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DETERMINANT FACTORS OF TOOTH PULP CARIES IN ROWOSARI, SEMARANG, INDONESIA

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ABSTRACT

Background: Tooth pulp caries is commonly found in community Rowosari, Semarang, Indonesia based on the patient visit at the public health centre. The process of the pulp caries occur because of clinical factors including the interaction among host, agent, environment, and time. Non-clinical factors including environment, attitude, health care and heredity.

Aims: This study aims to determine the factors that cause pulp caries in community Rowosari, Semarang, Indonesia year 2016.

Methods: It is descriptive quantitative research with case control study design. The sampling technique used nonprobability sampling by purposive sampling with 74 samples which consist of case group is the community which has pulp caries and control group is that haven't pulp caries. Data collection techniques of clinical factors by direct examination, while nonclinical factors using questionnaires. Analysis of the data used is the Odds Ratio.

Results: In the case group showed the highest odds ratio value on clinical factors are plaque index (OR = 4.524), which means that people with high plaque index have 4.524 times greater risk than the well index plaque. In non-clinical factors Odds Ratio is the highest value of action (OR = 1.949), which means people with bad actions have 1.949 times greater risk than those with good action.

Conclusion: There are several caused factor of pulp caries. Biggest caused by the clinical factors is the plaque index, while biggest caused nonclinical factors are action. It is suggested that the community has to know and apply good dental health care in daily activities to reduce dental plaque.

Keywords: causative factor, tooth pulp caries, plaques, attitude

INTRODUCTION

Dental and oral health is a condition of tooth and mouth free from pain, oral and throat cancer, oral infections and wound, periodontal disease, tooth decay, tooth loss, and other disruptive and diseases that limit the individual in biting, chewing, smiling, speaking and psycho-social well-being. Poor dental health may affect the general well-being [1, 2]. Basic Health Research Results 2013 obtained DMF-T Indonesia value of 4.6, with the value of each D (Decay) = 1.6, M (Missing) = 2.9 and F (Filling) = 0.08, which means that in Indonesia, dental and oral health are underwhelming. Based on the data, the permanent teeth removal and no form of residual roots still occupy the highest rank, while WHO standard of DMF-T is ≤ 3 . Dental problems also reported in Rowosari community, Semarang City, Indonesia. The Rowosari Health Center in February - July 2015 recorded that periodontal disease and pulp caries among the locals are prevalent. [3, 4].

Based on the priority determination, it was found that pulp caries was the first priority needed for follow-up. Pulp caries is an inflammation of the pulp due to the continuation of pulp hyperaemia. There are two main factors of pulp caries, namely clinical factors and non-clinical factors. The clinical agent of caries is in the form of dental plaque and bacteria. Saliva also plays a great role in the oral environment because of the vulnerability of the teeth against caries depends on the state of saliva. Other clinical factors that influence the state of oral hygiene includes diet, bacteria and immunity [5, 6].

The preliminary study of the locals experiencing pulp caries visiting the dental clinic of Rowosari Health Centre, found out that ten patients are experiencing pulp disease, eight do not brush their teeth correctly and in timely manner, and six frequently eat snack more than three times in a day. The presence of brushing technique mistakes and frequent snacking shows that the attitude of the community in the field of dental health is still lacking. The patients also do not routinely perform dental check every six months, as recommended, and tend to seek for help only when in pain. Therefore, the access to health services has not been fully accepted by the community. Attitude and access to public health services are factors that can affect a person's health status. This is in line with HL Bloom's statement. in the health and wellness paradigm which states that a person's health status is influenced by four factors, namely environmental, attitude, health services and heredity [7, 8].

Preliminary study results found that attitude factors are one of the causes of pulp caries, so it is necessary to formulate a problem related to pulp caries in the Rowosari community. The purpose of this study was to determine the dominant clinical factors and non-clinical factors to cause pulp caries.

METHODS

This research is descriptive quantitative research with research design of case control study. This is a study on how the risk factors studied using retrospective approach or probing cause factor by comparing case group and control group. In this study, the case group are the group that owns the pulp caries and the control group are those who do not have pulp caries [7].

The independent variable in this research are clinical and non-clinical factors. The first clinical factor includes plaque index measured using a PHP measurement index that has previously been applied in disclosing solution on tooth surfaces. The second clinical factor is OHI-S measured by summing up the Debris Index score and the Calculus Index. The third clinical factor is pH of saliva measured by pH strips and is classified on the saliva indicator. The fourth clinical factor is saliva hydration method used to monitor the rate of saliva flow. The last clinical factor is saliva viscosity. On the other hand, the non-clinical factors include the environment, the behaviour consisting of knowledge, attitude, and action, ancestry and health services assessed through a questionnaire that validity and reliability has been tested. The dependent variable in this research is pulp caries.

The respondents for this research are 37 patients with pulp caries and 37 without pulp caries. Using the nonprobability sampling technique by purposive sampling with Rowosari villagers with pulp caries and aged 15-44 years old as the inclusion criteria.

Odds ratio analysis is used to determine the most dominant factor. This research has followed through the ethical clearance procedures determined by Health Ministry of Health Polytechnic Semarang ethical commission.

RESULTS

The percentage between cases and control group on clinical factors are shown in the Table 1. In clinical factors, it can be seen that among the existing clinical factors, the plaque shows the greatest difference between the control group and case groups. The highest difference of plaque index in case group and control group was 32.3% while other clinical factors had only difference <30%.

Table 1. Result of percentage clinical factors of pulp caries in Rowosari community, Semarang city of Indonesia

		Low	High	Total
OHI-S	case	46%	54%	100%
	control	65%	35%	100%
plaque index	case	49%	51%	100%
	control	81%	19%	100%
saliva hydration	case	54%	46%	100%
	control	35%	65%	100%
viscosities	case	46%	54%	100%
	control	57%	43%	100%
pH saliva	case	49%	51%	100%
	control	70%	30%	100%

The results of data analysis of clinical factors can be seen in the Table 2. It is known that the odds ratio is the highest in the plaque index of clinical factors with OR = 4.524 which means that patients are 4.524 times more likely to develop pulp caries. Meanwhile, the lowest OR value is salivary viscosity with OR = 1.542. This means that the chance of having pulp caries is twice greater compared to those with low salivary viscosity.

Table 2. Results of data analysis of clinical factors of pulp caries in Rowosari community, Semarang city of Indonesia

No	Causative Factors	OR Value	Explanation
1.	Plaque index	4.524	Caused
2.	pH saliva	2.495	Caused
3.	OHI-S	2.172	Caused
4.	Saliva hydration	1.569	Caused
5.	Viscosities	1.542	Caused

The Table 3 shows the percentage between cases and control group on nonclinical factors. It can be seen that the actions and knowledge have the same difference in the case and control group, but the results show the action has a greater difference than other nonclinical factors. The difference of the bad actions in case group and control group is 16.3%.

Tabel 3. Result of percentage nonclinical factors of pulp caries in Rowosari community, Semarang city of Indonesia

		Good	Bad	Total
Environment	Case	49%	51%	100%
	Control	60%	41%	100%
Knowledge	Case	43%	57%	100%
	Control	60%	41%	100%
Attitude	Case	43%	57%	100%
	Control	51%	49%	100%

		Good	Bad	Total
Action	Case	49%	51%	100%
	Control	65%	35%	100%
Health care	Case	84%	16%	100%
	Control	84%	16%	100%
Heredity	Case	51%	49%	100%
	Control	54%	46%	100%

Analysis of non-clinical factors can be seen in the Table 4. In the non-clinical factors, the highest odds ratio value is action with OR = 1.949, which means that the action could affect the pulp caries by 1.949 times greater. On the other hand, the lowest OR value is health service with OR = 1 or neutral value which means that health service does not affect the formation of pulp caries.

Table 4. Results of the data analysis of nonclinical pulp caries factors in Rowosari society, Semarang Indonesia

No	Causative Factor	OR Value	Explanation
1.	Action	1.949	Caused
2.	Knowledge	1.925	Caused
3.	Environment	1.548	Caused
4.	Attitude	1.548	Caused
5.	Genetic	1.115	Neutral
6.	Health Services	1	Neutral

DISCUSSION

The patients who have high plaques index tend to have 4.524 higher risk than those with low plaques index. This is because dental caries begins with the existence of fermentation and strong organic acid production such as lactate, format, and pyruvate, causing dental demineralization. The bacteria present in the plaque ferment the carbohydrate and produce acid that decrease the plaque's pH level to 4.5-5.0 within 1-3 minutes. The plaque's pH will return to normal within 30-60 minutes. If the plaque's pH is decreasing continuously, it may cause dental demineralization or acidic conditions favoured by *Streptococcus* mutants and *Lactobacillus* sp bacteria to form caries [9, 10].

Based on the results of the study, the cause of high index plaque is mainly attributed to the irregularity and incorrect teeth brushing technique. For instance, brushing the teeth only during the morning and evening shower only. Dental experts say that tooth brushing is the most important factor to prevent dental disease and recommend to brush the teeth for 2-3 minutes at least is twice a day after breakfast and before bedtime [11, 12].

Lack of discipline in brushing teeth will cause the plaque to increase the mouth's acidity level and creates a conforming environment for bacteria to grow and develop cavities. In addition, many respondents still do not brush their teeth properly. As a result, plaque accumulates within the area of teeth that are not cleaned and the bacteria left behind makes the teeth more easily perforated. Brushing teeth could reduce the average 42% plaque with a variation of 30-53% depending on index used. This is consistent with studies conducted by Hendari et.al. (2015) which shows that the pulp tissue disease caused by external factors are attitudinal (64%) due to the wrong time of brushing (54%), snacking habits and preference for food that is sweet and sticky (70%) and frequency of snacking of more than three times daily (50%) [13, 14].

Incorrect brushing technique impacts the effectiveness in cleaning teeth from plaque. Plaque attached to the tooth surface can lead to tooth tissue and tooth supporting tissues diseases. This is due to the bacteria in the plaque fermenting carbohydrates and resulting in plaque's pH to decrease in 4 - 5 minutes. Low plaque's pH increases the risk of high caries development. After damaging tooth enamel, increasing the amount of plaque will accelerate the process of developing caries in the pulp tissue damage [1, 2, 15].

The prevalence of pulp caries among the respondents is related to their attitude of taking over-the-counter medicine to ease the pain rather than having professionals to check their teeth due to their lack of awareness of the root cause of their discomfort. These medicines can only temporarily reduce the pain and the pain will return again when the effect is gone. The preference for taking commercial medicine instead of going to the dentists is because the respondents feel easier to get them and they are affordable. This is in accordance with research conducted by Dini & Lestari which says that from 300 respondents, as much as 50% answered that easy to get and cheap price are the main reasons to consume the commercial medicine. Meanwhile, 156 or 26% of the respondents simply hesitated to visit the doctor and as many as 144 or 24% could not afford to pay for health [16].

Poor behaviour in the community occurs due to lack of knowledge about dental health. This is in accordance with the research conducted by Noor et.al. (2015), which states that only 25% of the respondents had acquired sufficient knowledge of oral health from health personnel. Awareness on dental health in the community can be increased by promoting knowledge and behavioural change through demonstration and counselling. These methods leave deeper impression and are accessible for the target to receive the materials [17, 18].

CONCLUSION

Factors causing pulp caries include clinical factors (plaque index, salivary pH, OHI-S, salivary hydration, and salivary viscosity) and non-clinical factors (behaviour and environment). The highest clinical factor leading to pulp caries is the plaque index and the highest non-clinical factor leading to pulp caries is action. To reduce the formation of dental plaque, it is suggested that the patients should be more disciplined to brush their teeth correctly and regularly, at least two times a day after breakfast and before bedtime, and consume more fruits and vegetables rather than food that is high in sugar.

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