



AISCH 2022

**The 3rd AI Insyirah International Scientific
Conference on Health**

RISK FACTOR ANALYSIS OF DIABETIC ULCUS IN DIABETES MELLITUS PATIENTS

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ABSTRACT

Diabetes Mellitus is a very dangerous disease, because it can cause many complications. One of the complications that often occurs in DM patients is the occurrence of Diabetic Ulcers. Diabetic ulcers themselves are a condition that is often experienced by people with DM which is characterized by the appearance of wounds accompanied by a discharge that smells bad from the feet. Diabetic ulcers can be prevented if the level of risk is detected early on. Therefore, it is important for DM sufferers to know the risk factors for their occurrence. Diabetic Ulcers. The purpose of this study was to identify the risk of developing Diabetic Ulcers in people with Diabetes Mellitus in the Pukesmas Binjai City area. This research is a type of quantitative research with a descriptive study design. The sample in this study were DM patients in the Binjai City Health Center area as many as 40 respondents, with a total sampling technique of sampling. The results showed that the majority of respondents had a moderate risk of developing diabetic ulcers with a total of 25 people (62.5%). For health services, efforts must be made to avoid the occurrence of Diabetic Ulcers, such as conducting health education about foot care.

Keywords: Risk Factor Analysis, Diabetes Mellitus, Diabetic Ulcer, Risk of Diabetic Ulcer

INTRODUCTION

Diabetes Mellitus (DM) is a very dangerous disease, because it can cause many complications. Complications due to DM significantly increase mortality morbidity, this is due to damage to body organs causing various diseases, such as blindness, kidney failure, nerve damage, heart disease, diabetic foot, and so on [1]. Diabetes Mellitus is at risk for complications including severe foot infections that cause gangrene and can even lead to amputation [2].

The long-term complications of diabetes mellitus that are as reliable as the body include organ damage and metabolic complications of retinopathy, nephropathy, and neuropathy. Retinopathy which is a function of vision; nephropathy with kidney damage; autonomic neuropathy that can cause gastrointestinal, genitourinary, cardiovascular, and sexual dysfunction; and peripheral neuropathy with risk of gangrene, amputation, and Charcot's joint [3]. According to Lubis (2016) the prevalence of Diabetic Ulcers in North Sumatra in the last 5 years starting from 2009 to 2013 there were 236 patients suffering from Diabetic Ulcers and there was an increase every year. This is related to diet, lack of exercise, irregular diet, irregular use of pharmacological drugs and lack of DM wound care. The risk factors for diabetic ulcers are walking barefoot, lack of knowledge of foot care, male sex is associated with smoking habits, suffering from diabetes for more than 10 years, and retinopathy [5].

Calluses on the feet and blood pressure above 130/80 mmHg are at high risk for diabetic ulcers. Foot care factors, motor neuropathy, peripheral arterial disease, controlling blood glucose levels, and visual disturbances are risk factors for diabetic ulcers [6]. Diabetics have a 15% risk of developing diabetic foot ulcers in their lifetime and a 70% risk of recurrence within 5 years [7].

If not handled properly, the expansion of gangrenous infection will result in disability and even death. About 20% of people with moderate or severe diabetes with foot gangrene have to have their feet amputated. Peripheral artery disease independently increases the risk of wound infection and non-healing amputation. The 10-year risk of death in diabetic patients with foot ulcers or gangrene is two times higher than in patients without gangrene [8].

There were 61.7% diabetic foot, 65% poor < DM for 10 years, 78.3% poor foot care and 51.7% poor glycemic control [9]. Factors affecting the occurrence of wounds in people with diabetes mellitus obtained from various literature review results found that factors of age, gender, duration of DM disease, neopathy, wound care, have a major effect on the occurrence of wounds in dm sufferers and other factors that must be considered are adherence to taking medications, wearing footwear, daily activities, smoking, and the habit of cutting nails. This should be a serious concern for dm sufferers [8].

RESEARCH METHODS

The research using descriptive design, which is research conducted to determine the value of independent variables, either one or more variables (independent) without making comparisons, or linking with other variables [10]. This study used a survey method to analyze the risk level of Diabetic Ulcer in dm sufferers in the Binjai City Health Center area in 2022.

a. Location and time research

This research was conducted in the working area of the Binjai City Health Center. The reason for choosing the location is because there is a problem to be taken and based on the observations of researchers at the Binjai City Health Center because the incidence of DM is quite high, namely in January 2021 there were recorded data on visits to DM sufferers, namely 129 people and experienced another increase in July, namely 310 people and decreased in December by 155 people. This research starts in September 2021 - May 2022 starting from research surveys, literature searches, title submissions, until the research is completed.

b. Population and sample

Population is a generalized area consisting of objects / subjects that have a certain quantity and characteristics set by the researcher to be studied and then drawn conclusions (Sogiyono, 2019). [WU3] The population used in this study as a case subject was all type 2 DM sufferers in the Binjai City Health Center work area for the last 3 months totaling 40 respondents. Samples are part of the number and characteristics possessed by the population (Sugiyono, 2019). [WU4] The sample in this study amounted to 40 responden. The technique used is total sampling, which is a sampling technique where all members of the population are used as samples [10].

Table 1. Operational Definition

Variable	Operational Definition	Measuring Instruments	Measuring Scale	Measuring Results
The Risk of Diabetic Ulcer:	The possibility that causes the occurrence of Diabetic Ulcers in people with DM.	Questionnaire	Ordinal	a)Risk ≥ 10 Years b)Not at risk <10 Years
a. Long suffering from DM disease (≥ 10 years)	The length of time the patient suffers from DM disease. In patients with DM for ≥ 10 years increases the risk of diabetic ulcers.			
b. Blood sugar control	Patient compliance in controlling blood sugar levels.	Questionnaire	Ordinal	a)Controlled b)Uncontrolled
c. Ages	High risk of diabetic ulcers.	Questionnaire	Interval	a)Risk (≥ 60 years old) b)No Risk (<60 Years Old)
d. Obesity	Overweight as a result of excessive fat accumulation.	Questionnaire	Ordinal	a) Risk (30-39.9) b) No Risk (18.5-29.9)
e. Foot Care	An effort is made to keep the feet clean and avoid complications.	Questionnaire	Ordinal	a)Regularly b)Irregularly
f. Physical activity	Activity that increase energy expenditure and energy burning.	Questionnaire	Ordinal	a)Regularly b)Irregularly
g. Proper use of footwear	Improper use of footwear, shoes, or foot protection.	Questionnaire	Questionnaire	a)Risk b) Not at risk
h. Knowledge	Known information about Diabetic Ulcers	Questionnaire	Questionnaire	a) Less b) Quite-enough

c. Data Collecting

The title should be clear, straightforward, concise, and To measure the data in this study using questionnaires from previous studies by giving an unequivocal answer "YES" or "NO", TRUE" or "WRONG in this research questionnaire used The answers are YES and NO with a value of YES: 1, NO: 0, then calculated the score of the questionnaire based on the criteria of the measuring method used to determine risk or not, controlled or not, Only then the number of risks is grouped again based on 4 levels, namely:Not Risky (0); Low (1 - 2); Medium (3 - 5); High (6-8). The purpose of the study using this scale is to make it easier to fill out the questionnaire.

d. Data Analysis

The type of data analysis in this study is using the form of univariate data (descriptive analysis). After the data collection and processing process, the data can then be presented into a frequency distribution table which is then analyzed.

The measurement scale used is the Gutman scale, which uses the answer option "yes" given a score of "1, and the value of each answer "no" is given a score of "0", then the score from the questionnaire is calculated based on the criteria of the measuring method used and grouped again based on three levels of risk, namely mild, moderate, severe.

Based on the calculation of class intervals, the values are grouped into 4 categories, namely:

- a. The category is not at risk if the risk of Diabetic Ulcers occurs in the can be (0)
- b. Low category if the total risk of Diabetic Ulcer is obtained (1 - 2)
- c. Moderate category if the total risk of Diabetic Ulcer is obtained (3 – 5)
- d. High category if the total risk of Diabetic Ulcer is obtained (6 – 8)

RESULTS AND DISCUSSIONS

Table 2. Respondent Characteristic by Ages

Ages (year)	F	%
40 – 51	12	30
52 – 63	13	32,5
64 – 74	15	37,5
Amount	40	100
Education		
primary school	8	20%
Junior School	21	52,5%
Senior School	9	22,5%
High School	2	5%
Amount	40	20%
Work		
Self employed	12	30
Farmer	9	22,5
Housewives	18	45
Civil		
government employee	1	2,5
Amount	40	100
Gender		
Man	12	30
Woman	28	70
Amount	40	100

From the characteristics of the respondents it can be seen that:

- a. The majority of respondents by Age were 64-74 years old as many as 15 people (37.5%).
- b. The majority of respondents based on education were junior high schools As many as 21 people (52.5%).
- c. The majority of respondents based on employment were working as IRT as many as 18 people (45%).
- d. The majority of respondents' genders were female as many as 28 people (70%).

Questionnaire measurement results based on risk factors for diabetic ulcers in dm sufferers

Table 3 Respondent Characteristic by Education

Risk Factor	F	%
a. Long suffering from DM disease (≥ 10 years)		
Risk ≥ 10 Years	18	45
Not at risk <10 Years	22	55
b. Blood sugar control		
Controlled	23	57,5
Uncontrolled	17	42,5
Amount	40	100
c. Ages		
Risk (≥ 60 years old)	18	45
Not at risk (<60 years old)	22	55
	40	100
d. Obesity		
Risk	21	52,5
Not at risk	19	47,5
	40	100
e. Foot Care		
Routin	17	42,5
Not routin	23	57,5
Amount	40	100
f. Physical Activity		
Risk	20	50
Not at risk	20	50
	40	100
g. Proper use of footwear		
Risks (not using proper footwear)	24	60
No risk (using proper footwear)	16	40
Amount	40	100
h. Knowledge		
Less	15	37,5
Quite –enough	25	62,5

The results of the study based on risk factors for the occurrence of Diabetic Ulcers in patients with DM Based on the table it is known that the majority are not at risk as many as 22 people (55%), whose blood sugar control is 23 people (57.5%), who are not at risk as many as 22 people (55%), at risk of 21 people (52.5%), irregular in foot care, namely 23 people (57.5), based on the lack of physical activity in the Binjai City Puskesmas area in 2022 it is known that the number is the same, namely those who are at risk as many as 20 people (50%), and those who are not at risk as many as 20 people (50%), at risk as many as 24 people (60%), based on insufficient knowledge about DM and Diabetic Ulcers in the Binjai City Health Center area in 2022, it is known that the majority are not at risk as many as 25 people (62.5%) and the majority of Diabetic Ulcers are at a moderate level with a total of 25 people (62.5%).

DISCUSSION

a. Long Suffering from DM

Disease Based on the results of the study, it can be seen that the level of risk of Diabetic Ulcers in DM sufferers based on the length of time they suffer from DM disease in the Binjai City Health Center area in 2022 is known to be the majority of not at risk as many as 22 people (55%). This is supported by research conducted by [11] that long periods of DM are associated with decreased muscle strength, impaired range of motion, ulceration of the skin of the legs and increased pain in the legs. This is also supported by Boyko's research which found that Diabetic Ulcer patients experienced DM on average for 11.4 years.

b. Blood Sugar Control

From table 4.6 based on the results of the study, it can be concluded that the level of risk of Diabetic Ulcers in DM sufferers based on blood sugar control in the Binjai City Health Center area in 2022, the majority of which are controlled by blood sugar are 23 people (57.5%), and the uncontrolled minority is 17 people (42.5%). This is because DM sufferers in the Binjai City Health Center area still pay attention and maintain their blood sugar so that it remains controlled by maintaining a diet, diet, and regular blood sugar checks. Poorly controlled blood sugar levels can accelerate the development of diabetic retinopathy, nephropathy and neuropathy in DM patients with insulin dependence [12].

c. Age of DM Sufferers

From table 4.7 based on the results of the study, it can be concluded that the level of risk of Diabetic Ulcers in DM sufferers based on the age of DM sufferers in the Binjai City Health Center area in 2022 is known to be the majority who are not at risk as many as 22 people (55%), and the minority at risk as many as 18 people (45%). The age of DM sufferers in the Binjai City Health Center area is mostly less than 60 years old. If the age of the dm sufferer ≥ 60 , it will increase the risk for diabetic ulcers. The incidence of Diabetic Ulcers is related to the age of ≥ 60 years because in old age, body functions are physiologically decreased due to aging processes such as secretion or decreased insulin resistance so that the ability of body functions to control high blood glucose is not optimal.

d. Weight Loss (Obesity)

From the results of the study, it can be concluded that the level of risk of Diabetic Ulcers in DM sufferers based on body weight calculated from the results of BMI calculations in the Binjai City Puskesmas area in 2022 is known to be the majority at risk, namely 21 people (52.5%), and minorities who are not at risk as many as 19 people (47.5%). This is because the weight of DM sufferers at the Binjai City Health Center is calculated based on the results of the majority of BMI at 30-39.9 is included in the Obesity category. In people with obesity,

insulin resistance will occur more often. Hyperinsulinemia is a condition that indicates that when insulin levels exceed 10 $\mu\text{U} / \text{ml}$, it can cause atherosclerosis which has an impact on vasculopathy, resulting in moderate/large blood circulation disorders in the limbs that cause the limbs to have Diabetic Ulcers more easily [4].

e. Irregular Foot Care

Based on the results of the study, it can be concluded that the level of risk of Diabetic Ulcers in DM sufferers based on irregular foot care in the Binjai City Puskesmas area in 2022 is known to be the majority irregular in foot care, namely as many as 23 people (57.5%) this happens because DM sufferers in the Binjai City Puskesmas area are less regular in treating their foot conditions such as checking the condition of the feet, maintaining foot hygiene and moisture, nail care and other measures in foot care that can reduce the risk of Diabetic Ulcers occurring. This is in line with research conducted by Hastuti that irregular foot care is a risk factor for diabetic ulcers. So that foot care measures need to be maintained and even improved to prevent the occurrence of Diabetic Ulcers. Foot care practices should be done daily regularly [13].

f. Physical Activity

From table 4.10 based on the results of the study, it can be concluded that the level of risk of Diabetic Ulcers in DM sufferers based on lack of physical activity in the Binjai City Puskesmas area in 2022 is known to be the same number, namely those who are at risk as many as 20 people (50%), and those who are not at risk as many as 20 people (50%). By exercising or doing physical activity can lower the risk of diabetic ulcers. Exercise that is done regularly, can stimulate cell sensitivity to insulin as well as reduction of central fat and changes in muscle tissue (Kriska, 2007[WU6]). Exercise is very useful for improving blood circulation, losing weight and improving sensitivity to insulin, so it will improve blood glucose levels. Controlled blood glucose levels can prevent the risk of DM complications such as Diabetic Ulcers [9].

g. Improper Use of Footwear

From table 4.11 based on the results of the study, it can be concluded that the level of risk of Diabetic Ulcers in DM sufferers based on improper use of footwear in the Binjai City Health Center area in 2022 is known to be the majority at risk as many as 24 people (60%), and those who are not at risk as many as 16 people (40%). This happens because there are still many DM sufferers in the Binjai City Puskesmas area who are not right in using footwear such as inappropriate sizes, hard materials, not wearing socks, causing blisters on the feet and increasing the risk of Diabetic Ulcers. The incidence of Diabetic Ulcers can be lowered with the correct use of footwear, because by using proper footwear, the pressure on the plantar of the foot can be reduced and prevent and protect the foot from being punctured by sharp objects (Suryati et al., 2019).

h. Lack of Knowledge

Based on the results of the study, it can be concluded that the level of risk of Diabetic Ulcers in patients with DM based on insufficient knowledge about DM and Diabetic Ulcers in the Binjai City Health Center area in 2022 is known to be the majority not at risk as many as 25 people (62.5%). Patients with DM in the Binjai City Health Center area mostly already know about DM and Diabetic Ulcer, so the risk for Diabetic Ulcer can be reduced.

Lack of knowledge causes sufferers not to try to prevent the occurrence of Diabetic Ulcers, so they rarely control blood sugar levels and do not adhere to the DM diet. In addition, the

patient does not take immediate treatment if he experiences a wound which ultimately results in the occurrence of Diabetic Ulcer. High knowledge about the treatment of patients with Diabetic Ulcer, has a high probability of carrying out prevention thereby reducing the risk of Diabetic Ulcer (Suryati et al., 2019).

CONCLUSION

From the characteristics of the respondents it can be seen that:

- a. The majority of respondents by age are 64-74 years as many as 15 people (37.5%).
- b. The majority of respondents based on education were junior high schools. There were 21 people (52.5%).
- c. The majority of respondents based on work worked as IRT as many as 18 people (45%).
- d. The majority of the respondent's gender is female as many as 28 people (70%).

Based on the risk factors for the occurrence of Diabetic Ulcers in DM sufferers

- a. Based on the length of suffering from DM in the Binjai Kota Health Center area in 2022, it is known that the majority are not at risk of 22 people (55%).
- b. Based on blood sugar control in the Binjai Kota Health Center area in 2022, the majority of those with controlled blood sugar are 23 people (57.5%).
- c. Based on the age of DM sufferers in the Binjai Kota Health Center area in 2022, it is known that the majority are not at risk of 22 people (55%).
- d. Based on body weight calculated from the results of BMI calculations in the Binjai City Health Center area in 2022, it is known that the majority are at risk, namely 21 people (52.5%)
- e. Based on irregular foot care in the Binjai Kota Health Center area in 2022, it is known that the majority are irregular in foot care, namely 23 people (57.5%).
- f. Based on the lack of physical activity in the Binjai Kota Health Center area in 2022, it is known that the same number is at risk, namely 20 people (50%), and as many as 20 people (50%) who are not at risk.
- g. Based on the use of improper footwear in the Binjai Kota Health Center area in 2022, it is known that the majority are at risk of 24 people (60%).
- h. Based on insufficient knowledge about DM and Diabetic Ulcers in the Binjai City Health Center area in 2022 it is known that the majority are not at risk of 25 people (62.5%).

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