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KEYWORDS: Diabetes mellitus (DM) type 2, diabetic foot, complications category of diabetic foot

IDENTIFICATION OF THE RISK CATEGORY OF DIABETIC FOOT IN TYPE 2 DIABETES MELLITUS PATIENTS

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ABSTRACT

INTRODUCTION: Diabetes is a chronic macro-vascular complication in the form of diabetic foot which can cause circulatory disorders as well as nerve damage (neuropathy). Nerve damage is quite dangerous for the feet, so it is important to do an assessment of foot abnormalities with the aim of supporting the prevention of foot problems.

OBJECTIVE: This study will identify risk categories for foot complications in diabetic patients.

METHODS: This was a descriptive study with a cross-sectional design on 90 patients diagnosed with type 2 diabetes mellitus. Recruitment of samples employs accidental sampling technique with the criteria no ulcers and willingness to become respondents. Data collection used an instrument in the form of an observation sheet containing demographic information and an assessment of the risk of complications of diabetic foot by IWGDF (International Working Group on Diabetic Foot) guidelines. Data analysis works with descriptive statistics.

RESULTS: The majority of respondents diagnosed with diabetes were aged > 46 years (elderly category) in 88.9%. The grouping of foot complications category showed that there were more diabetics in risk category 0, in 41.1% and followed by risk category 1, in 26.7%.

CONCLUSION: The majority of the risk category for diabetic foot complications was in the non-neuropathy category, followed by peripheral neuropathy, deformity and POAD. It is very important for diabetes sufferers to carry out early examination of the risk category for diabetic foot.

INTRODUCTION

Diabetes is a group of chronic metabolic diseases characterized by hyperglycemia, which occurs when the pancreas does not produce enough insulin to regulate glucose (American Diabetes Association (ADA), 2014; WHO, 2017). Chronic hyperglycemia is associated with long-term damage including failure of organs such as nerves and blood vessels. About 90-95% of people with diabetes are categorized as type 2 diabetes mellitus. This type of diabetes is generally caused by the dominant insulin resistance due to poor compression (American Diabetes Association (ADA), 2014).

Public health problems related to diabetes are very important disease problems to continue to be followed up because this disease is classified as one of the four categories of non-communicable diseases (WHO, 2017). Diabetes is a serious, long-term condition with a major impact on the lives and well-being of individuals, families and communities around the world (International Diabetes Federation (IDF), 2017). In the last few decades, the number of cases and prevalence of diabetes has continued to increase (WHO, 2020a).

Globally, in 2014 an estimated 422 million people were living with Diabetes and 1.6 million deaths annually were directly attributable to diabetes (WHO, 2017, 2020a, 2020b). The WHO also estimated that diabetes is the seventh leading cause of death in 2016 (WHO, 2020b). Whereas in 2017 diabetes was one of the top 10 causes of global death in adults, up to four million deaths (International Diabetes Federation (IDF), 2017). Meanwhile, in 2019 the global prevalence will increase to 463 million people (9.3%), and the IDF estimates it will increase to 10.2% (578 million) in 2030 and 10.9% (700 million) in 2045 (International Diabetes Federation (IDF), 2020; Saeedi et al., 2019). According to 2017 statistical data, China has the largest population of people with diabetes in the world with a total of 110 million (Wu et al., 2018).

Apart from global data, Indonesia is also prone to diabetes patients. Based on data from Basic Health Research (Riskesdas) in Indonesia, it shows a significant increase in the prevalence of Diabetes, from 6.9% in 2013 to 8.5% in 2018. So that the estimated number of sufferers in Indonesia reaches more than 16 million people (Kementerian Kesehatan RI, 2018a). Based on the doctor's diagnosis, the highest prevalence of diabetes aged > 15 years in 2018 was DKI Jakarta, 3.4%, while the lowest was in NTT, 1.2%.As for Southeast Sulawesi, it is 1.3% (source Riskesdes, 2018 Litbangkes Agency) (Kementerian Kesehatan RI, 2018b, 2018c). Based on data from the 2020 Central Bureau of Statistics, diabetes in Southeast Sulawesi is ranked 5th out of the top ten cases of disease, of which 7,357 cases (Badan Pusat Statistik Sultra 2020, 2020).

Diabetes causes both macrovascular and microvascular complications in parts of the body that can increase the overall risk of premature death (American Diabetes Association (ADA), 2014; WHO, 2017). Possible complications include heart attack, stroke, kidney failure, leg amputation, vision loss, nerve damage including diabetic foot (International Diabetes Federation (IDF), 2017; WHO, 2017). Over time these complications can result in reduced blood flow, which is combined with nerve damage (neuropathy) in the legs which increases the likelihood of foot ulcers, infection, and ultimately leg amputation (WHO, 2017). Nerve damage (peripheral neuropathy) as a long-term complication of diabetes puts you at risk for leg ulcers and amputations (American Diabetes Association (ADA), 2014).

The nerve damage that causes numb on the feet is quite dangerous for those with diabetes. Therefore, it is important to assess or examine foot abnormalities (diabetic foot) as a form of early diagnosis with the aim of supporting the prevention of foot problems which also support the importance of foot care (National Institute for Health and Care Excelence (NICE), 2017; Schaper et al., 2016). Therefore, the starting point for a healthy life with diabetes is early diagnosis because the longer a person lives with undiagnosed and untreated diabetes, the worse the health outcomes are likely to be (WHO, 2017). For this reason, this study will identify risk categories for diabetic foot complications in diabetics.

METHOD

Design

This study is a quantitative with a descriptive cross-sectional design. Descriptive study is a type of study to provide an overview or information about the characteristics of situations that occur naturally (Grove et al., 2015). While the cross-sectional design means that data is collected from respondents at one time (LoBiondo-wood & Haber, 2014). This means the study will provide an overview of the risk categories for diabetic foot in diabetics.

Participant

The samples in this study are patients diagnosed with diabetes. They were collected from the medical records of health centres in Kendari with a total of 90 diabetes patients. Sampling using accidental sampling technique, this is to include research subjects who are only present or found at the time of the research (Grove et al., 2015). As for the inclusion criteria sampled in this study were diagnosed with type 2 diabetes (referring to the criteria from the ADA (American Diabetes Association (ADA), 2016), there was no foot wound and willing to be a respondent.

Instruments and Data Collection

The instruments for data collection in this study are an observation sheet containing demographic data (age, gender and education) and data on the risk category for diabetic foot. Diabetic foot risk categories use the IWGDF (International Working Group on Diabetic Foot) guidelines which consist of 3 categories: (1) category 0 means no neuropathy, and no POAD (Peripheral Arterial Occlusive Disease), (2) category 1 means peripheral neuropathy, no POAD and no deformities, (3) category 2 means peripheral neuropathy, deformity, POAD and / or deformity (divided into two categories; 2A: peripheral neuropathy and deformity; while 2B is: category 2A + POAD), (3) category 3 means peripheral neuropathy, deformity, POAD and history of leg injury or lower limb amputation (divided into 2, namely category 3A: peripheral neuropathy, deformity, POAD, history of injury, while category 3B: category 3A + history of amputation of lower extremities) (Lavery et al., 2008; Schaper et al., 2016).

Data collection in this study went through two stages. First, the researcher introduces himself, explains the objectives and then submits statements for respondents who are willing to become participants through informed consent. Furthermore, the two researchers began to collect respondent data including early detection of feet at risk of complications of diabetic foot. Examination of risky foot complications, researchers used the Ipswich Touch Test (IPTT) technique as an alternative method of detecting diabetic foot for neuropathy and palpation of the dorsalis pedis and posterior tibial arteries to detect ischemia (angiopathy). To detect neuropathy, the method is to touch the toes of diabetics (fingers 1, 3, and 5) and then ask to indicate when to feel the touch. As for the detection of ischemia (angiopathy) it is performed through palpating the pulsations in the dorsalis pedis and posterior tibial arteries.

Both of these methods are quite practical in detecting the risk of diabetic foot. Detection of the risk of diabetic foot complications for neuropathy using a monofilament test compared to the Ipswich Touch Test (IpTT) as an alternative method, the sensitivity level is not much different and is quite easy for health workers to assess sensation (Sharma et al., 2014). IpTT is a standard, reliable neuropathy screening tool, and is ready to use to detect risky feet (Bowling et al., 2012; Madanat et al., 2014; Rayman et al., 2011). Miller et al., (2014); Sharma et al., (2014), recommended to use IPTT as a screening test to detect sensory loss by placing the index finger on the tips of the first, third, and fifth fingers and asking the patient to indicate when to sense.

Likewise for ischemia detection to detect peripheral artery disease detection (Peripheral Artier Diseases) can be done by using lower leg vessel palpation. Soyoye et al., (2016), argued that the assessment of PAD was carried out using palpation of the vessels of the lower leg. Palpation is carried out using the fingertip of the examiner and the pulse intensity is rated on a scale of 0 to 4+, with details: 0 indicates that there is no palpable pulse, 1+ shows a faint but detectable pulse, 2+ shows a pulse that is slightly less than normal, 3+ normal pulse rate and 4+ shows a bound pulse (Ikem et al., 2010). Bilateral palpation of an examiner is a standard criterion that is subjective in nature for the femoral, tibial posterior and dorsalis pedis arteries with the criteria if the pulse is <3 indicating symptoms of peripheral artery disease (Criqui et al., 2015; Ikem et al., 2010).

DATA ANALYSIS

The research data were analyzed using descriptive statistics in to describe the values of the research variables measured in the form of frequency distributions and percentages.

Research Ethics

This study has received ethical approval from the Research and Development Agency for Southeast Sulawesi Province, Number: 070/731 / BALITBANG / 2018 and the Kendari Health Office Number: 800/1104/2018 regarding research permits. As well as a written statement of the respondent's willingness to participate in the research through informed content before data collection was carried out by the researcher.

RESULTS

The study was conducted at health centre throughout the city of Kendari in May 2018 with the following results:

Table 1. Frequency of respondent demographic data (f = 90)

Variable	Frequency (f)	Percentage
Age (years)		
26-35	2	2.2
36-45	8	8.9
46-55	42	46.7
> 55	38	42.2
Gender		
Male	25	27.8
Women	65	72.2
Education		
No educational background	3	3.3
Elementary	12	13.3
JHS	14	15.6
SHS	30	33.3
Bachelor	31	34.5

Table 1 shows the demographic distribution of respondents. Based on the age characteristics more in the age category 46-55 years (46.7%), the sex is dominated by female respondents (72.2%) and in terms of education more respondents with undergraduate education (34.5%).

Table 2. Distribution of risk categories for diabetic foot in type 2 DM patients (f = 90)

Diabetes foot risk categories	Frequency (f)	Percentage (%)
0	37	41.1
1	24	26.7
2A	10	11.1
2B	19	21.1

Note. Category 0 means no neuropathy, and no POAD (Peripheral Arterial Occlusive Disease), category 1 means peripheral neuropathy, no POAD and no deformotas, and category 2A means peripheral neuropathy and deformity, while category 2B means peripheral neuropathy, deformity and POAD.

Table 2 shows the frequency distribution of the risk category for diabetic foot in people with diabetes mellitus type 2. It shows that the majority of diabetics are in risk category 0 (not neuropathy) 41.1% and followed by risk category 1 (neuropathy) 26.7%.

DISCUSSION

Until now, the prevalence of diabetes sufferers in Southeast Sulawesi is still quite high, which is the fifth most common disease, including in Kendari. Data from several health centers in Kendari shows the number of cases of patients diagnosed with different diagnoses based on measurement of blood sugar levels and other criteria such as HbA1c. Diabetes is a chronic disease that has both microvascular and macrovascular complications (Black & Hawks, 2014). Diabetic foot complications are one of the chronic microvascular complications which will contribute to diabetic neuropathy, foot ulcers and will have the potential for amputation if not treated as early as possible (Lavery et al., 2010). Thus, diabetic

foot is one of the most dreaded complications because it is a lifelong disease category (Pendsey, 2010).

Diabetic foot complications generally present with symptoms such as peripheral neuropathy (nerve damage causing loss of sensation and tingling), and peripheral arteries (Peripheral Arterial Occlusive Disease) which causes decreased blood flow to the feet as a sign of poor circulation –hardened legs, foot deformities (American Diabetes Association (ADA), 2015; American Orthopaedic Foot & Ankle Society (AOFAS), 2017). Both of these conditions can cause foot ulcers, infections, gangrene and amputations (American Orthopaedic Foot & Ankle Society (AOFAS), 2017). Therefore, it is very important to conduct an assessment of diabetic feet to assess the status of the feet at risk as an effort to minimize complications and as a determinant of further action (National Institute for Health and Care Excelence (NICE), 2017). An assessment to determine the status of the feet at risk can be carried out using the IWGDF guidelines. Guidelines for risk assessment of complications of diabetic foot developed by IWGDF are divided into the categories of no neuropathy, peripheral neuropathy, deformity, POAD, including a history of injury or amputation (Schaper et al., 2016).

The results of the study showed that the leg status was at risk of category 0 which was quite large (not neuropathy). This was followed by category 1 (peripheral neuropathy) and category 2 (neuropathy, deformity and POAD) risk foot status. Physiologically, neuropathy is related to diabetes metabolic disorders which can lead to vascular disease characterized by loss or reduction in circulation (American Orthopaedic Foot & Ankle Society (AOFAS), 2017). Through direct interviews during the study, patients diagnosed with diabetes generally had an average diabetes rate of less than 5 years and the age category was elderly. Research by Nehring et al., (2014), showed that the risk of diabetic foot in type 2 DM patients increases in the duration of diabetes. Another study suggests that the prevalence of foot complications such as diabetic foot increases with age and duration of diabetes (Al-Rubeaan et al., 2015). Patients with a longer duration of diabetes are more likely to experience poor comorbid survival such as peripheral artery disease (Begun et al., 2016).

CONCLUSION

The majority of the risk category for diabetic foot complications in type 2 diabetes sufferers is in category 0 (not neuropathy). This is followed by category 1 (neuropathy), and category 2 (peripheral neuropathy, deformity and POAD) status. It is very important for all patients diagnosed with type 2 Diabetes to carry out early examination or identification of the risk category for diabetic foot.

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