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Description Of Periodontal Tissue Severity Level In Diabetes Mellitus Patients At Dahlia Makassar Health Center

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Abstract

Diabetes mellitus or what is better known to the general public as diabetes is a degenerative disease that can be accompanied by chronic or acute complications and is a non-communicable disease. Diabetes Mellitus is a systemic disease that is often found in developed and developing countries, one of which is our country, Indonesia. This is caused by some Indonesian people having an unhealthy lifestyle and a lack of physical activity such as exercising. The aim of this study was to determine the level of severity of periodontal tissue in Diabetes Mellitus sufferers who visited the Community Health Center dental clinic. The descriptive research method is to determine the level of severity of Periodontal Tissue in Diabetes Mellitus sufferers at the Community Health Center. The results show that all Diabetes Mellitus sufferers have problems with their periodontal tissue and most of them are at a severe level. Based on the results of the research and discussion above, it can be concluded that all Diabetes Mellitus sufferers have problems with their periodontal tissue and as many as 60% of them are at a severe level of severity.

Keywords: Periodontal Tissue, Diabetes Mellitus, Severity Level

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1. Introduction

Oral health is an integral part of general health that cannot be separated from bodily health. Dental and oral health has an important role in improving a person's quality of life. In Indonesia, dental and oral problems are one of the disease problems that are included in the 10 list of diseases most complained about by the public. A dental and oral health problem that is often experienced by adults and older is periodontal disease. Generally, periodontal disease is chronic so that the complaints or symptoms that arise are only realized by the sufferer when the condition is advanced, especially in elderly people. (Nuzulul, 2016).

The aging process of the population certainly has an impact on various aspects of life, both social, economic and especially health, because with increasing age, the function of the body's organs will decrease, both due to natural factors and due to disease. Therefore, the problems of the elderly must be of concern to all of us, both government, community institutions and society itself. (Dinkes, 2008).

One of the diseases suffered by the elderly is Diabetes Mellitus. Diabetes Mellitus (DM), commonly known as diabetes or diabetes, is a chronic disease that the patient will suffer from for the rest of his life. Diabetes Mellitus is a disorder of carbohydrate metabolism due to insulin deficiency which is characterized by increased blood sugar levels and the presence of sugar in the urine (glucosuria). Uncontrolled blood glucose levels can cause complications in other organs, including the oral cavity (Haranti, 2013).

One of the serious complications of DM in the field of dentistry is oral diabetes, which includes dry mouth, gingiva that bleeds easily (gingivitis), calculus, alveolar bone resorption, periodontitis and so on. Of the many complications that occur, periodontitis is the most frequent complication in DM sufferers with a high prevalence rate of up to 75%. DM sufferers have a greater tendency to suffer from periodontitis than those who do not suffer from DM. This is caused by changes in blood vessels, impaired neutrophil function, collagen synthesis, microbiotic factors, and genetic predisposition. (Stephanie 2015).

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Periodontal disease is different from dental caries, in that periodontal disease is more chronic and does not cause severe pain. Even in early conditions, there are no complaints of pain. This disease is caused by plaque bacteria which begins with gingivitis or inflammation of the gums. Currently, periodontal disease is often found at a young age , one of the causes is the presence of calculus on the teeth. Calculus appears on areas of the tooth surface that are difficult to clean. Calculus becomes a place for various germs to stick in the mouth. As a result, calculus can cause various gum diseases, such as gingivitis or gingivitis which is characterized by appearing redder, slightly swollen and often bleeding when brushing your teeth. Gum inflammation or gingivitis can become periodontitis, but not all gingivitis can develop into periodontitis. (Carranza, 2006, 2012) in (Indirawati et al, 2013).

The International Diabetes Federation's latest estimate is that there were 382 million people living with diabetes in the world in 2013. In 2035, this number is expected to increase to 592 million people. It is estimated that of these 382 million people, 175 million of them have not been diagnosed, so they are threatened with progressive development into complications without realizing it and without prevention. (Indonesian Ministry of Health, 2014).

Various epidemiological studies show a trend in increasing the incidence and prevalence of type 2 DM in various parts of the world. WHO predicts a significant increase in the number of people with diabetes in the coming years. WHO predicts an increase in the number of people with DM in Indonesia from 8.4 million in 2000 to around 21.3 million in 2030. In line with WHO, the International Diabetes Federation (IDF) in 2009, predicts an increase in the number of people with DM from 7.0 million in 2009 to 12.0 million in 2030. Although there are differences in prevalence figures, both reports show an increase in the number of people with DM by 2-3 times in 2030. (Perkeni, 2011).

Based on data from the Indonesian Central Bureau of Statistics in 2003, it is estimated that Indonesia's population aged over 20 years is 133 million. With a DM prevalence of 14.7% in urban areas and 7.2% in rural areas, it is estimated that in 2003

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there were 8.2 million people with diabetes in urban areas and 5.5 million in rural areas. Furthermore, based on population growth patterns, it is estimated that by 2030 there will be 194 million people aged over 20 years and assuming the prevalence of DM in urban areas (14.7%) and rural areas (7.2%), it is estimated that there will be 12 million people with diabetes. in urban areas and 8.1 million in rural areas. (Perkeni, 2011) The 2007 Basic Health Research (Riskesdas) report by the Ministry of Health shows that the prevalence of DM in urban areas in Indonesia for those aged over 15 years is 5.7%. The lowest prevalence is in Papua Province at 1.7 %, and the largest is in North Maluku and West Kalimantan Provinces at 11.1%. Meanwhile, the prevalence of impaired glucose tolerance (IGT) ranges from 4.0 % in Jambi Province to 21.8% in West Papua Province. (Perkeni, 2011).

Apart from the world and Indonesian levels, the increase in the incidence of DM is also reflected at the provincial level, especially the province of South Sulawesi. Based on routine hospital-based surveillance of non-communicable diseases in South Sulawesi in 2008, DM was included in the fourth largest non-communicable disease, namely 6.65%, and the fifth largest NCD cause of death, namely 6.28%. In fact, in 2010, DM was the highest cause of PTM deaths in South Sulawesi, namely 41.56 %. The increase in Diabetes Mellitus cases also occurred at the district/city level, especially in Makassar City. Diabetes Mellitus was ranked fifth of the 10 main causes of death in Makassar City in 2007 with a total of 65 cases. Based on data from the Makassar City Health Service, the incidence of Diabetes Mellitus in 2012 from January to December was 7000 cases (Riskesdas, 2007) in (Desi et al, 2013).

Makassar City consists of 14 sub-districts, if we look at the number of DM cases per sub-district in 2012, it was found that three sub-districts had the highest incidence of DM, namely Makassar sub-district with 1076 cases, Tamalate sub-district with 910 cases, and Biring Kanaya sub-district with 700 cases (Makassar City Health Service 2012). Makassar District is the district with the highest population density in Makassar City, namely 32,093/km2. Apart from that, Makassar District is located in the center of

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Makassar City. The incidence of diabetes mellitus in Makassar District was 1076 people in 2012. (Makassar City Health Service 2012) in (Desi et al, 2013).

Based on preliminary data from the Dahlia Community Health Center dental polyclinic, in 2018 there were 39 people suffering from Diabetes Mellitus who visited the dental polyclinic and there were 27 people or around 69.2% who had problems with periodontal tissue. Based on these data, it shows that the majority of Diabetes Mellitus sufferers experience problems with their periodontal tissue.

Diabetes Mellitus (DM), or what is better known to the general public as diabetes, is a degenerative disease (aging) which can be accompanied by chronic or acute complications and is a non-communicable disease. (Olivia et al, 2015).

The World Health Organization (WHO) defines diabetes mellitus (DM) as a disease characterized by hyperglycemia and disorders of carbohydrate, fat and protein metabolism which are associated with absolute or relative deficiencies in insulin action and/or secretion. (Nadyah et al, 2013)

DM is a disorder of carbohydrate protein and fat metabolism resulting from an imbalance between the availability of insulin and the need for insulin. These disorders can include absolute insulin deficiency, impaired insulin release by the pancreas, inadequate or damaged insulin receptors, inactive insulin production and insulin damage before it works (sudoyo.et.al, 2006 in Santi, 2016).

1. The classification of diabetes mellitus consists of:
   a. Type 1 Diabetes Mellitus

      Type 1 DM (Juvenile Diabetes, Insulin Dependent Diabetes Mellitus or IDDM) is diabetes that occurs due to a reduced ratio of insulin in the blood circulation due to damage to the insulin-producing beta cells in the islets of Langerhans of the pancreas due to a reaction error. IDDM can be suffered by children and adults. Currently, type 1 diabetes can only be treated using insulin and careful monitoring of blood glucose levels via blood testing monitors. (Anggita, 2012).

   b. Diabetes Mellitus type 2

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Type 2 diabetes mellitus (T2DM) is a metabolic disorder characterized by an increase in blood sugar due to decreased insulin secretion by pancreatic beta cells or impaired insulin function (insulin resistance). Diabetes Mellitus has a significant relationship with periodontal severity. The T2DM group was 3.505 times more likely to experience periodontal severity compared to the non-T2DM group. Periodontal disease in T2DM patients is more severe than in non-T2DM patients. (Rikawarastuti in Dian et al, 2015).

c. Other types of diabetes

Other types of diabetes mellitus include genetic abnormalities specific to insulin secretion or action, metabolic abnormalities that interfere with insulin secretion, mitochondrial abnormalities, and several other causative factors that interfere with glucose tolerance. (Apik, 2016).

d. Gestational Diabetes

This diabetes is gestational diabetes, namely glucose intolerance that occurs during pregnancy. This can occur in the second trimester of pregnancy because the secretion of growth hormone and chorionic hormone somatomamotropin (HCS) increases to supply amino acids and glucose to the fetus. (Anggita, 2012)

2. Signs and symptoms of Diabetes Mellitus
   a) Frequent urination, especially at night (Polyuria).
   b) Often feel thirsty (Polydipsia).
   c) Increased appetite (polyphagia) and feeling less energetic.
   d) Lose weight and become thin.
   e) Tingling in the feet.
   f) Itching in the groin area.
   g) There are wounds that are difficult to heal.
   h) Vision becomes blurred. (Ulfah, 2015)
3. Diagnosis

The diagnosis of DM is made on the basis of checking blood glucose levels. At the age of 75 years, it is estimated that around 20% of elderly people experience DM, and

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approximately half of them are not aware of the existence of this disease. For this reason, the American Diabetes Association (ADA) recommends that screening for DM should be carried out on people aged 45 years and over at 3 year intervals. This interval may be shorter in high-risk patients (especially those with Hypertension and Dyslipidemia).

Diagnostic Criteria for DM According to ADA 2010:

a. HbA1C >6.5%; or
b. Fasting blood sugar levels >126 mg/dL; or
c. 2-hour blood sugar level pp >200 mg/dL on oral glucose tolerance test performed with 75 g glucose.
d. Patients with classic symptoms of hyperglycemia or hyperglycemia crisis with blood sugar levels >200 mg/dL.

To assess the ability of DM patients to control blood glucose levels, HbA1c examination can be used. When blood sugar is not controlled (which means high blood sugar levels) the blood sugar will bind to hemoglobin (glycated). Therefore, the average blood sugar level can be determined by measuring the HbA1C level. If blood sugar levels are high for several weeks, then HbA1C levels will be high too. The HbA1C bonds formed are stable and can last up to 2-3 months (according to the age of the red blood cells). HbA1C levels will reflect the average blood sugar levels in the 2-3 months before the examination. (Anggita, 2012).

Table 1
Correlation between HbA1c levels and average blood sugar levels

HbA1C (%)	Average Sugar Blood (mg/dl)
6	135
7	170
8	205
9	240
10	275

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11	310
12	345

In Diabetes sufferers, HbA1C levels are targeted at ≤7%. The higher the HbA1C level, the higher the risk of complications. The Diabetes Control and Complications Trial and the United Kingdom Prospective Diabetes Study revealed that reducing HbA1C would provide many benefits. Every 1% reduction in HbA1C will reduce the risk of death from diabetes by 21%, heart attack by 14%, microvascular complications by 37% and peripheral vascular disease by 43%. Apart from that, according to the American Diabetes Association (ADA), controlled blood glucose levels can also be assessed from the results of checking fasting blood glucose levels, namely 70-130 mg/dl or from the results of blood glucose levels 2 hours after eating, namely <180 mg/dl (Indra, 2010).

4. Complications of Diabetes Mellitus in the oral cavity

   a. Periodontitis

      Periodontitis is one of the six complications of DM. A number of studies show that the severity of periodontal disease increases in diabetes sufferers compared to healthy individuals. Several researchers state that the severity of periodontal disease in DM sufferers is influenced by a decrease in the immune response. This condition is characterized by a number of tissue changes that cause susceptibility to disease. The vascular changes that occur indicate an increase in collagen activity as well as changes in the response and chemotaxis of PMN to plaque antigens, thereby causing phagocytosis to be inhibited (Tantin, 20112).

   b. Gingivitis

      Apart from periodontitis, another systemic disease in the oral cavity which is one of the manifestations of Diabetes Mellitus is gingivitis, this can occur in Diabetes sufferers due to uncontrolled blood sugar disrupting white blood cells and immune cells such as neutrophils, monocytes and macrophages which function to body defense system. This causes the Diabetes Mellitus patient's body's ability to fight bacteria to decrease and they are susceptible to infection. In DM sufferers there is

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an increase in the number of bacteria in the oral cavity which can cause gingivitis (Monoarfa, 2015 in Bambang, 2017).

c. Xerostomia (dry mouth)

Occurs because DM sufferers experience frequent urination and decreased saliva flow. This can cause caries, candidiasis, periodentitis and gingivitis. (Bambang, 2017)

d. Dental caries

Studies regarding the occurrence of dental caries in DM sufferers have been carried out, but there is no definite relationship between DM and caries. It is suspected that the increase in the incidence of caries in DM sufferers occurs due to a decrease in saliva flow rate and a high concentration of glucose in saliva which increases saliva pH. (Anggita, 2012).

e. Candidiasis

Candidiasis is a primary or secondary fungal infection caused by fungi of the genus Candida, especially Candida albicans. This disease can be acute or chronic and localized to the skin, mouth, throat, scalp, vagina, fingers, nails, lungs and digestive tract (Ramali, 2001 in Oktavia, 2014).

5. Management of Diabetes Mellitus

The elderly are a population that is vulnerable to chronic complications of DM which can cause morbidity and mortality. Therefore, management must be more comprehensive for elderly people suffering from DM to prevent chronic complications of DM.

a. Blood Sugar Control

With good blood sugar control, the risk of macrovascular complications can be reduced. Blood sugar control does not need to be too strict in the elderly considering the risk of hypoglycemia in elderly people with DM. Blood sugar control targets are determined by health status as well as physical and mental abilities. (Indra 2010)

b. Blood Pressure Control

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The incidence of hypertension in elderly people with DM is increasing, the prevalence is 40% at the age of 45 years, increasing to 60% at the age of 75 years. Hypertension is one of the factors that plays a role in the occurrence of macrovascular and microvascular complications in DM. Studies from The United Kingdom Prospective Diabetes Study (UKPDS) show that good blood pressure control with any antihypertensive reduces the risk of macrovascular and microvascular complications. (Indra 2010)

c. Blood Fat Control

DM is considered a risk factor equivalent to coronary heart disease, so dyslipidemia in DM must be managed aggressively, namely achieving the target LDL cholesterol level <100 mg/dl. In patients who also suffer from coronary artery disease or have other components of metabolic syndrome, an LDL cholesterol level of <70 mg/dl is recommended. Many studies show that reducing cholesterol levels can reduce cardiovascular events in elderly people with DM. (Indra 2010)

d. Education

Empowering people with diabetes requires the active participation of sufferers, families and communities. Health workers are tasked with providing information regarding independent blood glucose monitoring, signs and symptoms of hypoglycemia and how to deal with it to DM sufferers and their families. Blood sugar monitoring can be done independently after the patient has received special knowledge and training. (Atik, 2016)

e. Diet

The principles of eating for people with diabetes are almost the same as the recommendations for eating for the general public, namely food that is balanced and in accordance with the calorie and nutritional needs of each individual. For people with diabetes, it is necessary to emphasize the importance of regular eating in terms of eating schedule, type and amount of food, especially for those who use blood glucose-lowering drugs or insulin. The recommended standard is food with

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a balanced composition in terms of 60-70% carbohydrates, 20-25% fat and 10-15% protein. To determine nutritional status, it is calculated using BMI (Body Mass Index). Body Mass Index (BMI) is a simple tool or way to monitor the nutritional status of adults, especially those related to underweight and overweight. (Restyana, 2015)

f. Medical Nutrition Therapy

The principles of food management for people with diabetes are almost the same as the food recommendations for the general public, namely food that is balanced and in accordance with the calorie and nutritional needs of each individual. Recommended carbohydrates are 45-65% of total energy intake, fat intake is around 20-25% of calorie needs and protein is 10-20% of total energy intake, sodium limitation should not be more than 3000 mg (1 teaspoon), consume enough fiber (approximately 25g/day) and non-calorie sweeteners (aspartame, saccharin, sucralose etc.). (Atik, 2016)

g. Quit smoking

DM and smoking are synergistic atherosclerotic risk factors. In addition, smoking can accelerate the emergence of microalbuminuria which can progress to macroproteinemia. The benefits of stopping smoking to prevent chronic complications of DM are obtained after 3-6 months and beyond. (Atik, 2016)

h. Physical Training

Daily physical activity and regular physical exercise (3-4 times a week for approximately 30 minutes) is one of the pillars in managing type 2 DM (Atik, 2016)

i. Use of Aspirin

Aspirin 75-162 mg is recommended for use as primary prevention of chronic complications of DM, and is recommended for DM patients aged >40 years with a family history of DM complications or other metabolic syndrome components. (Indra 2010)

j. Use of β –adrenergic blockers

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Studies from The United Prospective Diabetes Study (UKPDS) showed that after myocardial infarction, patients who had relative contraindications to β-adrenergic blockers (asthma, chronic obstructive pulmonary disease, low blood pressure and low left ventricular ejection fraction) were able to tolerate and obtain Cardioprotective benefits of β-adrenergic blocker use. Based on this study, unless there are absolute contraindications (bradycardia, heart block, severe hypertension, uncontrolled heart failure, severe lung disease), DM patients with a history of myocardial infarction should be given a β-adrenergic blocker. (Indra 2010).

2. Research methods

This type of research is descriptive, namely to determine the level of severity of periodontal tissue in diabetes mellitus sufferers at the Community Health Center. The population in this study were all patients who visited the dental clinic at the Dahlia Community Health Center, Mariso District, Makassar City, totaling 132 people. The sample for this study was taken from 30 patients suffering from Diabetes Mellitus who visited the Dahlia Health Center dental clinic and met the inclusion and exclusion criteria. The inclusion criteria are:

a. Patients visiting the Dahlia Health Center dental clinic.
b. Suffering from Diabetes Mellitus.
c. Willing to participate in research. Exclusion criteria are:
    1) Patients who do not visit the Dahlia Health Center dental clinic.
    2) Not suffering from Diabetes Mellitus.
    3) Not willing to participate in research

3. Results and Discussion

a. Results

From the results of research regarding the description of the severity of periodontal tissue in Diabetes Mellitus sufferers at the Dahlia Community Health Center, Makassar City with a sample size of 30 people, the following results were obtained.

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The following table will show the characteristics of the respondents in this study.

Table 2
Frequency distribution of respondents based on gender

Type sex	Frequency	Percentage
Man – man	10	33.3 %
Woman	20	66.7 %
Total	30	100%

Based on data from table 2, it shows that the majority of respondents were female, namely 20 people (66.7%).

Table 3
Frequency distribution of respondents based on age classification

Classification age	Frequency	Percentage
< 50 year	6	20 %
51 – 60 year	14	46.7 %
> 61 year	10	33.3 %
Total	30	100%

Based on data from table 3, it shows that the majority of respondents were in the age group 51 – 60 years, namely 14 people (33.3%).

Table 4
Frequency distribution of respondents based on periodontal tissue condition

Condition Network Periodontal	Frequency	Amount	Percentage	Category
Healthy	0	0	0	Good
Bleeding	5			

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There is coral tooth	7	12	40 %	Currently
Pocket shallow	11	18	60 %	Heavy
Pocket in	7			
Total	30	30	100%	

Based on data from table 4, it shows that on average respondents had a severity level of periodontal tissue in severe conditions as many as 18 people (60%).

Table 5
Distribution of periodontal tissue conditions based on age classification

No	Classification Age	Condition Network Periodontal			Frequency
		Good	Currently	Heavy	
1	< 50 Year	0	3 (10 %)	3 (10 %)	6 (20 %)
2	51 – 60 Year	0	4 (13.3 %)	10 (33.3%)	14 (46.7%)
3	> 61 Year	0	5 (16.7%)	5 (16.7%)	10 (33.3 %)
Total		0	12 (40 %)	18 (60 %).	30 (100)

Based on table 5, it shows that the majority of DM sufferers who have severe periodontal tissue conditions, namely 10 people (33.3%) are in the age classification of 51 - 60 years.

b. Discussion

Based on data from research conducted at the Dahlia Makassar Community Health Center from 30 respondents, it shows that in table 2 there are 20 more female respondents (66.6%), compared to only 10 male respondents (33.3%). This means that most of the respondents in this study were women suffering from diabetes mellitus. This is in accordance with research conducted in Colombo, Sri Lanka on patients

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suffering from type 2 DM, which showed that the majority of patients suffering from type 2 DM were women compared to men.

Based on the distribution of respondents by age group in table 3, the majority of the samples obtained were 51 - 60 years old, 14 people (46.7%) . This means that the majority of respondents are sufferers of Diabetes Mellitus experienced by elderly people aged 51 - 60 years. Based on research by Nandya and Agustina in 2013, DM is usually found in patients aged >30 years and is most commonly found in the age range 50–70 years.

Based on table 4, it shows that of the 30 respondents according to the assessment of gum/periodontal status (CPITN), in terms of severity, there were 12 people (40%) with moderate severity and 18 people (60%) with severe severity. Based on the research results of Pranckeviciene et al., none of the DM patients had normal periodontal tissue. In DM sufferers, increasing glucose levels in the blood and gingival fluid also changes the microflora environment and induces qualitative changes in bacteria. These changes lead to severe periodontal disease.

Based on table 5, it shows that the majority of DM sufferers who have severe periodontal tissue severity are in the age classification of 51 - 60 years, namely 10 people (55.5%) and 4 people (33.3%) with moderate periodontal tissue severity. These results are in accordance with research by Brennan DS et al (1998) in Australia which also showed that the most people with periodontal pockets > 6 mm were aged 50 - 60 years.

This is also in line with research conducted by Ulipe in 2010 which also found that advanced stage periodontal disease was more common in DM sufferers than non-DM sufferers. Factors that cause a higher, more severe and more rapid prevalence of periodontal disease are metabolic changes in DM sufferers which will cause a series of changes in the periodontal tissue that lead to periodontal destruction.

The results of this study are in line with research conducted by Saddang 2012 showing that as many as 11 out of 24 Diabetes Mellitus sufferers had periodontal tissue severity in severe conditions.

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According to Stephanie 2015. Of the many complications that occur, periodontitis is the most frequent complication in DM sufferers with a high prevalence rate of up to 75%. This is because in people with Diabetes Mellitus the blood sugar levels increase which can cause complications in the oral cavity. There are several behaviors that actually worsen the condition of periodontal tissue in Diabetes Mellitus sufferers, such as lack of physical activity by exercising, coupled with smoking habits which can worsen the condition of periodontal tissue, another factor that also influences is uncontrolled blood sugar levels.

Handling or monitoring diabetes sufferers by controlling blood sugar levels will influence the success of clinical improvement. Well-controlled blood glucose levels in Diabetes Mellitus sufferers will reduce the occurrence of infections. So a very influential factor in reducing periodontal disease in Diabetes Mellitus sufferers is controlling blood glucose levels. The lower the blood sugar levels in Diabetes Mellitus sufferers, the better the condition of the periodontal tissue (Hartanti, 2013).

4. Conclusion

Based on the results of the research and discussion above, it can be concluded that all Diabetes Mellitus sufferers have problems with their periodontal tissue and as many as 60% of them are at a severe level of severity.

5. Compliance with ethical standards

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Disclosure of conflict of interest

This research collaboration is a positive thing for all researchers so that conflicts, problems and others are absolutely no problem for all writers.

Statement of informed consent

Every action we take as authors is a mutual agreement or consent.

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