



RISK FAKTORS FOR DIABETIK FOOT IN FARMERS WITH DIABETES MELLITUS

Laili Nur Azizah^{1*}, Indriana Noor Istiqomah¹

¹ Diploma of Nursing, Faculty of Nursing, University of Jember

*Corresponding author's email: lailinurazizah3@unej.ac.id

*Corresponding: Laili Nur Azizah

Diploma of Nursing Program Faculty of Nursing, University of Jember

E-mail: lailinurazizah3@unej.ac.id

ABSTRACT

Background: Diabetes mellitus (DM) is a progressive chronic disease that requires constant medical supervision and patient education for self-care. Diabetes is associated with an increased risk of neuropathy which causes loss of touch and perception of pain. High agricultural work area (in some places) and constant risk of injury (animal bites, injuries from farming tools, not wearing footwear/shoes, feet exposed to sunlight). Farmers experiences who have to prepare planting media starting from the process of preparing the soil to plowing the land (either using a hoe, cow or tractor, and barefoot). Examination of the feet is necessary to prevent foot ulcers from occurring. The purpose of this study is to identify risk factors for diabetik foot in farmers with diabetes mellitus in Lumajang. **Methods:** The research method is quantitative descriptive research. The population of this study were 141 farmers with purposive sampling technique. The data collection technique used was observation, using the 2009 Diabetes Care Program of Nova Scotia (DCPNS) foot risk assessment form. Includes skin assessment, assessment of the bone structure of the foot, assessment of blood vessels, sensation, and movement of the foot. **Results:** The results found that the majority of respondents were female and in the early elderly age category. While the results of observations of risk factors for diabetik foot, almost half of the respondents have a high risk of diabetik foot. **Conclusions:** This study concluded that several actions need to prevent an increased risk of diabetik foot. Therefore it is necessary to have an integrated diabetik ulcer prevention management strategy, sharing consultations and optimizing effective resources to get quality care.

Keywords: Risk faktors, diabetik foot, farmers

INTRODUCTION

Diabetes mellitus (DM) is a disease that requires ongoing treatment, especially glucose control, to prevent or slow complications (Fitriyanti,, M. E., et al., 2019). In 2017, the number of DM sufferers worldwide was 425 million people and is predicted to increase to 629 million people in 2045. Indonesia is the sixth country with the highest number of DM sufferers, namely 10.3 million people (International Diabetes Federation, 2017).

Type 2 diabetes as a risk factor for diabetic peripheral neuropathy in 2018 showed an increase in DM sufferers from 6.9% in 2013 to 8.5% or 10.9%. in 2018 (Simanjuntak, G. V., & Simamora, M., 2020).

One of the chronic complications that cause major problems for people with diabetes mellitus is diabetic foot (Kurdi, 2019). The International Diabetic Foot Working Group states that one in six people in the world who suffer from



diabetes mellitus experience foot problems, and every year 4 million people worldwide experience foot ulcers which can lead to amputation. (Tini, T., et al, 2019).

Diabetes is associated with an increased risk of peripheral sensory neuropathy, peripheral vascular disease, and foot deformities. This combination can lead to the formation of foot ulcers, which requires complex multimodal management, including extensive local wound care, weight relief, revascularization, and optimization of glycemic control. Despite intensive treatment, only 60% of all diabetic foot ulcers heal within one year of onset, and more than 10% of diabetics subsequently require lower extremity amputation (Robert M. Stoekenbroek et al., 2017). A person with neuropathy is 20 times more likely to fall than someone with uncontrolled diabetes. The results showed that peripheral diabetic neuropathy is the most important predictor of fall risk. (Reeves, N. D., et al, 2021). With the increasing prevalence and frequency of diabetes, neuropathy is influencing medical care in many care providers, but to date there is no sufficiently effective therapy. (Braffett, B. H., et al, 2020).

The results of a previous survey of several farmers in Lumajang District indicated a high level of agricultural work (in some areas) and a constant risk of injury (animal bites, injuries from farming tools, neglected shoes, feet exposed to the sun). This is experienced by farmers who have to prepare plant substrates starting from cultivating the land to plowing the land (either with hoes, cows or tractors and barefoot). Based on these problems, it is necessary to conduct research to identify risk factors for diabetic ulcers in farmers with DM. The purpose of this study was to identify risk factors for diabetic foot in farmers with diabetes mellitus in Lumajang District, Lumajang Regency.

METHODS

The research was conducted through quantitative analytical research. Participants were 141 farmers in the Rogotrunan health center area, with purposive sampling. The data collection technique used observation, using the Diabetic Care Program of Nova Scotia (DCPNS) foot risk assessment instrument. The variables studied included skin assessment, assessment of the bone structure of the foot, assessment of blood vessels, sensation, and movement of the foot. Data were analyzed using bivariate (Chi Square) and multivariate (Double Regression) analysis. This research has received ethical approval from KEPK Faculty of Dentistry, University of Jember No 332/UN25.8/KEPK/DL/2019.

RESULTS

Table 1 Age Distribution respondents

Age (Year)	f	%
15-25	0	0
26-35	8	5,6
36-45	15	10,6
46-55	68	48,2
56-65	39	27,6
>65	11	7,8

Source: research data

The results showed that respondents were in the age range of 36-65 years, with the highest number being in the age group 46-55 years of 48.8%.

Table 2 Sex Distribution respondents

Sex	f	%
Male	57	40
Female	84	60

Source: research data

The results showed that the distribution of female respondents was more than half of the total respondents (60%).



Table 3 Risk Factors Diabetic Foot (N=141)

Variable	Yes		No		P value	OR (95% CI)
	f	%	f	%		
Disorders of skin and nail conditions	82	58	59	41	0,015	2,343
Structur disorders	33	39	108	76	0,023	1,251
Vascular disorders	12	8	129	91	0,047	1,016
Mobility	30	21	111	78	0,048	1,243
Disturbance of sensation	57	40	84	59	0,021	2,485

Source: research data

Bivariate analysis was performed to determine the existence of a relationship. All of the five variables have a p value <0.05, which means there is a relationship. Bivariate test results that have a p value <0.25 are included in the multivariate test, while variables that have a p>0.25 are not included in the multivariate analysis.

Table 4 Multivariate Test Analysis Results

Variable	β	P Wald	OR	95% CI
Disorders of skin and nail conditions	1,021	5,291	22,623	1,352-8,470
Structur disorders	1,110	2,012	2,019	0,124-0,802
Disturbance of sensation	1,088	2,939	3,222	0,295-0,682
Constant	-0,712	2,166	0,156	

Source: research data

The results of the multivariate analysis showed that the variables of skin and nail conditions had the highest risk of developing diabetic foot in patients with Diabetes Mellitus. This is indicated by the variable skin and nail disorders having the lowest p value or the highest Wald value.

DISCUSSION

Age

The results showed that the respondents with the highest number were in the age group of 46-55 years as much as 48.2%. These respondents aged from 40 years, at which age insulin production began to decline and muscle cell function also decreased. This is related to the increased fat content in the muscles, which makes it difficult for glucose to be used for

energy. Type 2 diabetes is a type of diabetes that commonly occurs in people over 40 years old (Syamsiyah, N. (2022).

Sex

The results showed that the majority of respondents, 60%, were women. Women have a higher risk of developing diabetes because women have the potential to experience a greater increase in body mass index than men, putting them at greater risk of obesity. This condition also coincides with hormonal processes, menstrual cycle syndromes and postmenopause, which cause redistribution of body fat, leading to insulin resistance. (Suprihatin, W., & Purwanti, O. S., 2021)

In this study several risk factors for the occurrence of diabetic foot. Among them are conditions of skin and nail disorders, structural abnormalities, vascular disorders, mobility and sensation disturbances. From the data table 3, it was found that the p values for the variables were conditions of skin and nail disorders, structural abnormalities, vascular abnormalities, mobility and sensation disturbances respectively (0.011; 0.023; 0.047; 0.048; 0.021) which means that there is a relationship between the five variables with the risk of developing diabetic foot.

Disorders of skin and nail conditions

The results of the relationship analysis showed that 58% of the respondents had skin and toenail disorders. P value was obtained 0.011 which means there is a significant relationship between skin and nail disorders and diabetic feet. From the results of the analysis, it was also obtained an OR value of 2.343, which means that people with diabetes mellitus who have abnormal skin and nail conditions are at risk of having a 2.343 greater chance of experiencing diabetic feet compared to people with diabetes without skin and foot conditions. Damage



to the sensory nerves causes the sufferer to not realize if his leg is hit or injured by a sharp object. Damage to the autonomic nerves causes inhibition of sweat and sebum production, resulting in dry and cracked skin. This allows bacteria to enter the skin and cause inflammation (Djamaludin, D., et al, 2019). Nail or fungal infections are common in people with diabetes and usually affect the toenails. White/yellow/green discoloration and thickening of the nail tips gradually spreads across thick and brittle nails. Crooked nails can be sharp or broken and can extend to other toes (Nistiandani, A., et al, 2023).

Structure disorders

The results of the relationship analysis showed that 39% of respondents had foot structural abnormalities. The P value was obtained 0.023, which means that there is a significant relationship between skin and nail disorders and diabetic feet. From the analysis results, it was also obtained an OR value of 1.251, which means that people with diabetes mellitus who have foot structural abnormalities are at risk of having a 1.251 greater chance of experiencing diabetic feet compared to people with diabetes mellitus without skin and foot conditions. Foot deformity is a risk factor for diabetic foot ulcers. Structural deformities of the foot can cause plantar ulcers. Common deformities of the diabetic foot, such as hallux valgus and hammer toe. Types of internal body deformities, namely calluses or thickening of the skin that appear on parts that are exposed to constant pressure, warts, flat feet (Susanti, 2021). Deformity results in difficulty in mobilizing (Susanti, D. and Amita, D. (2021). Foot deformities are caused by increased pressure on the feet and, when combined with neuropathy, increase the risk of leg complications in the form of diabetic ulcers. (Ariyani, I., & Widiyanto, B., 2023).

Vascular abnormalities

The results of the relationship analysis showed that 8% of respondents had leg vascular abnormalities. The P value was obtained 0.047 which means that there is a significant relationship between skin and nail disorders and diabetic feet. From the analysis results, it was also obtained an OR value of 1.016, which means that people with diabetes mellitus who have foot structural abnormalities are at risk of having a 1.016 greater chance of experiencing diabetic feet compared to people with diabetes mellitus without skin and foot conditions. Peripheral arterial disease is caused by ischemia so that the feet become red and dry which often coincides with neuropathy (Ariyani, I., & Widiyanto, B., 2023). Elevated blood sugar can increase the risk of foot ulcers. This is due to reduced ability of blood vessels to contract and relax, reducing blood flow to the tissues in the legs. This condition is a favorable environment for the growth of anaerobic pathogens because the plasma of DM sufferers is not properly regulated, has high viscosity, slows blood circulation and lowers oxygen levels. (Wulandari, N. . A., Waluyo, A., and Irawati, D., 2019).

Mobility

The results of the relationship analysis showed that 21% of respondents had foot structural abnormalities. P value obtained 0.048 which means there is a significant relationship between skin and nail disorders with diabetic feet. From the results of the analysis, it was also obtained an OR value of 1.243 meaning that people with diabetes mellitus who have foot structural abnormalities are at risk of having a 1.243 greater chance of experiencing diabetic feet compared to people with diabetes mellitus without skin and foot conditions. Exercise or physical exercise is an effective diabetes treatment for reducing insulin resistance and blood sugar. If you exercise three times a week,



your blood sugar can drop immediately (Heart, Y., et al, 2023). In addition, active leg ROM exercise is a form of physical exercise that is useful for facilitating and facilitating blood flow to the cells, especially in the legs. In addition to contracting the leg muscles, active ROM exercises prevent the formation of blood clots, improve nerve function, increase the protective value of the feet and prevent neuropathy. (Putriyani, N., et al, 2020).

Disturbance of sensation

The results of the relationship analysis showed that 40% of the respondents had foot structural abnormalities. The P value was obtained 0.021, which means that there is a significant relationship between skin and nail disorders and diabetic feet. From the analysis results, it was also obtained an OR value of 2.485, which means that people with diabetes mellitus who have foot structural abnormalities are at risk of having a 2.485 greater chance of experiencing diabetic feet compared to people with diabetes mellitus without skin and foot conditions. Foot sensation plays an important role in the risk of developing diabetic foot. Sensory feedback from the feet during walking is important for activating the muscles to stabilize the lower leg and control balance. Reduced or absent peripheral sensation in the feet alters gait biomechanics, affects balance and increases the risk of falls. (Reeves, N.D., et al, 2021).

From table 4, the results of multivariate analysis using the regression test show that the variable of skin and nail conditions disorder has an OR value of 22.623, meaning DM sufferers who have abnormal skin and nail conditions (such as dryness, sweating, maceration, fissures, corns, callus, not warm, swelling, inflammation, discharge, pain, cracked skin, ulcers, thick nails, discolored nails, deformed nails, non-growing nails, and numbness of the feet) are 3.391 times

more likely to have diabetic feet than DM sufferers who do not have skin disorders and toe nails. The OR value for the variable structural abnormalities is 2.019, meaning that DM sufferers who have foot structural abnormalities (such as hammer toe, claw toe, overlapping toes, bunions, deformities, and amputation) are 2.019 times more likely to experience diabetic feet than DM patients who do not. have a structural deformity. Meanwhile, the sensation disorder variable has an OR value of 3.222, meaning that DM sufferers have impaired sensation in the legs (such as reduced/no sensation, pain, numbness, tingling, holes, itching, feeling of tightness in the legs, feeling of heaviness in the legs, and cramps). 3.222 times greater risk of experiencing diabetic foot than DM sufferers who do not have impaired sensation in the feet.

Based on the explanation above, DM farmer are at risk of developing diabetic ulcers, which require complex multimodal treatment and of course require costs and management which is quite time consuming. Therefore, several steps must be taken and prepared to prevent an increased risk of diabetic foot. Therefore, it is necessary to develop an integrated strategy for diabetic ulcer prevention, share consultations and optimize effective measures to ensure quality care. For example routine foot examinations in DM farmer, foot care (eg cutting nails, cleaning and drying feet, using appropriate footwear, foot exercises), as well as monitoring blood sugar control and exercise. (Azizah, L.N, et al, 2023).

CONCLUSIONS

The results of this study found that of the 5 (five) risk variables for diabetic foot, there were 3 (three) variables that increased the risk of developing diabetic foot, namely: disorders of skin and nail conditions, structural abnormalities and disturbances of sensation. It is hoped that



future researchers will continue this research using other methods and develop more rapid detection aspects using more complete applications for the prevention of diabetic ulcers.

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