus at 6 permanent teeth calculated using *Debris Index- Siplified* (DI-S) and *Calculus Index-Simplified* (CI-S). The data were subsequently calculated and recalculated using the *Oral Hygiene Index- Simplified* (OHI-S).

Table 2. The distribution of oral and dental hygiene based on OHI-S index

Criteria	OHI-S	%
Good	8	8,08
Fair	65	65,65
Poor	26	26,26
Total	99	100

Students with good criteria of dental and oral hygiene were 8.08%, moderate were 65.65 %, and poor were 26.26 %.

The research data were obtained from the questionnaires completed by parents of the students at home.

Table 3. Distribution of toothbrush replacement in a year of the students

Frequency	Number of Student	%
2 times	14	14,14
3 times	35	35,35
4 times	50	50,50
Total	99	100

The students replacing toothbrush 2 times in a year were 14.14 % , 3 times a year were 35.35 %, and 4 times a year were 50 % , 50 %.

The data were subsequently analyzed using *Spearman* correlation test using SPSS version 16.0 for Windows to determine the relationship between two variables. The results showed significant value of 0.042 ( $p < 0.05$ ) indicating that there was a relationship between the frequency of toothbrush replacement to deciduous tooth caries, the significant value was 0.153 ( $p > 0.05$ ) demonstrating no relationship between the frequency of toothbrush of replacement to the permanent tooth caries, and a significance value of 0.036 ( $p < 0.05$ ) showing a relationship between the frequency of replacing the toothbrush toward oral and dental hygiene.

## Discussion

The results show that the prevalence of caries in permanent teeth is lower than deciduous tooth caries, distribution of toothbrush replacement frequency of children in a year at most four times a year, and the most dental and oral hygiene are at the moderate criteria. A proper replacement frequency of toothbrush is every 3 months, or 4 times a year in order that a toothbrush can work effectively in cleaning the teeth and mouth [2]. The statement does not correspond with the results of the research because there are 50.50 % replacing toothbrushes four times a year but the most of dental and oral hygiene are at the moderate criteria i.e. 65.65%.

*Spearman* correlation test results show a significant relationship between the frequency of toothbrush replacement toward deciduous tooth caries of the children, but no relationship in the permanent tooth caries. *Spearman* correlation test of the resulted data also shows a significant correlation between the frequency of toothbrush replacement on oral hygiene. The results of data analysis using *Spearman* correlation test demonstrate a significant relationship between oral and dental hygiene and deciduous tooth caries, but not related to permanent tooth caries.

The more hygiene a person is, the more that person will be avoided from dental caries [10]. Differences in oral and dental hygiene of person may be influenced by many factors including the frequency of brushing teeth, the selection of appropriate toothbrush, oral hygiene behavior and the role of parents, thus it will also affect the prevalence of dental caries [8].

Differences in the prevalence of dental caries of permanent and deciduous teeth are caused by that a child at the age of 10-12 years is an age group of mixed dentition period that is susceptible to dental caries [11]. The study shows many common deciduous teeth do not come out, thus the deciduous teeth remain in the oral cavity for longer time, and are more susceptible to caries than permanent teeth. The period of mixed dentition has permanent teeth and deciduous teeth in the oral cavity in almost the same number i.e. 14 permanent teeth and 10 deciduous teeth [12]. Morphology of deciduous teeth is

characterized with thinner enamel compared to permanent teeth consequently they are more prone to dental caries than permanent teeth.

The high prevalence of dental caries is also caused by the poor eating habits of children aged 10-12 years that frequently consume foods containing high sugar e.g. chocolates, sweets and biscuits. In addition, this condition is worsened by a lack of awareness of children to clean their teeth after eating high sugar foods [13].

Jember Kidul 04 State Elementary School is one of the primary schools in Jember Regency that does not have a School Dental Health Program and never holds oral health promotion, as a result the student's low knowledge about oral health affects their behavior in maintaining oral health, therefore the School Dental Health Program and counseling should be provided for the students. As consequent, selection of the elementary students as the object of School Dental Health Program is very important considering to the lack attention of students on dental health. This age period is considered very sensitive to the education of both behavioral and habitual models that can still be improved [4].

## Conclusion and Suggestion

Based on result of the research, it is concluded that there is a relationship between the frequency of toothbrush replacement of children in a year and dental hygiene as well as deciduous tooth caries. The results show no relationship between the frequency of toothbrush replacement of children in a year and permanent tooth caries. The researchers suggest the necessity of toothbrush replacement every three months in order to maintain the toothbrush ability to clean teeth properly to enhance the status of oral hygiene, and to reduce the incidence of caries. The results of the research can also be used as supporting information to the Health Authority in Jember Regency. Thus, we recommend that Jember Kidul 04 State Elementary School to establish School Dental Health Program and to provide oral and dental health in order to achieve optimum health degree through oral and dental health service in educational environment especially primary schools.

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