



THE EFFECT OF FOOT MASSAGE ON PERIPHERAL SENSITIVITY IN PATIENTS WITH TYPE 2 DIABETES MELLITUS USING THE IPSWICH TOUCH TEST AT RSUD KABUPATEN BEKASI HOSPITAL IN 2025

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Abstract

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder that frequently leads to peripheral neuropathy due to prolonged hyperglycaemia. Peripheral neuropathy is characterized by reduced protective sensation in the lower extremities, particularly the feet, thereby increasing the risk of diabetic foot ulcers and amputation. Prevention of these complications requires early detection and appropriate non-pharmacological interventions. Foot massage is considered a safe and easily applicable intervention, while changes in peripheral sensation can be assessed using the simple and reliable Ipswich Touch Test (IpTT). Methods this study employed a quantitative pre-experimental design with a one-group pretest–post test approach. The sample consisted of patients with Type 2 Diabetes Mellitus receiving outpatient and inpatient care at Bekasi District General Hospital. Participants received foot massage according to standard procedures. Peripheral sensation was assessed before and after the intervention using the Ipswich Touch Test. Data were analysed using the Wilcoxon Signed Rank Test to evaluate differences in peripheral sensation before and after the intervention. Results there was a statistically significant difference in peripheral sensation scores before and after the foot massage intervention. Post-intervention findings showed an increase in the number of respondents with normal peripheral sensation based on IpTT results. The Wilcoxon test yielded a p-value of 0.002 ($p < 0.05$), indicating that foot massage had a significant effect on improving peripheral sensation in patients with Type 2 Diabetes Mellitus. Discussion foot massage significantly improves peripheral sensation in patients with Type 2 Diabetes Mellitus as measured by the Ipswich Touch Test. This intervention may serve as a supportive non-pharmacological therapy in preventing peripheral neuropathy and diabetic foot ulcers. Incorporating foot massage as an independent nursing intervention in clinical practice is recommended. Future studies should employ more rigorous research designs, larger sample sizes, and comparisons with other non-pharmacological interventions to produce more comprehensive evidence.

Keywords: *Type 2 Diabetes Mellitus; Foot Massage; Peripheral Sensation; Peripheral Neuropathy; Ipswich Touch Test*

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INTRODUCTION

Type 2 Diabetes Mellitus is a chronic metabolic disease characterized by hyperglycemia due to impaired insulin secretion or action. One of the most common long-term complications is peripheral neuropathy, characterized by a decrease in protective sensitivity in the lower extremities, particularly the feet. This condition increases the risk of diabetic foot ulcers, which can lead to amputation and a decrease in the patient's quality of life. Therefore, preventive efforts are required through early detection and non-pharmacological interventions that are effective and easy to apply in nursing practice.

Foot massage is a nursing intervention with the potential to improve blood circulation and peripheral nerve function. Peripheral sensitivity can be measured using the Ipswich Touch Test (IpTT), which is a simple, safe, and effective method. This study aims to determine the effect of foot massage on peripheral sensitivity in patients with Type 2 Diabetes Mellitus at RSUD Bekasi Regency.

METHODS

Study Design and Setting

This study uses a quantitative design with a pre-experimental one-group pretest–posttest approach, where peripheral sensitivity measurements were conducted before and after the foot massage intervention on the same group.

Population and Sample

The research population consisted of all Type 2 Diabetes Mellitus patients undergoing outpatient and inpatient treatment at RSUD Bekasi Regency. The sampling technique used was purposive sampling, considering specific inclusion and exclusion criteria. The total sample size used in this study was 43 respondents, which was deemed adequate for a one-group pretest–posttest design.

Instruments

The instrument used in this study was the Ipswich Touch Test (IpTT) to assess foot peripheral sensitivity. The IpTT is performed by applying light touches to six points on the toes without pressure, and results are assessed based on the patient's ability

to feel the touch. Additionally, the foot massage intervention was carried out according to the established Standard Operating Procedure (SOP).

Data Collection Procedure

Data collection was carried out in the following stages: Respondents were provided with explanations regarding the purpose and procedures of the study and signed an informed consent form. An initial peripheral sensitivity measurement (pretest) was conducted using the IpTT. Respondents were then given a foot massage intervention according to the SOP. After the intervention, peripheral sensitivity was measured again (posttest) using the IpTT, and all data were recorded on research observation sheets.

Data Analysis

Data analysis was performed univariately and bivariately using SPSS v.31. Univariate analysis was used to describe respondent characteristics and the distribution of peripheral sensitivity before and after the intervention. The Shapiro–Wilk normality test showed that the data were not normally distributed ($p < 0.05$), so bivariate analysis was conducted using the Wilcoxon Signed Rank Test with a 95% confidence level.

Ethical Considerations

This study adhered to ethical research principles, including respect for persons, beneficence, non-maleficence, and justice. All respondents were given clear information and signed informed consent. Respondent identity confidentiality was maintained, and the intervention provided posed no risk to the participants.

RESULTS AND DISCUSSION

A total of 43 respondents receiving treatment at the internal medicine outpatient clinic of Bekasi Regency General Hospital participated in this study. All respondents received foot massage intervention, and peripheral sensitivity was assessed before and after the intervention using the Ipswich Touch Test.

Respondent Characteristics

Table 1. Respondent Characteristics

Characteristic	Frequency	Percentage
Age	20	46,5%
40 – 59 Year Old	23	53,5%
≥ 60 Year Old		

	Total	43	100.0%
Gender		20	46,5%
Male		23	53,5%
Female			
	Total	43	100.0%
History of Type 2 Diabetes Mellitus			
5 -9 Years		16	37,2%
≥ 10 Years		27	62,8%
	Total	43	100%

Based on the table above, there is a significant frequency distribution regarding the characteristics of patients with Type 2 Diabetes Mellitus undergoing follow-up at the Internal Medicine Clinic of RSUD Bekasi Regency. Of the 43 respondents, 20 (46.5%) were in the 40–59 age range, and 23 (53.5%) were aged over 60 years.

In terms of gender category, it was noted that female respondents predominated significantly, accounting for 23 respondents (53.5%) of the total. In contrast, the number of male patients involved in this observation was 20 respondents (46.5%).

Regarding the category of Type 2 Diabetes Mellitus history, it was recorded that respondents with a disease duration of more than 10 years predominated significantly, with 27 respondents (62.8%) of the total sample. Conversely, those with a disease history of 5–9 years numbered 16 respondents (37.2%).

Based on an in-depth analysis of these characteristics, it can be concluded that the majority of the Type 2 Diabetes Mellitus patient population at RSUD Bekasi Regency are females aged over 60 years with a disease history exceeding 10 years.

Frequency Distribution of Peripheral Sensitivity

Table 2. Frequency Distribution of Peripheral Sensitivity Before and After Foot Massage Using Ipswich Touch Test

Peripheral Sensitivity	Frequency	Percentage
Before Foot Massage		
Normal (Sensation in 5–6 toes)	13	30,2%
Abnormal (Sensation in 1–4 toes or none)	30	69,8%
Total	43	100%
After Foot Massage		
Normal (Sensation in 5–6 toes)	29	67,4%
Abnormal (Sensation in 1–4 toes or none)	14	23,6%
Total	43	100%

Based on the table above, there is a significant change in the frequency distribution of peripheral sensitivity after the administration of foot massage using the Ipswich Touch Test among Type 2 Diabetes Mellitus patients at the Internal Medicine Clinic of RSUD Bekasi Regency in 2025. Of the 43 respondents prior to the foot massage, the majority fell into the abnormal category, totaling 30

respondents (69.8%), while 13 respondents (30.2%) were in the normal category.

After the foot massage therapy was administered, there was an increase in peripheral sensitivity within the normal category to 29 respondents (67.4%), while the abnormal category decreased to 14 respondents (23.6%).

Bivariate Analysis

Table 3. The Influence of Foot Massage on Peripheral Sensitivity in Type 2 Diabetes Mellitus Patients

Variable	Category	Frequency		Negative Rank	N Positif Rank	(Ties)	Mean	P-Value
		Pre	Post					
Peripheral Sensitivity	Normal (Sensation in 5–6 toes)	13	29	6	22	15	14,50	0.002

Level (IpTT)	Abnormal (Sensation in 1-4 toes or none)	30	14
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The Wilcoxon Signed Ranks Test results showed a p-value of 0.002 ($0.002 < 0.05$). This indicates that H_a is accepted and H_o is rejected, concluding that there is a significant influence of foot massage on peripheral sensitivity.

Discussion

Type 2 Diabetes Mellitus is a chronic metabolic disease that frequently leads to various complications, one of which is peripheral neuropathy, characterized by a decrease in sensitivity in the lower extremities. This decline in peripheral sensitivity increases the risk of diabetic foot ulcers, which can impact the patient's quality of life. Therefore, effective prevention and management efforts are required, such as non-pharmacological nursing interventions like foot massage. This discussion aims to interpret the research findings regarding the effect of foot massage on peripheral sensitivity in Type 2 Diabetes Mellitus patients at RSUD Bekasi Regency in 2025 using the Ipswich Touch Test, through an analysis of sensitivity conditions before and after the intervention.

Based on the research results, there were 'negative ranks' for 6 respondents, indicating that some participants experienced a decrease in peripheral sensitivity following the foot massage intervention. Statistically, a negative rank describes a condition where the post-test scores are lower than the pre-test scores, signifying a decline in touch perception during the Ipswich Touch Test. This phenomenon suggests that although foot massage generally has a significant effect on peripheral sensitivity, the individual responses are not always homogeneous.

The decrease in peripheral sensitivity after foot massage can be explained by long-standing and progressive diabetic peripheral neuropathy. According to the American Diabetes Association (2024), peripheral neuropathy in patients with type 2 diabetes mellitus is a chronic complication resulting from long-term hyperglycemia that causes structural damage to nerve axons and myelin. In this condition, peripheral nerves experience a reduced ability to conduct sensory impulses, so mechanical stimuli such as massage no longer provide optimal

therapeutic effects. In advanced neuropathy, additional stimulation may even elicit unstable or diminished sensory responses.

Furthermore, research by McKechnie et al. (2020) states that the effectiveness of touch therapies, such as massage, is highly influenced by the degree of nerve damage and individual sensory adaptation responses. In nerves that have undergone degeneration, mechanical stimulation can trigger sensory receptor fatigue or changes in the stimulus threshold, causing post-intervention sensitivity results to appear lower than pre-intervention levels. This supports the finding of negative ranks among some respondents in this study.

Similar findings were also reported by Putri and Handayani (2022), who found that not all type 2 diabetes mellitus patients showed an increase in sensitivity after foot massage. Some respondents with a history of diabetes exceeding 10 years actually showed stagnant or declining results, which is attributed to irreversible chronic diabetic neuropathy. This condition confirms that foot massage is more effective in patients with mild to moderate nerve impairment compared to those with severe nerve damage.

Another factor contributing to the negative ranks is the technique and intensity of the massage. Smeltzer and Bare (2021) explain that massage pressure not tailored to the patient's sensory condition can cause tissue irritation or protective nerve responses, particularly in patients with already diminished sensitivity. This can lead to post-intervention results indicating a reduced ability to feel touch.

Thus, the presence of negative ranks in this study is a clinically and scientifically acceptable finding. It demonstrates that the effectiveness of foot massage is heavily influenced by the neuropathic condition, disease duration, and individual patient characteristics. This finding reinforces the importance of an initial sensitivity assessment and disease history review before providing foot massage interventions to type 2 diabetes mellitus patients.

In addition to the decrease in peripheral sensitivity, the results showed 15 respondents with constant values (ties), referring to those who

experienced no change in sensitivity before and after the foot massage. This condition can also be linked to the duration of the respondents' diabetes mellitus history. According to the American Diabetes Association (2024), peripheral nerves in chronic conditions experience structural damage that hinders impulse conduction, rendering mechanical stimuli less effective. In advanced neuropathy, additional stimulation may even elicit unstable or diminished sensory responses.

This is consistent with research by Suryani et al. (2021), stating that DM patients with a disease duration of more than 10 years show lower responses to peripheral stimulation interventions compared to those with shorter durations. Therefore, the lack of change in sensitivity among some respondents is likely influenced by established chronic diabetic neuropathy. The absence of change or even the decrease in sensitivity can be caused by several factors, including advanced age, poor glycemic control, and the severity of neuropathy.

According to Smeltzer & Bare (2021), advanced peripheral neuropathy is characterized by minimal response to external stimulation due to axonal and myelin damage. Research by Rahmawati et al. (2024) also mentions that non-pharmacological interventions like foot massage require adequate duration and frequency to provide optimal effects; thus, short-term interventions may not yet show significant changes in some patients. Thus, the lack of change in sensitivity after foot massage is a clinically acceptable condition influenced by respondent characteristics.

This study also observed 'positive ranks' in 22 respondents, indicating an increase in the number of participants with normal sensitivity after the foot massage. This suggests that foot massage functions not only as a rehabilitative therapy but also as a preventive measure to maintain peripheral nerve function. According to the International Diabetes Federation (2023), foot care interventions involving sensory stimulation can help maintain peripheral nerve integrity and prevent the progression of diabetic neuropathy. Research by Wahyuni et al. (2023) found that type 2 DM patients with good initial sensitivity still showed improvements in touch perception after foot massage, indicating enhanced perfusion and neuromuscular function.

This reinforces the premise that foot massage is beneficial not only for patients with sensitivity

impairments but also for those whose sensory conditions remain relatively good.

Conflict of Interest

The authors declare no conflict of interest.

Availability of data and materials

Research data is available from the primary author upon reasonable request.

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