RELATIONSHIP BETWEEN RISK FACTORS AND PERIODONTAL DISEASE AMONG PATIENTS IN COMMUNITY HEALTH CENTERS

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ABSTRACT

Background: Periodontal disease is an infection in the oral cavity that is often found in the community and is considered as the number two disease in the world after dental caries. The higher the age, the higher the index of periodontal disease and if no prevention is carried out it can affect a person's quality of life. This study aims to determine the relationship between risk factors and the occurrence of periodontal disease.

Method: This type of research is observational with a cross-sectional design. The sample in this study was taken by proportional random sampling and it was obtained as many as 250 patients aged 15-55 years. The risk factors studied were: OHI-S index, instantaneous blood sugar, knowledge of periodontal disease, dental and oral health maintenance behavior, food selection behavior, smoking habit, and utilization of health services. Measurement of periodontal disease based on the state of gingival infection and the data were analyzed using the chi-square test.

Result: The results of the chi-square test obtained the OHI-S index, knowledge of periodontal disease, dental and oral health maintenance behavior, food selection behavior, personal blood sugar, and utilization of dental health services (p<0.05). The relationship between smoking habits and the occurrence of periodontal disease was p>0.05

Conclusion: the risk factors: OHI-S, knowledge of periodontal disease, dental and oral health maintenance behavior, food selection behavior, instantaneous blood sugar levels, and utilization of dental and oral health services are significantly associated with the occurrence of periodontal disease.

INTRODUCTION

Dental and oral health is critical to our general health because the oral cavity plays an important role in speech, food digestion, communication, and socialization. Periodontal disease is one of the oral and dental diseases found in the community can affect a person's quality of life.[1]

The periodontal disease index, especially the gingivitis index, in the age range between 15-24 years is 0.69%, 25-34 years 0.74%, 35-44 years 0.76%, 45-54 years 0.76%, 55-64 years 0.75% and above 65 years 0.73%.[2] Based of the national basic health research 2018, the increases of age shows the higher periodontal disease index, which tends to occur in people with low income will be.[3]

Bacteria in periodontitis include *Streptococcus sanguinis,* they attach to the teeth and may enter the bloodstream, causing

inflammation of the wall of the blood vessel. Once inflammation occurs in the blood vessels, atherosclerosis may occur and, in turn, become cerebral vascular disease.[3]

Periodontal disease is a type of destructive inflammation disease, in dental support issues caused by a specific microorganism which cause further damage in periodontal ligament and alveolar bone as indicated by the existence of pocket, gingival recession, or both. Periodontitis often develops out of existing gingivitis, although not all gingivitis can turn into periodontitis. Changes in composition and pathogenic potency from plaque microorganisms on a host resistance factors and surrounding tissues determine the change from gingivitis into periodontitis and the severity of damage in periodontal tissues[4]. Periodontal diseases are often be present in the subgingival plaque of patients with chronic periodontitis. Three bacteria contribute to the disease are *Porphyromonas gingivalis, Treponema denticola and Bacteroides forsythu*s.[1] Periodontal tissues condition examinations are conducted to determine the severity of periodontal disease by probing the depth, level of clinical attachment, and bleeding at the time of the probe.[5]

One of the efforts to reduce the impacts of systemic diseases in oral cavity is to provide early diagnosis, prevention, and efficient management of systemic diseases. According to an epidemiology study, periodontal diseases have become one of the factors that cause cardiovascular disease, stroke, and peripheral arterial diseases.[4] In order to increase oral health promotion efforts, the risk factors that cause periodontal disease need to identified.

Therefore, the objectives of this study was to determine the association between risk factors and periodontal disease.

MATERIALS ANDMETHODS

This study was observational with the analytical cross-sectional design. The population of study consisted of patients being treated at dental health clinics in community health centres, Sleman regency, during April-Juni 2021. The samples consisted of dental patients with age range between 15-55 years in six community health centres in Sleman regency, The Special Region of Yogyakarta. The samples, consisting of 250 respondents, were acquired with the proportional random sampling method. The inclusive criteria for respondents are 1) male and female patients with age range between 15-55 years, 2) respondents' willingness to become samples of the study, and 3) not pregnant (for females). The exclusive criteria are respondents are unable to participate or get sick when the study is being conducted.

The study was conducted by measuring respondents' periodontal diseases: the conditions of gingivitis infection and periodontal pocket were examined. The risk factors being measured were the oral and dental hygiene (OHI-S) index according to Green and Vermilion, the knowledge of periodontal disease, the dental and oral health maintenance behavior, the food selection behavior, the instantaneous glucose levels, the smoking habit, and the utilization of health service.

The research instruments were; 1) periodontal disease measurement sheets for measuring gingiva inflammation and depth of periodontal pocket, 2) the OHI-S index, with degrees as follows: high: 3.1-6, moderate: 0.13-3 and low: 0-1.12 (Green and Vermillion), 3) the questionnaires regarding periodontal disease which consisted of 8 question items and score indications as follows: high: 5-8, low :1-4, 4) the questionnaires regarding oral and dental health maintenance behavior which consisted of 10 question items and score indications as follows

high: 26-40 and low: 10-25, 5) the questionnaires regarding food selection behavior which consisted of 4 question items and score indications as follows high:11-16 and low:4-10, 6) the instantaneous blood sugar level where it is considered high if it is more than 200 mg/dl and low if it is less than or equal to 200 mg/dl, 7) the check-lists regarding the smoking habit, with smoking means high score while not smoking means low score, 8) the check-lists regarding the utilization of dental health services, with check-ups more than two times a year means high score while check-ups less or equal to twice a year means low score, and 9) the periodontal diseases in this study if gingivitis and periodontal pocket

depth were more than 3 mm. The study was conducted after the researchers received the permission from the Committee of Ethics and Research of Health Polytechnic of Health Ministry Yogyakarta no: No. e-KEPK/POLKESYO/0304/III/2021.

RESULTS

Table 1 shows that the dominant characteristics of respondents are 1) female, within age range of 15-25 years, have senior high school education, housewives, and whose household incomes were lesser than Indonesian Rupiah (IDR) 2.500.000.

Table 1. Distribution of characteristics of respondents

Characteristics of respondents	n	%
Gender		
Male	96	38,4
Female	154	61.6
Age range		
15-25 years	90	36
26-35 years	70	28
36-45 years	59	23.6
46-55 years	31	12.4
Education		
Unschooled	0	0
Elementary School (SD)	9	3.6
Middle School (SMP)	25	10
Senior High School (SMU)	127	50.8
Diploma	13	5.2
Higher education	76	30.4
Occupation		
Housewife	83	31.2
Farmer	35	2
Merchant	46	4
Private employee	39	15.6
Government employee	47	14.4
Income		
More than IDR5.000.000	39	15.6
IDR2.500.000 - IDR5.000.000	64	25.6
Lesser than IDR2.500.000	147	58.8

The distribution of the characteristics of the respondents is shown in table 1, 154 (61.6%) are women, 90 (36%), senior high school are 127 (50.8%), housewives are 83 (31.2%), 90 (36%) are 15-25 years, and 147 (58.8%) are income less than IDR 2.500000

Table 2. Description of risk factors of periodontal disease

Risk factors of periodontal disease	Minimum	Maximum	Average	SD
OHI-S	1,1	3.6	3.29	0.63
Knowledge of periodontal disease	1	8	6.43	1.49
Oral and dental health maintenance behavior	10	40	29.88	4.09
Food selection behavior	7	16	12.04	1.81
Instantaneous blood sugar level	80	265	147.06	46.19
Smoking habit	1	2	1.82	0.39
Utilization of oral and dental health services	1	2	1.42	0.49

Note: SD: Standard Deviation

The results of study (table 2) is shown that the mean value of respondents' oral and dental hygiene measured with the OHI-S index is $3,29\pm0,63$ (high), knowledge of periodontal diseaseis $6,43\pm1,49$ (high), oral and dental health maintenance behaviour is $29,88\pm4,08$(high), food selection behaviour is$12,04\pm1,81$ (high), Instantaneous blood sugar level is $147,06\pm46,19$ (low), smoking habit is $1,82\pm0,39$ (high), and tilization of oral and dental health services is $1,42\pm0,40$ (low).

Table 3. The cases number of periodontal disease

Risk factors	Criteria	Periodontal disease		*p-value*	X^2
		Low	High	*(sig)*	
		n (%)	n (%)		
OHI-S	High	101(40.4)	149(59.6)	0.000*	0.000
	Low	0	0		
Knowledge of periodontal disease	High	89 (35.6)	137(54.8)	0.038*	0.317
	Low	12(4.8)	12(4.8)		
Oral and dental health maintenance behavior	High	99(39.6)	147(58.8)	0.001*	0.696
	Low	2(0.8)	2 (0.8)		
Food selection behavior	High	98(39.2)	146(58.4)	0.036*	0.631
	Low	3(1.2)	3 (1.2)		
Smoking habit	Smoking	14(5.6)	31(12.4)	0.182	0.156
	Not smoking	87(34.8)	118(47.2)		
Instantaneous blood sugar level	High	25(1.)	51(20.4)	0.012*	0.107
	Low	76(30,.4)	98(39.2)		
Utilization of oral and dental health services	High	45(18.)	59(23.6)	0.041*	0.436
	Low	56(22.4)	90(36.)		

Note: * = there is a significant relationship (p < 0,05)

Table 3. shows that the risk factors for periodontal disease that affect the occurrence of periodontal disease are: OHI-S, knowledge of periodontal disease, oral and dental health maintenance behaviour, food selection behaviour, Instantaneous blood sugar level, utilization of oral and dental health services (p<0.05).

In this study, periodontal diseases were determined by measuring the condition of gingiva. It was obtained that 101 respondents (40%) had a low criteria (healthy gingiva) and 149 respondents (58.65%) had high criteria (gingivitis).

DISCUSSION

Table 2, show that the mean value of respondents' oral and dental hygiene measured with the OHI-S index is 3.29 ± 0.63 (high). Many respondents (59.6%) have high OHI-S index and high periodontal diseases (see Tables 2 and 3). The high value of the OHI-S index was determined by the oral and dental health maintenance behavior, meal pattern, and poor teeth brushing method.[6]

The mean value of the knowledge of periodontal disease is 6.43 ± 1.49 (high). Many respondents have high level of knowledge and periodontal disease (54.8%) (Table 2 and 3). Individual's knowledge is influenced by predisposition factors such as economics status, age, gender, and family structure. The population's level of knowledge of periodontal disease influences the occurrence of periodontal disease in the population. Therefore, a good health education program both in formal or informal phases are necessary.[7]

Based on Table 2, the mean values of oral and dental health maintenance and food selection behaviors are 29.88 ± 4.09 (high) and 12.04 ± 1.81 (high). The results are in accordance with the chi-square analysis (Table 3), where many respondents (58.8%) have high values in the oral and dental health maintenance behavior and periodontal disease. The same goes for the food selection behavior: many respondents (58.4%) have high values in the food selection behavior and periodontal disease (see Table 3). The high level of food selection behavior was influenced by the high level of knowledge.[7] The results were also influenced by the level of education of respondents which in this study was also high, diploma (5.2%) and higher education (30.2%) (see Table 2).

The result of measurement of blood sugar level showed a mean value of 147.06 ± 46.19 (low). 39.2% respondents had low glucose level and high periodontal disease. Physical activities or regular exercises can decrease and maintain blood sugar to normal level. Basically, one does not have to perform intense exercises. Light exercise or other physical activities are sufficient for maintaining health. Exercises can increase the usage of glucose.[8]

The mean value of the smoking habit criteria in this study was 1.8 ± 0.39. 47.2% respondents did not smoke and had high periodontal disease (see Table 3). This shows that smoking is still one of dominant behaviors in communities. The prevalence of smoking in Indonesia is considered high. More men tend to smoke compared to women. The data provide by the Report on the Result of National Basic Health Research 2018 shows that the percentage of smokers with ages above 15 years is 33.8%. The percentage of total number of male smokers is 62.9% while the percentage of total number of female smokers is 4.8%. The increase in the number of smokers is accompanied by the increase in diseases caused by smoking such as hypertension, stroke, diabetes, heart attack, and cancer.[2]

The mean value of utilization of oral and dental health services is 1.4 ± 0.49. This means that every year, respondents had oral and dental check-up once (see Table 2). The low level of utilization of oral and dental health services causes a high level of oral and dental diseases in the community.[9] Other factors which influence the utilization of oral and dental health services is perception towards the need for certain health service and assessment towards the need for or benefits of such service.[10]

The chi-square analysis result shows that there is a relationship between the OHI-S index and periodontal disease ($p<0.05$). Periodontal disease can develop in individuals with poor oral and dental conditions. The disease is

caused by the accumulation of debris which, if not being cleaned soon, can transform into plaque. In turn, the plaque will reduce pH in saliva, making it easier for the bacteria to develop and damage periodontal tissues.[11]

A significant relationship is found between the knowledge level of periodontal disease and the occurrence of periodontal disease with *p-value*=0,038. This result shows that there is a relationship between the knowledge level and the occurrence of periodontal disease.[12] Knowledge allows individuals to change their behavior. The change depends on the level of comprehension they have regarding the periodontal disease. Therefore, prevention can be conducted.[13] The importance of oral and dental health is still ignored because some people do not know that oral and dental problems can cause dangerous, systemic diseases in their bodies.[14] In order to change individual's behaviors or overt behaviors, knowledge can be used to influence it constantly. Knowledge can help individuals to be consistent in maintaining their behavior and attitude longer than those who do not possess such knowledge. Knowledge of periodontal disease is one of factors which can influence individuals' oral and dental health because most oral and dental problems in the community are caused by their behavior and attitude. Good knowledge will influence healthy attitude towards health improvement, especially in the oral and dental area.[12]

The chi-square analysis result shows that there is a significant relationship in the occurrence periodontal disease (p<0.05). Periodontal disease in patients with type 2 diabetes is generally in form of chronic inflammation.[13] Many studies report that there is a two-way relationship between periodontal disease and the high level of blood sugar among diabetic

patients.[14] An epidemiology study shows that diabetic patients with uncontrolled blood levels have high risk of having periodontal diseases.[13] The high level of blood sugar in patients of diabetes mellitus changes the responses of periodontal tissues towards local factors, increasing the rate of bone loss and prolonging the duration of treatment.[14] In diabetic patients, there is increase in the attachment loss and the pocket depth which is accompanied with periodontitis.[5,13] A greater prevalence of gingivitis can be caused by the difference of a subject's condition and exposure of other risks.[16]

The analysis result of risk factors regarding the smoking habit on periodontal disease is p=0.182. The result shows that the smoking habit does not significantly influence the occurrence of periodontal disease. It is because some respondents in this study had higher education (50.85%). The smoking habit is influenced by the level of education. The higher the level of education one has, the easier they can acquire knowledge or information. Acquiring information from various sources widens one's knowledge.[17]

The motivation for visiting dentists will emerge once one has unwanted experiences from their oral and dental disease.[18] They will have better understanding on the importance of dental health maintenance if they conduct dental examination frequently.[19] While visiting a dentist, the dentist will provide knowledge regarding periodontal diseases. Early prevention can be conducted if any cause or symptom of periodontal disease can be identified as early as possible, therefore avoiding a worse condition.[14,20] Prevention and health improvement regarding periodontal disease are better performed at young ages.[21] Limited knowledge regarding periodontal disease in most citizens is one of factors that

causes their low awareness to have early dental examination.[6]

CONCLUSION

Based on the research result and discussion, the risk factors of the OHI-S index, the knowledge of periodontal disease, the oral and dental health maintenance behavior, the food selection behavior, the instantaneous blood sugar level, and the utilization of oral and dental health services are related to the occurrence of periodontal disease.

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