

Socioeconomic characteristics of the parents and the risk prediction of early childhood caries

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ABSTRACT

Background: The high prevalence of early childhood caries still becomes a major health problem. It is because children prefer to consume sweet foods, which are also cariogenic. The oral mucosa is a mirror of general health or any systemic disease which usually shows visible symptoms in the oral cavity. Dental caries in children is often related to the socioeconomic characteristics of the parents. Some references suggest that there is a relationship between the socioeconomic status with the incidence of caries. **Purpose:** The purpose of this study was to examine the relationship of socioeconomic characteristics of the parents with the risk prediction of early childhood caries by using cariogram approach to the elementary school students in Wonosobo. **Method:** The research is an observational analytic study with cross-sectional approach survey method. The research sampling uses proportional random sampling with 201 respondents of fifth graders. The socioeconomic status is measured through questionnaires, while the risk prediction of early childhood caries is measured by using cariogram. The research data analysis uses Spearman rank. **Result:** The results of the study show that the socioeconomic characteristics of the respondents' parents mostly belong in the middle category as many as 145 respondents (72.1%), lower category as many as 31 respondents (15.4%) and in the upper category as many as 25 respondents (12.4%). Prediction of the respondents avoiding early childhood caries is 55%, while the prediction of the respondents being risked of having early childhood caries is 45%. The results of data analysis show that the relationship between the socioeconomic characteristics of the respondents' parents and the risk of having early childhood caries for the respondents is $p < 0.05$. **Conclusion:** There is a relationship between the socioeconomic characteristics of the respondents' parents with the early childhood caries, which shows that the higher the socioeconomic status of the parents, the lower the risk of the respondents from having early childhood caries.

Keywords: socioeconomic; the risk prediction of early childhood caries; cariogram

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INTRODUCTION

Dental caries is caused by the demineralization of enamel and dentin, which is highly related to the excessive consumption of cariogenic foods and the bacterial activity of mutant *Streptococcus*.¹ The high prevalence of early childhood caries still becomes a major health problem. The World Health Organization (WHO) has determined that the prevalence of early childhood caries is 60-90%. The data from Household Health Survey (SKRT / Survey Kesehatan Rumah Tangga) in 2007 states that the prevalence of dental

caries is 76.92%. Basic Health Research (RISKESDAS / Riset Kesehatan Dasar) in 2007 by the Ministry of Health Republic of Indonesia states that the DMF-T score in Indonesia shows four dental caries, with the prevalence of active caries in Central Java is 43.1% and the incidence of dental caries is 67.8%. The average index of DMFT in Wonosobo is 6.5, with the prevalence of active caries in is 44.9% and the incidence of dental caries is 78.6%.²

Dental caries is a common case in children because they prefer to consume sweet foods, which are also cariogenic. Oral cavity is an important part of the body and is a mirror

of general health or any systemic disease which usually shows visible symptoms in the oral cavity. Children tend to have early childhood because of they are likely to have bad oral hygiene of children and they also prefer to eat sweet foods.³

Generally, school-age children have a high-risk of early childhood caries, because the habit of consuming snack foods and drinks usually grow the highest around this age. The five graders are selected because their average age are 10-13 years old when they start to have the habit of consuming sweet foods and drinks, that are also cariogenic, both at school and at home.¹ There should be any precaution taken since the beginning to minimize the cost of their healthcare treatment. One of the precaution strategies of early childhood caries is by identifying the risk factors. It should be necessary to acknowledge the level of risk factors of early childhood caries and distinguish the precaution strategies.⁴ Some references state that there is a relationship between socioeconomic status with incidence of early childhood caries, one of them is the study by Tulangow.⁵ The result of that study shows that children coming from the lower socioeconomic status have the higher index of DMF-T, compared to children from the higher socioeconomic status.

Cariogram is a computer application for predicting the incidence of dental caries and describing the relationship between the interrelated risk factors of dental caries. There has been developed the education program on cariogram to achieve the better understanding on the multifactorial aspects of dental caries and to estimate the risk factors of dental caries. This program can be used in the clinic or a variety of educational purposes. The computer application for cariogram has several advantages, such as to give recommendations for preventive care and to encourage the motivation of the patient. There has been

a research using the computer application for cariogram conducted in Wonosobo. This study aims to examine the relationship between the socioeconomic characteristics of the respondents' parents with the risk prediction of early childhood caries of the elementary school students in Wonosobo and the use of cariogram to find out the order of risk prediction of early childhood caries in Wonosobo.⁶

MATERIALS AND METHODS

This study uses an analytic observational with cross sectional approach. The research subjects are 201 students from 31 elementary schools in 15 subdistricts in Wonosobo which are taken randomly proportional. The socioeconomic characteristics of the respondents' parents is measured by using questionnaire consisting of nine questions from the previous validated researches. Cariogram is used to find the risk prediction of early childhood caries. The cariogram is equipped with 10 assessment criteria, in which the risk prediction of the dental caries can be found out once the 7 components of the assessment have been filled in. In this study, the eight assessment criteria are caries experience (DMFT), the affecting disease, the food contents (measured by using dietary survey), eating frequency, plaque score, fluoride program, salivary pH and volume of saliva. The research data is analyzed statistically by using Spearman rank, if $p < 0.05$, then there is a significant relationship.

RESULTS

By using linkert scale, it is found that 72.1% of the research subjects (145 respondents) are in the middle category, 15.4% of the research subjects are in the lower

Table 1. Overview of the socioeconomic characteristics of the respondents' parents

| Socioeconomic | Amount | Percentage (%) |
|---------------|--------|----------------|
| Higher | 25 | 12.4 |
| Middle | 145 | 72.1 |
| Lower | 31 | 15.4 |

Table 2. The risk predictions of early childhood caries of the respondents

| The risk predictions of early childhood caries | Amount | Percentage (%) |
|--|--------|----------------|
| Very high | 2 | 1 |
| High | 36 | 17.9 |
| Medium | 84 | 41.8 |
| Low | 64 | 31.8 |
| Very low | 15 | 7.5 |

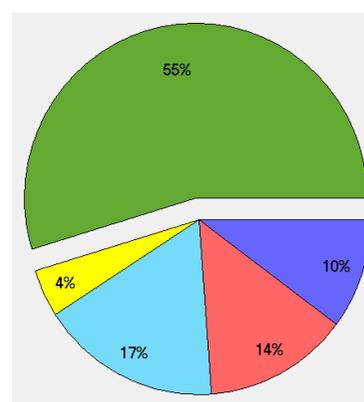


Figure 1. The diagram of risk prediction of early childhood caries of the respondents.
 (■ : the chance in avoiding dental caries;
 ■ : dietary; ■ : bacteria; ■ : susceptibility ;
 ■ : the influential condition)

category as many as 31 respondents (15.4%) and in the high category by 25 respondents (12.4%) (Table 1).

Table 2 shows that most of the research subjects are in the medium category, as many as 84 respondents (41.8%), 2 respondents are in the very high category (1%), 36 respondents are in the high category (17.9%), 64 respondents are in the low category (31.8%) , while 15 respondents are in the very low category (7.5%).

Figure 1 shows the prediction of the respondents to avoid the early childhood caries as many as 55% and the risk prediction of early childhood caries as many as 45%, with the highest risk factor is susceptibility, bacteria, dietary, and the influential condition. Table 3 shows the cross tabulation between the socioeconomic characteristics with the risk predictions of early childhood caries. Table 4 shows the fluorine content in the spring and public water supply

Table 5 shows the significance score between the socioeconomic characteristics with the risk predictions of the early childhood caries, which is measured by using Spearman rank test, is 0.043. It shows that there is a significant relationship between the socioeconomic characteristics with the risk predictions of early childhood caries.

DISCUSSION

Vulnerability is one of the risk factors gained from the combinations of the research data obtained from the salivary pH, volume of saliva and fluoride program. There are several functions of saliva, including to lubricate the tissues in oral cavity, to protect the tissues in the oral cavity so that there will be no abrasion during the mastication process, to help metabolizing carbohydrates, as an antibacterial activity against the pathogenic bacteria in the oral cavity,

to clean up debris and food scraps left in the oral cavity, and to maintain the stability of the buffer system in the oral cavity. The low salivary secretion may cause such a disturbance in the salivary function.⁷

The results of the study show that most of the respondents only use fluoride containing toothpaste so that they don't get the maximum intake of fluoride program. Most of respondents only brush their teeth once a day during the morning shower. The research laboratory data shows that the water used by the respondent, either it is from the public water supply or springs, contain fluoride as much as 0.18 and 0.08 mL per gram, respectively. Fluoride is the primary anticaries agent. Fluoride has the potentials to inhibit dental demineralization, enhance remineralization and inhibit cariogenic bacteria. Fluoride may enhance remineralization of enamel or crystals by partially dissolving dentin by combining with calcium and phosphate in saliva. Remineralization is the natural repair process against caries lesions that have not formed any cavity. Fluoride may help accelerating the process of remineralization and forming layers, like the new layer of Fluoroapatite on top of the remineralization crystals which are left under caries lesions. Hence, it may decrease the solubility of the aforementioned crystals.⁸

Caries prevention can be done by increasing the resistance of email by using flour either locally or systemically. It can also be obtained from toothpaste. Brushing teeth twice a day with a toothpaste containing fluoride is proven to reduce caries.⁴ Most respondents have used toothpaste for tooth brushing, although it is only once a day. There should be any counseling and supervision from the parents to increase the frequency of tooth brushing to twice a day, after having breakfast and before going to bed.

Table 3. Cross tabulation between the socioeconomic characteristics with the risk predictions of early childhood caries

| | | The risk predictions of early childhood caries | | | | |
|--------------|--------|--|-----|--------|------|-----------|
| | | Very low | Low | Medium | High | Very high |
| Socioeconomy | Lower | 1 | 8 | 16 | 5 | 1 |
| | Middle | 14 | 48 | 55 | 27 | 1 |
| | Higher | 0 | 8 | 13 | 4 | 0 |

Table 4. The fluorine content in water

| Parameter | Public water supply (mL) | Springs (mL) |
|-----------|--------------------------|--------------|
| Fluor | 0.18 | 0.08 |

Table 5. The analysis of the relationship between the socioeconomic characteristics with the risk predictions of early childhood caries

| Free variable | Bound variable | p | Spearman rank |
|--------------------------|--|-------|-------------------------|
| Socioeconomic characters | The risk predictions of early childhood caries | 0.043 | There is a relationship |

Fluoridation of drinking water is the most effective way to reduce the of caries problem in the community generally.⁵ Fluoridation of drinking water can only be done if there is a centralized public water supply. It is quite expensive though, which is why it cannot be done yet here in Indonesia.

The second higher risk factor of early childhood the bacteria. It is obtained from the plaque score. The average of the plaque score of the respondents is categorized as quite well. Plaque is a thin layer of microorganisms, food waste and organic material that can be formed on the teeth, and sometimes can also be found on the gums and tongue. Plaque is the aggregate of a large numbers and a wide varieties of microorganisms on the surface of the teeth which begins erupted so quickly that would be protected by the thin layer of a glycoprotein called the acquired pellicle. Glycoproteins in saliva will be specifically absorbed on Hydroxiapatite and firmly attach to the surface of the teeth plaque.⁹ One of the preventive methods is teeth brushing. A routine dental care check-up is one way to prevent dental and oral health care problems. Teeth brushing is a common way that is recommended to clean any debris that is attached to the surface of the teeth and gums. In order to obtain the optimum results in tooth brushing, try to acknowledge the influential factors, including the teeth brushing technique and the frequency of teeth brushing (twice a day, at the very least, in the morning after having breakfast and at night before bedtime). Ideally, teeth brushing should be done after having breakfast every me morning, but the most important time is right before bedtime.¹⁰

Oral health treatment should be done from early age. Primary school period is the ideal age to train the motor skills of a child, including teeth brushing. Teaching teeth brushing to young children should be done by using models and simple techniques, with is accompanied with interesting and attractive methods without changing the content, such as live demonstrations of teeth brushing, audio-visual programs, or through a controlled program of mass teeth brushing activity.¹¹

The third higher risk prediction of early childhood caries is dietary. Dietary is the risk factor obtained from the content of foods (carbohydrates), and eating frequency. Substrate (carbohydrates) also has an important role in the occurrence of dental caries, since the substrate is the source of energy for bacteria and helps in forming plaque. Not all types of carbohydrates have the important role in the formation of caries. Sucrose (disaccharide) and glucose (monosaccharide) are the two types of substrates that are highly cariogenic, while the other types of disaccharide have no strong cariogenic properties.¹²

Some of the references state that there is a relationship between socioeconomic status with the incidence of dental caries, one of the references is the study of Tulangow on the overview of caries status of elementary school students in SDN 48 Manado based on the socioeconomic status of their parents. The results of the study show that the children with lower socioeconomic status have a higher DMF-T index

than the children from the higher status. There are several variables that are often used as the indicator to measure the elements of socioeconomic status, including the job, regular income, and level of education.¹³ Gerungan states that the criteria of either low or high socioeconomic status depends on the type and location of the house, the regular income of the household, and several other criteria in regards with the welfare of the family. The socioeconomic status of the household is associated with oral and dental hygiene, which is why the economic status highly affects (even restrains, in some cases) the dental health care of the respondents.¹⁴

The result of the statistical test shows that $p < 0.05$, with the significance value of 0.043, which means that there is a significant relationship between the socioeconomic characteristics with the early childhood caries. There is a similar research shows that the prevalence of early childhood caries is higher in children who come from low socioeconomic status, because they eat less fiber foods. They also have low levels of education, which lead to the lack of knowledge about the importance of oral health. Hence, it increases the rate of dental healthcare problems.¹⁵ The social and economic factors are some of the factors that influence the number of dental caries problems. The low socioeconomic status, which are measured by the level of education and regular income, is associated with the lack of fiber consumption in individuals who live in areas with bad socioeconomic surroundings.¹⁶ It can be concluded that there is a relationship between the socioeconomic characteristics with the risk predictions of the early childhood caries measured by using cariogram. The higher the socioeconomic status is, the lower the risk prediction is.

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