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The Effect of Diabetic Foot Exercises on Foot Sensitivity in Diabetes Mellitus Patients at Primasari Clinic, Kismantoro, Wonogiri

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Abstract. This study investigates the effect of diabetic foot exercise on foot sensitivity among patients with diabetes mellitus at Klinik Primasari Kismantoro, Wonogiri. Diabetes mellitus may cause peripheral nerve disorders that reduce foot sensitivity and increase the risk of injuries, ulcers, and diabetic foot complications. Therefore, preventive interventions are needed to maintain foot health and improve patients' quality of life. This research employed a pre-experimental method with a one-group pretest-posttest design. A total of 32 patients with diabetes mellitus participated in the study and were selected based on criteria. Foot sensitivity was assessed before and after the intervention to identify changes resulting from the exercise program. The intervention consisted of six sessions of structured diabetic foot exercise performed under guidance. The findings showed improvement in foot sensitivity after the intervention. Before the exercise program, most participants were classified as having moderate foot sensitivity, whereas after completing six sessions, the majority moved to the good sensitivity category. These results indicate that regular diabetic foot exercise can improve blood circulation, stimulate peripheral nerves, and enhance foot sensitivity. In conclusion, diabetic foot exercise is an effective, simple, non-pharmacological intervention that may help prevent diabetic foot complications and can be incorporated into routine diabetes care.

Keywords: Diabetes Mellitus; Foot Exercise; Foot Sensitivity; Nursing Care; Prevention.

1. INTRODUCTION

Diabetes Mellitus (DM) is a chronic disease characterized by metabolic disorders

in the pancreas, leading to elevated blood sugar levels (hyperglycemia). DM is known to have many complications, one of which is diabetic neuropathy, which is damage to the peripheral nerves, especially in the feet. This complication often leads to decreased sensitivity in the feet and increases the risk of injury or even amputation if not optimally managed.

The prevalence of diabetes mellitus (DM) continues to rise worldwide, including in Indonesia, which has one of the highest rates of diabetes. In addition to this high prevalence, complications of diabetic neuropathy tend to occur in patients with poor blood sugar control or long-standing diabetes. At the Primasari Kismantoro Clinic in Wonogiri, the number of DM cases continues to rise, with many patients reporting impaired sensitivity in their feet. This condition is particularly risky because patients are often unaware of wounds or injuries to their feet, increasing the potential for complications and even amputation.

Based on a 2024 field survey at the Primasari Kismantoro Clinic, 480 diabetes patients were recorded, most of whom had impaired foot sensitivity. Of the 10 patients examined, only 5 could still sense capacitive stimulation (using cotton), 3 with rubber, and 2 with needles—indicating a significant decrease in foot sensitivity. Previous research also showed that peripheral neuropathy complications in diabetes patients can reach 57.8%, especially after more than 10 years of diabetes.

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Decreased foot sensitivity in diabetes patients has serious consequences, including an increased risk of unnoticed foot wounds, the risk of developing difficult-to-heal infections, the potential for serious complications such as gangrene and amputation, a decreased quality of life and physical activity, and an economic and psychosocial burden on patients and their families.

One non-pharmacological intervention to prevent and address decreased foot sensitivity in diabetes patients is diabetic foot exercises. These exercises involve a series of exercises aimed at improving blood circulation in the feet, strengthening muscles, and stimulating sensory nerves. Research at the Primasari Kismantoro Clinic shows that diabetic foot exercises significantly improve foot sensitivity, reduce the risk of wounds and complications, and are easy to perform and tolerate. Therefore, diabetic foot exercises can be recommended as a preventive and rehabilitative solution to improve the overall foot health of diabetes patients.

2. THEORETICAL STUDY

Diabetes Mellitus and Diabetic Neuropathy

Diabetes Mellitus is a metabolic disorder that causes chronic hyperglycemia and can potentially lead to macrovascular and microvascular complications, including peripheral neuropathy. Diabetes Mellitus is a disease caused by elevated blood glucose or the inability of the body's organs to use insulin. Diabetic neuropathy is one cause of insensitivity, making sufferers unable to feel pain, temperature, and touch. People with diabetes who also suffer from neuropathy experience wounds, scars, and blisters, which are generally due to insensitivity. Diabetic neuropathy is characterized by a decreased ability of nerves to transmit stimuli, especially in the lower extremities. This nerve damage results in decreased sensitivity in the feet, making patients susceptible to injuries without realizing it.

Diabetic Foot Exercises

Diabetic foot exercises are a series of exercises aimed at improving blood circulation, strengthening foot muscles, and increasing nerve sensitivity. These exercises can be performed independently, are easy to remember, and do not require special equipment. Several previous studies have shown that diabetic foot exercises can improve blood circulation and foot sensitivity in patients with diabetes.

Related Research

Research by Nasution (2020) and Putra (2020) showed significant differences in blood circulation and foot sensitivity between the group performing diabetic foot exercises and the control group. However, a similar study at the Primasari Kismantoro Clinic in Wonogiri has

not been conducted before, making this research novel in the context of primary healthcare services in the area.

3. RESEARCH METHODS

This study used a pre-experimental design with a one-group pretest-posttest approach. The study population was all DM patients at the Primasari Kismantoro Wonogiri Clinic. The sample was taken by total sampling, namely all 32 DM patients who met the inclusion criteria. Data collection instruments included a foot sensitivity observation sheet assessed using cotton, rubber, and a needle. The intervention procedure, in the form of diabetic foot exercises, was carried out twice daily for three days (a total of six sessions). Foot sensitivity assessments were conducted before and after the intervention. Data analysis used the Kendall's Tau statistical test to assess changes in foot sensitivity.

4. RESULT AND DISCUSSION

This study, examining the effect of diabetic foot exercises on foot sensitivity in patients with diabetes mellitus, was conducted at the Primasari Kismantoro Clinic in Wonogiri. Data collection was conducted in May 2025 with 32 respondents, using a pre-experimental design with a one-group pretest-posttest design. Data were collected using an observational foot sensitivity assessment sheet before and after the diabetic foot exercise intervention.

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Data Analysis Results

Table 1. Characteristics of Informants Based on Gender at the Primasari Kismantoro Clinic.

Number	Gender	Frequency(F)	Precentage (%)
1.	Male	15	46,9%
2.	Female	17	53,1
3.	Total	32	100.0

Respondent Characteristics based on gender show that out of a total of 32 respondents, based on the Respondent Characteristics table by gender, it was found that of the 32 respondents, 15 (46.9%) were male and 17 (53.1%) were female. These results align with previous research showing a higher prevalence of diabetes in women because postmenopausal hormonal changes can affect insulin sensitivity, increasing the risk of diabetes.

Table 2. Characteristics of Informants Based on Respondent Age at the Primasari Kismantoro Clinic.

Number	Age	Frequency (F)	Precentage (%)
1.	< 50 years old	13	40,6
2.	≥ 50 years old	19	59,4
	Total	32	100.0

The table above shows that 32 respondents, 13 of whom were under 50 years old, represented 40.6% of the patients, while 59.4% of those over 50 years old. The risk of diabetes increases significantly with age, particularly after age 40, due to decreased pancreatic function and increased insulin resistance.

Table 3. Foot Sensitivity Measurement Results Before Intervention.

Number	Sensitivity Categori	Frequency(F)	Precentage (%)
1.	Tidak ada (0)	3	9,4
2.	Kurang (1)	11	34,4
3.	Sedang (2)	18	56,3
4.	Baik (3)	0	0
	Total	32	100.0

Pre-Test Sensitivity Category, before being given diabetic foot exercise intervention, the majority of respondents had a moderate level of sensitivity (score 2) of 18 people (56.3%), less sensitivity (score 1) of 11 people (34.4%), no sensitivity (score 0) of 3 people (9.4%), and good sensitivity (score 3) was not found.

Table 4. Foot Sensitivity Measurement Results After Intervention.

Number	Sensitivity Categori	Frequency(F)	Precentage (%)
1.	Tidak ada (0)	1	3,1
2.	Kurang (1)	11	6,3
3.	Sedang (2)	9	28,1
4.	Baik (3)	20	62,5
	Total	32	100.0

Post-Test Sensitivity Categories, after six sessions of diabetic foot exercise, foot sensitivity improved. Twenty respondents (62.5%) experienced good sensitivity (score 3), nine (28.1%) experienced moderate sensitivity (score 2), two (6.3%) experienced poor sensitivity (score 1), and one (3.1%) experienced no sensitivity (score 0).

Pre-Test and Post-Test Difference Analysis

Bivariate analysis using Kendall's tau test showed a p-value of 0.000, indicating a significant effect of diabetic foot exercises on improving foot sensitivity in people with diabetes mellitus. Diabetic foot exercises effectively improve peripheral blood circulation, increase nerve stimulation, and strengthen foot muscles. These results support the literature suggesting that diabetic foot exercises can reduce the risk of diabetic foot ulcers and peripheral nerve disorders.

Consistency and Differences with Previous Research

The results of this study are consistent with those of Nasution (2020), who also found improved blood circulation and foot sensitivity after administering diabetic foot exercises to patients with diabetes

mellitus. Similarly, Putra (2020) reported improved foot sensitivity in patients performing similar exercises compared to a control group. However, these findings also emphasize the need to control other factors such as age, obesity, smoking habits, and patient lifestyle to achieve optimal benefits of diabetic foot exercises.

Implications of the Research Findings

Practically, diabetic foot exercises can be implemented as a non-pharmacological intervention in clinics and communities to prevent decreased foot sensitivity and diabetic foot complications. Theoretically, this study strengthens empirical evidence on the effectiveness of structured exercise in the management of diabetes mellitus.

These results align with previous research, which suggests that diabetic foot exercises are effective in improving foot sensitivity in patients with diabetes. These exercises stimulate foot muscle contractions, improve blood circulation, and strengthen peripheral nerves. Improved foot sensitivity can prevent serious complications such as diabetic ulcers and amputations. In addition, foot exercises are easy to do, do not require special equipment, and can be made part of the daily activities of DM patients.

5. CONCLUSIONS

This study demonstrates that diabetic foot exercises significantly improve foot sensitivity in diabetes mellitus patients at the Primasari Kismantoro Clinic in Wonogiri. Foot exercises can be recommended as a non-pharmacological intervention that is easy to implement in primary healthcare settings. It is recommended that DM patients perform foot exercises regularly at least six times a week for optimal results. Future research could increase the frequency of interventions and control for confounding factors such as obesity, smoking, and hypertension.

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