Risk Factors for Periodontal Disease in Diabetes Mellitus Type 2 Patients at Padongko Health Center, Barru Regency (Study Epidemiology)

¹Masriadi^{*}, ²Erna Irawati, ³Chusnul Chotimah,⁴Kurniaty Pamewa, ⁵Sarahfin Aslan,⁶Moh. Hamzah

¹Department of Epidemiology, Faculty of Public Health, Universitas Muslim Indonesia, Makassar ²Department of Biology oral, Faculty of Dentistry, Universitas Muslim Indonesia, Makassar

³Department of Prostodontic, Faculty of Public Health, Universitas Muslim Indonesia, Makassar

⁴Department of Pedodontic, Faculty of Public Health, Universitas Muslim Indonesia, Makassar

⁵Department of Conservation, Faculty of Public Health, Universitas Muslim Indonesia, Makassar

⁶Department of Community Dentistry, Faculty of Dentistry, Universitas Muslim Indonesia, Makassar

Corresponding Author: Masriadi

Email: arimasriadi@gmail.com

ABSTRACT

Background: Diabetes Mellitus (DM) is a non-contagious chronic disease and becomes one of global public health problems. Several oral conditions frequently found in Diabetes Mellitus patient include periodontal disease with alveolar bone resorption and gingival inflammation, a clear abscess, and xerostomia. The many complications, periodontiis mostly occurs in Diabetes Mellitus patient. It is a common chronic disease that accounts for 75-85% of diabetes cases in which the inflammatory response to bacteria in the gum tissue (periodontal ligament) caused irreversible loss of supporting structures and can eventually lead to tooth loss.

Material and Methods: This research applied an observational analytic method with a case control study approach.

Result and discussion: The sample was 60 patients of diabetes mellitus type 2taken using demographic data questionnaires and patient medical record data. The results showed that the age of the elderly (>60 years) had a risk of periodontal disease compared to adulthood (<60 years); men have more risks to develop periodontal disease than women; low education was more at risk of periodontal disease compared to higher education; and the bad habit of brushing teeth also becomes the cause of periodontal disease. **Conclusion:** Education is one of the risk factors for periodontal disease in patients with diabetes mellitus type 2 with an OR value of 1.0 and p Value of 0.137.

INTRODUCTION

Diabetes Mellitus (DM) is a chronic non communicable diseases and is also one of the global public health problems. The World Health Organization (WHO) estimated in 2014 that 422 million adults lived with diabetes mellitus (DM) worldwide [1],[2].

Diabetes Mellitus Type 2 (DMT2) is the most common case of diabetes, characterized by impaired insulin secretion or insulin work disorder (insulin resistance). The proportion of Indonesians aged \geq 15 years with diabetes mellitus from 2013-2018 suffered a significant increase of 6.9% to 8.5%, spread over urban areas (10.6%) and rural areas (11.2%), as well as more common in women (12.7%) than men (9.0%) [3],[4].

The conditions of the oral cavity are often encountered in patients with Diabetes Mellitus including periodontal disease with alveolar bone resorption and gingival inflammation, recurring abscesses, and xerostomia. From many complications, periodontitis is complication that frequently occurs in people with diabetes mellitus.

Periodontal disease in Indonesia ranks second which is still a problem in society. Disease periodontal most commonly found is gingivitis and periodontitis. Gingivitis is a mild form of periodontal disease with clinical signs of gingiva that is red, swollen, and bleeds easily without the breakdown of alveolar bones. The clinical picture of Periodontice is the occurrence of discoloration to bright red, accompanied by a swelling of the margin. Bleeding during probing and the probing depth occurs \geq 4 mm. There is a loss of alveolar bone and unsteadiness of the teeth [7],[8],[9].

Keywords: Periodontal Disease, Risk Factors, Diabetes Mellitus, Epidemiology

Correspondence:

Masriadi Department of Epidemiology, Faculty of Public Health, Universitas Muslim Indonesia, Makassar Email: arimasriadi@gmail.com

The main cause of periodontal disease is the presence of microorganisms that colonize in dental plaque. Where plaque is a soft deposit in the form of a thin layer of biofilms containing a collection of pathogenic microorganisms such as Porphyromonasgingivalis, Actinobacillus Actinomycetemcomitans, Prevotelaintermedia, Tannerella Forsythia and Fusobacterium The nucleatum [10], [11].

The risk factors that can cause worsening or contributing factors and causes of periodontal disease such as diabetes mellitus and microorganisms. The study of Sihombing (2015) said that risk factors such as age, gender, education, and tooth brushing can affect the severity of periodontal disease. The results of the analysis test showed that age is one of the risk factors of Diabetes Mellitus which will affect periodontal condition. ^[7] Age, according to research in Iowa, Switzerland by Robert, shows that age> 60 years is associated with the occurrence of diabetes mellitus because in old age physiological function decreases due to decreased insulin secretion or resistance so that the body's ability to control high blood glucose is less than optimal [12],[13].

METHODS

The design of this research uses the type of analytical observation research and this research was entered in the draft research case Controlstudydone at Puskesmas Padongko District of Barru in January- March 2020. The sample used in this study were 60 people with diabetes mellitus type 2with a purposive sampling method in accordance with the criteria that researchers determined.

Data processing using SPSS 2.0 using the chi-square test and logistic regression.

RESULT

Subjects of research conducted at Padongko Public Health Center in Barru Regency were 60 people consisting of 30 people with Diabetes Mellitu type 2 controlled and 30 people with Diabetes mellitus type 2 uncontrolled and had fulfilled the determined criteria. The study was conducted by administering questionnaires and examining periodontal disease.

The results of the study will be presented as follows:

Table 1. Relationship between Risk Factors and Periodontal Disease Incidence in Diabetes Mellitus Type 2 Patients i
Padongko Health Center, Barru Regency

Variable	Periodontal Disease				Total	р
	Yes		No			Value
	Frequency	Percent	Frequency	Percent		
Age						0.100
Adult (<60 years)	8	21.1	30	78.9	38	
Elderly (>60 years)	9	40.9	13	59.1	22	
Sex						0.026
Male	9	47.4	10	52.6	19	
Female	8	19.5	33	80.5	41	
Education						0.000
Low	16	55.2	13	44.8	29	
High	1	3.2	30	96.8	31	
Tooth Brushing						0,000
Behavior	14	82,4	3	17,6	17	
Poor	3	7,0	40	93,0	43	
Good						
GDP						0,000
High	17	56,7	13	43,3	30	
Normal	0	0	30	100	30	

Table 1 shows that there is no significant relationship between age and periodontal disease, with a p value of 0.100. Subjects with adult age (<60 years) had no risk of periodontal disease by 21.1% compared to the elderly (> 60 years) who were at risk of periodontal disease of 40.9%. The table above also shows a significant relationship between sex and periodontal disease, with a p value of 0.026. Male subjects were at risk of periodontal disease 47.4% compared to 19.5% Female.

The table above shows a significant relationship between education and periodontal disease. With a value of P0, 000.

The subject of low education is at risk of periodontal disease as much as 55.2% compared to subjects with high educated 3.2%. Table 1 shows a significant realation between the tooth brushing behavior with periodontal disease, with a value of P0,000, subjects with poor tooth brushing behaviors are at risk of periodontal sebesear 82.4% in comparison with A good of 7.0%. And in the table above also shows a significant relationship between GDP and periodontal disease. With a value of P0,000, subjects with high GDP are at risk of periodontal disease of 56.7% compared with Normal GDP by 0%.

 Table 2. Logistic Regression Analysis of Risk Factors for Periodontal Disease Occurrence in Diabetes Mellitus Type 2 Patients in Padongko Health Center, Barru Regency

Variable	Wald	Sig.	OR	CI 95%	
				Lower	Upper
Age	0,000	0,996	0,0	0,000	
Sex	0,000	0,995	0,0	0,000	
Education	0,137	0,711	1,0	0,013	19,562
Tooth Brushing Behavior	0,000	0,994	0,0	0,000	
GDP	0,000	0,995	0,0	0,000	

In table 2 the educational variable has no significant effect but low education has an OR risk of 1.0 times with a 0.013-19.562 chance of developing periodontal disease in patients with type two diabetes mellitus compared to higher education

DISCUSSION

Diabetes mellitus type 2 (DMT2) is a metabolic disorder characterized by an increase in blood sugar due to decreased insulin secretion by pancreatic beta cells and impaired insulin function (insulin resistance) [5],[14]. A person is called diabetes mellitus when blood sugar levels (glucose) in the vein plasma above 200 mg/dL and capier blood above 200 mg/dL. While fasting blood glucose levels above 126 mg/dL (plasma veins) and above 110 mg/dL (capillary blood). High blood sugar levels due to the abnormalities of insulin secretion and insulin action. Insulin is a protein hormone secreted by the beta cell Langerhans in the pancreas. The function of insulin itself as a receptor for cells to receive glucose. Without glucose insulin can not enter in the cell so that glucose levels in the blood increases [15].

The condition of the oral cavity often encountered in patients with Diabetes Mellitus include periodontal disease with alveolar bone resorption and gingival inflammation, recurring abscesses, and xerostomia. Of the many complications that occur, periodontitis is a complication that often occurs in people with Diabetes Mellitus [2],[5],[6]. The main cause of periodontal disease is the presence of colonizing microorganisms in dental plaque. where plaque is a soft deposit in the form of a thin layer of biofilm containing a collection of pathogenic microorganisms such as Porphyromonas gingivalis, Actinobacillus actinomycetemcomitans, Prevotela intermedia, Tannerella forsythia and Fusobacterium nucleatum [10],[11]. Respondents with Diabetes mellitus type 2 in Padongko Public Health Center in Barru regency with GDP against periodontal disease have a significant correlation of p0,000 (<p0.05). High GDP is more at risk of developing periodontal disease compared to normal GDP. These results are in line with Titik's (2017) study, which shows that there is a significant influence between diabetes mellitus and the incidence of periodontitis as indicated by p = 0.007 (p < 0.05).^[16] According to Caranza (2019), explaining that in patients with diabetes mellitus can increase periodontal tissue damage [17].

The results of the data in this study indicate that the DMT2 group was controlled and uncontrolled more in women. This is the same as research conducted by Afni Mulyani (2017), which states that DMT2 is controlled and uncontrolled mostly in women. This might be because women feel more stress which can support an increase in blood sugar levels [18].

Based on the results of data from a study conducted at Padongko Public Health Center in Barru Regency aged> 60 years (elderly) found 36.7% and age <60 years (adults) obtained 63.3%. this is in line with research conducted by Sari, R. (2017) which shows the average age of subjects with diabetes mellitus is 66.7% with the youngest age is 40 years and the oldest age is 60 years. This is due to diabetes mellitus type 2often occurs in adulthood and the incidence of diabetes mellitus is gradual so it requires a long time to be identified and diagnosis. The incidence of diabetes mellitus is also reported to increase with age [19]. From the results of the study in table 1 of age on periodontal disease there is no significant relationship p0,100 p value (p>0.05), this is not in line with the study of Dharmawati (2015) which shows that the age of periodontal abnormalities in patients with diabetes mellitus there is a relationship significant with a value of p0,025 (p <0.05) [7], but in the elderly group (> 60 years) more at risk of periodontal disease compared with the adult group. Periodontal disease is more common in parents than in the younger group, this condition is often associated as a result of cumulative tissue damage during life (aging process), susceptibility to oral infections, excessive inflammatory response and periodontal tissue damage [9].

Age is also related to histological and clinical conditions in the oral tissues. This happens because in old age epithelial thinning occurs and a decrease in the degree of keratinization and changes in cellular components in the connective tissue. These changes in structure and function cause a decrease in endurance of the periodontal tissue, which often causes complaints in the oral cavity [19].

Age> 60 years is associated with the occurrence of diabetes mellitus because in old age physiological function of the body decreases due to decreased secretion or insulin resistance so that the body's ability to control high blood glucose is less than optimal. Research in the USA quoted by Rochman W shows from 1996-1997 in elderly aged > 60 years gained only 12% only in old age with diabetes mellitus which figures blood glucose levels controlled,

50% experienced macroangiopathy disorder factors affect the decrease in blood circulation. As a result of decreased circulation the slowing of blood flow will reduce the body's ability to inhibit infection, so that it can cause things that affect periodontal in people with diabetes mellitus. The nature of diabetes mellitus has an active effect on tissue damage, periodontal structure, local irritation factors, and diabetes mellitus is a predisposing factor that can accelerate periodontal tissue damage initiated by microbial agents, vascular changes in people with diabetes mellitus can affect large blood vessels and small blood vessels. Changes in small blood vessels occur in the arteiod, capillaries, and venules. Periodontal tissue will experience a lack of oxygen blood supply, so that it can affect the increase in the growth of anaerobic bacteria which causes the defense and function of the tissue to decrease so there is periodontal tissue infection. The glucose content in the gingival sulcus fluid and the blood of people with diabetes mellitus can change the environment and microflora resulting in a qualitative change in bacteria that increases gingival inflammation. In people with diabetes mellitus, fibroblasts which are primary reparative cells in the periodontium tissue do not function properly. In addition to reduced collagen synthesis, collagen produced by fibroblasts is susceptible to degradation by the matrix metalloproteinase enzyme, whose production is increased in patients with diabetes mellitus. Also in hyperglycemic conditions, there is also inhibition of osteoblast proliferation which reduces bone formation [7].

The results of data from a study conducted at Padongko Public Health Center in Barru Regency on gender in this study found 68.3% of women and 31.7% of men were found. The proportion of Indonesian population aged \geq 15 years with diabetes mellitus from 2013-2018 experienced a significant increase, from 6.9% to 8.5%, which is spread in urban areas (10.6%) and rural areas (11.2%), as well as more common in women (12.7%) compared to men (9.0%).^{[3],[4]} According to Central Disease Control (2017) in America sufferers are women (15.3%) and sufferers were male (14.9%). [26] Whereas in Ananta, A., N., H., et al. (2014) found 86.67% of women and 13.33% of men.^[27] and strengthened from the results of research conducted by Sari, R. (2017) found that 41.67% were male and 58.3% were female [19].

In table 1 the gender of periodontal disease indicates a significant relationship p0,026 (P < 0.05). This was in line with research conducted by Hong (2016) and Reyhan (2016) and reinforced by Sihombing Research (2015) which said that female respondents had better gingiva health than men, where the results showed that the prevalence of periodontal disease was 84% and men had more periodontal disease than women [12],[20],[21], but this research is not in line with research conducted by Dharmawati (2015) which shows that there is no relationship between the sex with periodontal disorder in people with diabetes mellitus with a value of P0,193 (p > 0.05) [7].

In addition, other studies prove the relationship between sex with attachment loss in adults. Another reason to support this is because women tend to be more aesthetic and bring more healthy lifestyle than men [20]. Gender plays a role in periodontal disease. Surveys conducted in the United States since 1960 show that men have more attachment loss than women. In addition, men have worse oral hygiene than women, as evidenced by higher levels of plaque and calculus [17]. Based on the results of educational research, it was found that subjects with high education were 51.7% and low education were 48.3%. In Table 1 Education on periodontal disease there is a significant relationship p0,000 (p <0.005) conducted in Padongko Public Health Center in Barru district. Low-educated subjects were more likely to have periodontal disease than those with higher education. This is in line with research conducted by Sihombing (2015) [12]. Based on the results of the logistic regression analysis in table 2, education has no effect on periodontal disease with a p-value of 0.137 (> 0.025) but has a risk of periodontal disease OR (Cl 95%) of 1.0 (0.013-19.562), which means low education has 1.0 risk with an opportunity of 0.013-19.562 times the risk of periodontal disease compared to tertiary education. This is in line with research conducted by Hong (2016) which shows that education has no effect with a p-value of 0.455 (0.025) but has a risk of periodontal disease OR (Cl 95%) of 0.873 (0.612-1.246) which means that education has a lower risk of 0.873 with an opportunity of 0.612-1,246 times compared to a high educated person [21].

This is strengthened by the results of the research Basuni (2014) and Lestari (2016) who say that the higher the level of education, it will affect also the knowledge it has for its ability to receive better information. The level of education greatly affects the knowledge, attitudes and behaviors of healthy living. A person with higher levels of education will have a good knowledge and attitude about health that will influence his behavior for a healthy life [22].

According to the Green Theory (1980) in Notoatmodjo (2007), knowledge is a predisposition factor that affects the health behavior and behavior of a person or community about health determined by knowledge. Knowledge is the result of the know, and this happens after people do the sensing of a particular object. Knowledge or cognitive is a domain that is very important in shaping one's actions (Overt Behavior). Experience and research proved that the behavior is based on knowledge [23].

Based on table 1 tooth brushing behavior that has a significant relationship to periodontal disease with a significant value of p0,000 (p < 0.05). The results of this study are in line with Ambarwati (2014) and Nataris (2017), showing that there is a relationship between the habit of brushing teeth with the incidence of periodontitis. According to Privoto (2015), one of the factors that influence the level of oral hygiene is behavior. Behavior is a form of experience and interaction of individuals with their environment, especially with regard to knowledge and attitudes about health and actions related to health. Dental health behaviors include knowledge, attitudes and actions related to the concept of healthy and toothbrushes for the maintenance of personal oral hygiene and prevention efforts. The most important factor in the effort to maintain oral hygiene is the factor of awareness and behavior because its activities are carried out at home without anyone's supervision, completely dependent on the knowledge, understanding, awareness and willingness of individuals to maintain oral hygiene [24], [25]. Diabetes Mellitus Diabetes Mellitus merupakan suatu penyakit degenerative yang umumnya berkaitan dengan faktor genetik dan faktor lingkungan. The prevalence of diabetes mellitus among the world's populations continues to increase yearly [28], [29].

This was strengthened on the research of the point (2017), reporting that there was a relationship between the habit of brushing with periodontice with a P value of 0.033. This

research explains that the community has been conducting tooth brushing but has not been in accordance with the correct procedure, both in terms, timing, frequency of tools and materials brushing, causing the accumulation of bacterial plaque and Calculus that will result from periodontal disease such as gingivitis or periodontitular.

CONCLUSION

Education is one of the risk factors for periodontal disease in patients with diabetes mellitus type 2 with an OR value of 1.0 and p Value of 0.137.

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Ethical Considerations: Ethical clearance was obtained from Universitas Muslim Indonesia, Makassar; with number" 295/KEPK-UMI/XI/2019. Just before the interview, written (or thumb impression) consent was obtained from each participant in Universitas Muslim Indonesia, Makassar guidelines.

CONFLICT OF INTEREST

The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated.

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