

ANKLE BRACHIAL INDEX (ABI) VALUE ON FOOT SENSATION OF TYPE 2 DIABETES MELLITUS PATIENTS

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ABSTRACT

Background: Type 2 diabetes mellitus is a chronic disease that often causes neurological and vascular complications (microvascular and macrovascular). One of the complications that often occurs is Peripheral arterial disease (PAD). An examination is needed to assess the presence of peripheral arterial disease, one of which is a non-invasive method, namely the Ankle Brachial Index (ABI). Objective: This study aims to determine the relationship between ABI values and foot sensation in patients with type 2 diabetes mellitus. Methods: This type of research used a quantitative research design with a cross sectional approach involving 40 patients with type 2 diabetes mellitus. The sampling technique used was purposive sampling. ABI measurements were performed using ultrasound doppler, while foot sensation was evaluated using a 10-gram monofilament test. Other demographic and clinical data were also collected through interviews and medical records. Results: Respondents in this study were mostly male, namely 24 people (60%). The age of respondents was mostly in the range of 51-60 years (57.5%). Based on the characteristics of religion, the most respondents were Muslim, namely 28 people (70%). While based on the duration of DM, the most respondents were in the range of 5-10 years, namely 17 people (42.5%). Bivariate test results obtained p value 0.018. Conclusion: There is a relationship between ABI value and foot sensation of patients with Type 2 DM, with the strength of the relationship in the moderate category. a decrease in ABI value is followed by a decrease in foot sensation by not feeling a monofilament examination of more than 3 points.

KEYWORDS: Ankle Brachial Index, Foot Sensation, Diabetes Mellitus type 2, Peripheral Neuropathy, Peripheral Arterial Disease.

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disease characterized by elevated blood glucose levels (hyperglycemia) due to disorders or damage to the pancreas and characterized by damage to insulin action, abnormalities in insulin secretion or both.^[1,2] Increased concentrations of glucose levels in the blood can damage many body systems, especially blood vessels and nerves.^[3,4] The prevalence of DM continues to increase from year to year worldwide.

Based on the results of the Basic Health Research (Riskesdas) in 2018, there was an increase in the prevalence of DM, which was 2.6% compared to 2013. Data from the International Diabetes Federation (IDF) also states the same thing where in 2013 there were 382 people with DM in the world and it is estimated that it will continue to increase to around more than 592 million

sufferers in 2035 and is dominated by women (6.4%) compared to men (4.9%).^[5] According to WHO, the prevalence of DM in the world is highest at the age of more than 30 years reaching 10.8%, the risk of amputation is 15-46 times higher than non-DM patients, the post-amputation mortality rate is 15.89% and diabetic ulcer patients are 9.4% (WHO, 2020.). According to the ADA in 2019, there is one person diagnosed with DM every 21 seconds. (American Diabetes Association, 2019). Many factors influence the incidence and high prevalence of DM.

Some of the factors that influence DM include age, physical activity, body mass index, exposure to smoke, blood pressure, stress, lifestyle, especially diet, family history, HDL cholesterol, triglycerides, gestational DM, history of glucose abnormalities and other abnormalities.^[8,9] The factor of blood sugar instability in

people with DM is one of the causes that will have a lot of impact on the systems in the body.^[10] The average blood sugar level in DM patients is still high exceeding the blood sugar level set by PERKENDI which is 128.05 and the lowest average ABI value is 0.58.^[11,12] Increased blood sugar can cause blood vascularity to become thicker, pathologic changes in blood vessels, endothelial cell dysfunction and smooth muscle cell abnormalities.^[13] Slow and inappropriate handling will cause complications in patients with DM.^[14]

Complications arising from DM are neurological and vascular (microvascular and macrovascular). One of the most common complications is Peripheral arterial disease (PAD).^[15] PAD is caused by atherosclerosis that occurs in peripheral arteries other than the heart and brain, resulting in narrowing to occlusion of blood vessels. Lack of blood sugar control in patients with DM increases the incidence of PAD because blood vascularity increases as a result of decreased blood supply to the limbs.^[15] Special examinations such as the ankle brachial index (ABI) are needed to evaluate the condition of blood circulation in peripheral arteries, especially in the lower extremities where this examination also plays a role in determining cardiovascular morbidity and mortality.^[16]

Another complication that occurs in patients with DM is peripheral neuropathy. Patients with peripheral

neuropathy will experience decreased foot sensation.^[17] Patients with this problem are very at risk of serious disorders, especially foot trauma (unrecognized wounds with various causes), and if accompanied by complications in the form of infection in the wound, the wound becomes chronic, amputation can occur and even death.^[18]

Based on the above background, where the prevalence rate of DM incidence continues to increase, serious complications, to amputation and even death, the researcher is interested in discussing the Relationship between Ankle Brachial Index (ABI) Values and Foot Sensation in Patients with Type 2 DM in order to provide useful information in the management of type 2 DM patients, especially related to neurological and vascular complications, reduce the incidence rate, prevent complications, reduce medical costs, morbidity and mortality rates and improve the quality of life of patients.

METHOD

This type of research uses a quantitative research design with a cross sectional approach involving 40 patients with type 2 diabetes mellitus. The sampling technique used was purposive sampling. ABI measurements were performed using ultrasound doppler, while foot sensation was evaluated using a 10-gram monofilament test. Other demographic and clinical data were also collected through interviews and medical records.

RESULTS AND DISCUSSION

Table 1: Frequency Distribution of Respondents' Characteristics Based on Gender, age, religion and duration of DM at PKU Muhammadiyah Kitamura Main Clinic Pontianak.

Type of Gender	Frequency	%
Male	24	60
Female	16	40
Age		
30-40	3	7,5
41-50	14	35
51-60	19	57,5
>60	4	10
Religion		
Islam	28	70
Christian	9	22,5
Buddhism	3	7,5
Hinduism	0	0
Duration of DM		
<5 Years	12	30
5-10 Years	17	42,5
>10 Years	11	27,5
Total	40	100.0

Based On Table 1. Respondents in this study for the most gender were men, namely 24 people (60%). This result is supported by research.^[19] The results stated that the gender of the majority of respondents was male with a percentage of 83.3%. The age of the respondents was mostly in the range of 51-60 years, as many as 19 people (57.5%). This is supported by research^[20] which states that the average respondent is at the age of 53.8 years.

Based on the characteristics of religion, the most respondents were Muslim, namely 28 people (70%). Meanwhile, based on the duration of DM, the most respondents ranged from 5-10 years, namely 17 people (42.5%). This is not in accordance with research conducted^[20] which states that the average length of suffering from DM in respondents is <5 years or 4.41 years.

Table 2: Bivariate Test of the Relationship between Ankle Brachial Index (ABI) Values and Foot Sensation in Patients with Type 2 DM at the PKU Muhammadiyah Kitamura Pontianak Main Clinic (n=40).

Variable		P value
Ankle Brachial Index (ABI) Value to Foot Sensation in Patients with Type 2 DM	Correlation Sig (2-tailed) N	Infeksi0.018 40

Based on Table. 2 Bivariate Test Results related to the Relationship between Ankle Brachial Index (ABI) Values and Foot Sensation in Patients with Type 2 DM at the PKU Muhammadiyah Kitamura Pontianak Main Clinic obtained a p value of 0.018. These results indicate that there is a significant relationship between ABI values and foot sensation in patients with Type 2 DM. This is also in line with research conducted^[20] Respondents with low ABI values tend to have decreased sensation in the feet, indicating the presence of peripheral neuropathy. Conversely, respondents with normal ABI values tend to have better foot sensation.

CONCLUSION

In this study, there was a relationship between ABI values and foot sensation in patients with Type 2 DM. This study shows that ABI value can be an important indicator in assessing the risk of peripheral neuropathy in patients with Type 2 DM. Regular ABI checks and evaluation of foot sensation are recommended for early detection of complications and proper management. These results also emphasize the importance of good blood sugar control to prevent further complications.

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