

The Effect Of SEKADI In Diabetic Ulcer Risk Patients On ABI Score

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ABSTRACT

Diabetic ulcers are a feared complication of type 2 diabetes, characterized by damage or loss of the skin layer in the epidermis, tendons, muscles, bones, or joints. Senam Kaki Diabetes (SEKADI) is an important activity in preventing diabetic ulcers which is done by moving the fingers and legs of both feet which can improve blood circulation, prevent glucose deposition, and improve blood flow to carry oxygen and nutrients. This research aims to identify the presence of peripheral artery disease using the Ankle Brachial Index (ABI), analyze changes in ABI after Senam Kaki Diabetes (SEKADI) are performed on patients at risk of diabetic ulcers, and identify changes in the Ankle Brachial Index (ABI) before and after the SEKADI. This research is a quantitative study with a quasi-experimental design using a one-group pre-test post-test approach. The sampling technique used was purposive sampling, the sample size was 30 people who met the exclusion and inclusion criteria. Data collection was carried out using a research instrument in the form of ABI scores to determine the presence of PAD disease. The research results were statistically tested using the Wilcoxon test, with a p-value of $0.000 < \alpha (0.05)$, which means there is a relationship between before and after the Senam Kaki Diabetes (SEKADI) was conducted. The respondents are hoped to perform SEKADI independently.

Keywords: ABI Score, Diabetic Ulcer Risk, SEKADI.

Introduction

Diabetic ulcer is a feared complication of type 2 diabetes, characterized by damage or loss of skin layers in the epidermis, tendons, muscles, bones, or joints (Hati & Sharfina, 2020). Necrosis occurs on the soles of the feet as a result of peripheral neuropathy (Budiman et al., 2024) and the occurrence of a significant and uncontrolled increase in blood sugar levels (Hati & Sharfina, 2020). Diabetic ulcers can lead to a decrease in the quality of life for individuals with type 2 diabetes mellitus (Erlina et al., 2022). Chronic wounds occur due to neuropathic disorders causing a reduced sensation in the distal region of the foot. The longevity of diabetes mellitus will cause microangiopathy complications where microvessels experience narrowing so that diabetic neuropathy causes diabetic foot ulcers (Budiman et al., 2024). Globally, diabetes mellitus is estimated to affect 537 million people (WHO, 2023). Indonesia ranks third with a total of 11.3%. Diabetes mellitus sufferers are at a 15-20% risk of developing diabetic ulcers within five years, with a recurrence rate of 50-70%, and 85% undergo amputations. The risk of diabetic ulcers can be reduced and prevented through examinations. (Erlina et al., 2022). According to the health profile of Banyuwangi in 2021, the total number of diabetes mellitus patients was 27,097



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individuals, with 1,029 individuals in the Kalibaru area (Dinas Kesehatan Kabupaten Banyuwangi, 2021).

Factors that enable the occurrence of diabetic ulcers include age, duration of suffering from diabetes mellitus, gender, neuropathy, peripheral artery disease, and a history of foot ulceration or amputation (Dewi & Asman, 2022), high blood sugar levels that are unstable, foot deformities, and smoking, while the factors affecting blood glucose levels include an irregular diet, lack of activity, improper medication use, stress, and other diseases or infections. (Dewi & Asman, 2022). Open wounds in patients with diabetic ulcers that occur due to complications of macroangiopathy on the skin surface, wounds that occur in patients often feel numb and not felt, which can develop into skin infections caused by aerobic (living without oxygen) and anaerobic (requiring oxygen) bacteria. Diabetic ulcers can cause difficulty in movement, limitation in activities, and dependence on others (Mentor, 2023).

In non-medical therapy, there are complementary therapies such as diabetic foot exercises, diabetic foot massage, yoga, meditation, acupressure, cupping, and hypnotherapy. Diabetic foot exercises, which are essential activities in the prevention of diabetic ulcers, are performed by moving the toes and legs of both feet. (Sanjaya et al., 2019), Which can improve blood circulation, prevent the deposition of glucose, and facilitate blood flow to deliver oxygen and nutrients; by performing diabetic foot exercises, the symptoms of diabetic neuropathy will decrease, as all extremities, especially in the lower legs, will be well supplied with oxygen. (Mardiana, 2021).

The Ankle Brachial Index (ABI) is used to assess arterial blood flow. It is a non-invasive procedure with high accuracy in detecting blockages or narrowing in the arteries by measuring regular blood pressure. The Ankle Brachial Index (ABI) can diagnose microvascular issues that lead to complications such as diabetic retinopathy and diabetic nephropathy. At the same time, blockages in blood flow and the accumulation of fatty plaques are significant problems contributing to prolonged macrovascular conditions. (Amelia et al., 2021).

Methods

This research employs a quantitative approach with a quasi-experimental design using a one-group pre-test and post-test method. The population studied is the community of Banyuwangi Kalibaru Village, and The researcher's sampling method used purposive sampling technique based on criteria. Inclusion criteria are DM patients who have been diagnosed for more than 1 year, DM patients without diabetic ulcers. Exclusion criteria are respondents who did not complete all stages of the research, respondents who were unwilling. The number of samples was 30 respondents. The research instrument is ABI scores to determine the presence of PAD disease. The analysis used is the Wilcoxon test.

Results

Characteristics of Respondents

Characteristics	Frequency	Presentation
Age		
SD	25	83,3%
SMP	5	16,7%
Gender		
Women	30	100%
Work		



Household Helper	21	70,0%
Entrepreneurship	3	10%
Not Working	6	20%
Age		
36-45	4	13,3%
46-55	9	30,0%
56-65	13	43,3%
66-76	4	13,3%

Tabel 1 The research results show that the majority of respondents have an elementary school education, with 25 respondents (83.3%). All 30 respondents (100%) are female, most of the respondents work as housewives, totalling 21 respondents (70%), and the respondents aged 56-65 years amount to 13 respondents (43.3%).

Pre-post-test ABI score assessment

Category	Frequency	Presentation
Pre-test		
Normal	0	0%
Lightweight	15	50%
Currently weight	11	36,7%
Abnormal	0	0%
Abnormal	4	13,3%
Post-test		
Normal	19	63,3%
Lightweight	11	36,7%
Currently weight	0	0%
Abnormal	0	0%
Abnormal	0	0%

Tabel 2 The results show that before the diabetic foot exercise therapy, more respondents experienced mild PAD, with 15 respondents (50%). After the SEKADI was conducted, the results indicated that the number of respondents in the normal category increased to 19 (63%).

Wilcoxon test results

ABI Pre Score	ABI Post-Score			Sig
	Lightweight	Light PAD	Total	
Abnormal	4	0	4	0.000
PAD Lightweight	15	0	15	
PAD Currently	0	11	11	
Total	19	11	30	

The results of the Wilcoxon test show a P value of $0.000 < 0.05$, indicating a significant increase in post-test scores compared to pre-test scores. This suggests that there is an effect after the intervention of diabetic foot exercise therapy, which has a significant positive impact.

Discussion

Studies show that before the SEKADI was conducted, the majority of respondents suffered from peripheral artery disease, with 15 respondents (50%) experiencing mild PAD, 11



respondents (36.7%) with moderate PAD, and four respondents (13.3%) classified as abnormal. After SEKADI was carried out on respondents, the majority of respondents had a significant level of change in ABI, namely 19 (63%) respondents in the normal category and 11 (36.7%) in the mild PAD category. The results of the research showed a significant effect before and after it was carried out, with a p value = 000 < 0.05.

SEKADI is a complementary therapy, correct and effective treatment and prevention will reduce the rate of complications including the non-medical therapy of diabetic foot exercises, this action is easy for everyone to do because it has no side effects and does not cause injury. Diabetic foot exercises are movements that move the leg muscles to help improve blood circulation in the legs to prevent blockages in blood vessels (Sanjaya et al., 2019), movements by moving the fingers and legs will strengthen the nerves and muscles of the legs. contracts and helps increase cell sensitivity to insulin, when the body is experiencing excess glucose and diabetic foot exercises are carried out, the high glucose will be used by the muscles, thereby preventing blood deposition and viscosity (Sanjaya et al., 2019). Diabetic foot exercises are also useful for increasing flexibility, blood circulation, and strengthening muscles (Simamora, Siregar, 2020).

One of the non-invasive tests to measure blood circulation is the ABI (Ankle Brachial Index), which uses a sphygmomanometer to determine blood pressure in the legs and arms. This examination can detect signs and symptoms of diabetic neuropathy. (Prayogi et al., 2023). The ABI value is interpreted as 5, with values classified as Abnormal (Calcification), Normal, Mild PAD, Moderate PAD, and Severe PAD. ABI is a simple and easy examination to establish the diagnosis of peripheral artery disease, which is a condition of atherosclerosis occurring in large blood vessels. PAD is one of the signs that atherothrombosis is happening in the blood vessels, and the narrowing up to the occlusion of blood vessels leads to a decrease in blood supply to the limbs. (Yunir et al., 2019). Signs of peripheral artery disease include reduced arterial pulse, decreased capillary refill, numbness in the limbs, tingling, and stiffness in the lower extremities upon waking up (Sirait & Mustofa, 2021).

The average in this study indicates that respondents experienced mild PAD because most of the respondents regularly consumed diabetes medications, such as metformin and glibenclamide. The efforts made to prevent diabetic ulcers involve detecting the presence of peripheral artery disease to avoid serious complications that may arise. The results indicate that the majority of respondents experience this condition within 1-3 years, ranging from mild to moderate and abnormal. Some respondents may not be aware that they are at high risk of complications such as diabetic ulcers, which can affect ABI values. In this study, female respondents entering menopause are at a higher risk of developing type 2 diabetes mellitus. Menopause is often accompanied by changes in estrogen and progesterone hormones, which can affect glucose metabolism.

It can also support the supply of oxygen and nutrients to the cells, allowing the nerves to function optimally and reducing complaints from peripheral neuropathy. After regularly performing diabetic foot exercises, respondents will feel comfortable, experience reduced pain, and prevent nerve damage, as the complications that often occur before someone develops a diabetic ulcer are related to blood flow disorders in the feet. When the ABI value is < 40, it indicates a high risk of foot wounds (Fatmasari et al., 2019). Regular exercise can help sufferers and has positive benefits and impacts on their health. Before the exercise, many respondents had ABI values below the normal range, and after consistent practice, there was a significant change in ABI scores, bringing them into the normal range. Compliance with exercising is very beneficial for improving blood circulation, which helps prevent complications.

It can be concluded that this affects the research conducted. This result is supported by previous researchers Tut Wuri Prihatin and Rahadian Dwi M, who were able to improve ABI values. This is due to the management implemented to address the symptoms of tingling caused



by impaired blood circulation in the legs, which can enhance blood circulation. (Prihatin & M, 2019). Research examining the effects of diabetic foot exercises shows a reduction in symptoms such as tingling, pain in the limbs, numbness, and stiffness, which are indicative of diabetic ulcer complications (Fatmasari et al., 2019).

The results of the research were conducted twice a week for three weeks, with each session lasting 20 minutes, which can prevent complications in patients with type 2 diabetes mellitus. Initially, some respondents experienced mild, moderate, and abnormal PAD; however, after regular SEKADI sessions, the values showed a change, with a majority of 19 (63.3%) falling within the normal range, and there was an improvement from moderate disturbances to mild disturbances. The implementation that has been carried out repeatedly by moving the legs has significant benefits and effects in improving blood circulation in the lower extremities, thereby preventing the risk of diabetic ulcers, eliminating the need for amputation, and enhancing the patient's quality of life.

Conclusion

There is an influence of the SEKADI treatment (Diabetic Foot Exercise) on the ABI score in patients at risk of diabetic ulcers in Banyuwangar Kalibaru Village, with results showing $P=0.01 < 0.05$, indicating a significant increase in post-test scores compared to pre-test scores. By carrying out SEKADI, it is hoped that every DM sufferer will have the will to do it independently, which has many advantages in preventing severe PAD.

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