Indonesian Journal of Global Health Research
Volume 7 Number 1, February 2025
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

THE EFFECT OF DIABETIC FOOT SPA ON NEUROPATHY IN TYPE 2 DIABETES MELLITUS PATIENTS

Rizkan Halalan Djafar*, Nurain Harun, Silvia Dewi Mayasari Riu
Universitas Muhammadiyah Manado, Jl. Raya Pandu, Kel. Link III, District. Bunaken, Manado City, North Sulawesi, Indonesia
*ns.rizkandjafar@gmail.com

ABSTRACT
Type 2 diabetes mellitus can cause various complications in sufferers, both acute and chronic. One of the most common chronic complications is peripheral vascular disease and diabetic neuropathy. Diabetic neuropathy is the main complication of diabetes mellitus. When someone already has diabetes mellitus, the thing that can be done is to prevent complications of diabetic neuropathy by improving blood circulation in the feet. This study aims to determine the effect of Foot SPA Diabetic on neuropathy in patients with type 2 diabetes mellitus. This study is a quasi-experimental study with a one group pre-test-post-test approach. This study was conducted once a week for 4 weeks. The sample in this study was 16 respondents using the Purposive sampling technique. The research instruments used were Monofilament tests and observation sheets.The results of the analysis using the Wilcoxon test obtained a significant difference in the sensitivity values of the right and left feet before and after the Diabetic Foot SPA intervention, namely p value = 0.000 (p value <0.05), with an average pre-test value of the right foot 1.88 to 2.81. while the average pre-test value of the left foot 1.69 to 2.81 after the Diabetic Foot SPA intervention. The conclusion of this study concluded that Diabetic Foot Spa which is done for 30 minutes once a week for 4 weeks will increase foot sensitivity in patients with diabetes mellitus.

Keywords: diabetic foot spa; dm type 2; neuropathy

How to cite (in APA style)
Djafar, R. H., Harun, N., & Riu, S. D. M. (2024). The Effect of Diabetic Foot Spa on Neuropathy in Type 2 Diabetes Mellitus Patients. Indonesian Journal of Global Health Research, 7(1), 495-502. https://doi.org/10.37287/ijghr.v7i1.4272.

INTRODUCTION

Diabetes mellitus is one of the chronic diseases that occurs throughout the world, and continues to experience a significant increase in numbers from year to year. Increased blood sugar levels and metabolic disorders are signs of diabetes mellitus (WHO, 2020). Type 2 diabetes mellitus is a chronic disease in the form of a metabolic disorder characterized by hyperglycemia that occurs due to decreased insulin secretion by pancreatic beta cells or impaired insulin function (Suryati, 2021). Clinical diabetes mellitus is a condition of metabolic disorder with an abnormal increase in blood sugar levels due to lack of insulin secretion or decreased insulin effectiveness or both (M. Clevo Rendy Margareth, 2019).Diabetes mellitus occurs due to the effects of the body being unable to produce enough insulin or being unable to use insulin effectively. Insufficient insulin production in the body causes disruption of the glucose mechanism characterized by hyperglycemia. Continuous hyperglycemia is associated with long-term damage or dysfunction of organs such as the eyes, heart, kidneys, blood vessels and nerves (Wertiningtyas, 2020).

According to the International Diabetes Federation (IDF 2021), the global prevalence of diabetes mellitus reached around 537 million people with diabetes mellitus in 2021 and is predicted to continue to increase to reach 643 million people in 2030, and 784 million people in 2045. The number of deaths due to diabetes throughout this year is estimated to reach 6.7

million cases or 1 incident per 5 seconds. IDF findings also state that 1 in 10 adults in the world suffer from diabetes. In addition, 1 in every 2 adults suffer from this disease without being diagnosed. (International Diabetes Federation, 2021). The International Diabetes Federation (IDF 2021) states that around 19.46 million people in Indonesia suffer from diabetes. This figure makes Indonesia the country with the fifth largest number of diabetes sufferers in the world (after China, India, Pakistan, and the United States). In fact, Indonesia is the only one in Southeast Asia that is included in the top 10 countries with the most cases. The number of diabetes sufferers in Indonesia continues to increase and is estimated to reach 23.32 million people in 2030. North Sulawesi Province is one of the provinces with a fairly high number of Diabetes Mellitus cases. The incidence of Diabetes Mellitus obtained from the Manado City Central Statistics Agency, found that the number of Diabetes Mellitus cases in 2020 was 6,804 cases (Manado City Central Statistics Agency, 2020).

The cause of type 2 diabetes mellitus is not yet known for sure, but genetic factors are thought to play a role in insulin resistance. Obesity, lack of activity, medical conditions, medications, and aging can all increase resistance. Type 2 diabetes mellitus can cause various complications in sufferers, both acute and chronic. One of the most common chronic complications is peripheral vascular disease and sensory and motor diabetic neuropathy (Lemone & Burke, 2022). Diabetic neuropathy is one of the main complications of diabetes mellitus, where nerve damage in DM patients most often occurs in the distal parts of the body and is a cause of significant morbidity and increased mortality (Giurini, 2018; Pamungkas & Usman, 2021). The cause of diabetic neuropathy is not yet known for certain, however, uncontrolled blood sugar triggers nerve damage. High blood sugar also weakens the walls of small blood vessels that supply oxygen and nutrients to the nerves Balgis et al., (2022). The main symptoms of diabetic neuropathy vary, including numbness, tingling, and pain starting from the distal extremities which can cause patients to fall frequently, get injured, have limited mobility, and decrease their quality of life.

Diabetic neuropathy is one of the most common microvascular complications in DM patients Neuropathy refers to a group of diseases that attack various types of nerves, including sensory, motor, and autonomic nerves that often occur in the peripheral parts of the body or are known as Diabetic Peripheral Neuropathy (DPN) (Tofure et al., 2021). Diabetic neuropathy increases the risk of ulceration and ulcers in the lower extremities which can ultimately lead to amputation. This condition can cause a decrease in the patient's quality of life, both economically and socially (Sri Rahmi et al., 2020).A study conducted by the Indonesian Ministry of Health (Kemenkes, 2020) showed that around 58.0% of diabetes mellitus patients in Indonesia experience diabetic neuropathy, with around 17.3% of them experiencing severe neuropathy. Therefore, every diabetic patient should have a thorough foot examination at least once a year including inspection, palpation of arterial pulsations, and examination of sensory neuropathy (PERKENI, 2021). Assessment and management of the severity of diabetic neuropathy are very important in efforts to prevent complications. Studies show that the prevalence of diabetic neuropathy is around 8% in newly diagnosed diabetes mellitus patients and is higher in patients who have had diabetes mellitus for a long time, namely 50%. Most diabetic neuropathy occurs within 6 years of being diagnosed with diabetes mellitus (ADA, 2020).

When someone already has diabetes mellitus, what can be done is to prevent complications of peripheral vascular disease and diabetic neuropathy by improving blood circulation in the feet. In diabetic patients, decreased peripheral blood circulation is caused by insulin

insufficiency, resulting in disorders in the form of sorbitol accumulation in the intima of blood vessels, hyperlipoproteinemia, and blood clotting disorders. Ultimately, disorders of peripheral blood circulation will cause complications of peripheral vascular disease and diabetic neuropathy. If this is not prevented, gangrene will occur which can lead to amputation (Black & Hawks, 2009; Djafar et al., 2019).

Management of Diabetes Mellitus consists of pharmacological therapy such as oral antidiabetic drugs and insulin injections. Second, non-pharmacological therapy such as a healthy lifestyle by regulating diet known as medical nutrition therapy, increasing physical activity, and proper care. One of the recommended treatments is foot exercise and diabetic foot SPA (Angraini Simamora et al., 2020). Diabetic foot spa is a series of foot treatments whose activities include foot exercises, cleaning with warm water and massage ((Purwanto, 2016). The mechanism of foot spa includes effective foot exercises on the level of foot sensitivity. The stimulation given from the reflexology foot exercise massage session will relax and improve blood circulation. Smooth blood circulation allows the blood to channel more oxygen and nutrients to the body's cells, while carrying more toxins to be removed. So that smooth blood flow will increase the sensation of protection on the skin. During the skin cleansing activity, the client's feet are soaked in warm water.

From the results of a study conducted by Ariyani et al., 2023, regarding the effect of foot care with foot exercises on the risk of diabetic foot ulcers in patients with type 2 diabetes mellitus, the results showed that there was a difference in the effect of reducing the risk of diabetic ulcers in patients with diabetes mellitus before and after being given foot care. This study aims to determine the effect of Diabetic Foot SPA on neuropathy in patients with type 2 diabetes mellitus.

METHOD

This study is a quasi-experimental study, namely to determine the Effect of Diabetic Foot Spa on Neuropathy in Type 2 Diabetes Mellitus patients. This study uses a one group pre-test-post-test approach, where the sample of this study measured the incidence of nerve disease in diabetic patients using a monofilament test and recorded on the observation sheet before being given treatment (pretest) and after being given treatment (post-test) sample Watch again. The population in this study were patients with type 2 diabetes mellitus with a total of 16 samples. The Diabetic Foot Spa intervention in this study was carried out once a week for 4 weeks starting on July 20 - August 20, 2024.

The data collection process in this study was carried out by researchers looking for respondents who met the criteria in the study, after getting a response that met the criteria, the researcher explained the intent and purpose of the study, after explaining the intent and purpose of the study, the researcher asked for approval and discussed the time contract by responding, after responding stating that they were ready to take part in the study, the researcher asked for a signature as Informed Concent. The study was conducted from house to house, before conducting the researcher first explained the standard operating procedure for Diabetic Foot SPA to the respondents, after that the respondents would be measured for nerve disease using the Monofilament test and recorded on the observation sheet as an initial test, before conducting the measurement for nerve disease, the researcher also explained the standard operating procedure for measuring the monofilament test on the respondents. After that, an examination was carried out using the monofilament test, the respondents were given treatment, namely Diabetic Foot SPA, after which the Respondent's Foot SPA with diabetes was re-observed using the observation sheet.

RESULTS

The results of the study using the Wilcoxon test showed that the results of the pre-test obtained a Mean value or average value of the right foot of 1.88, a standard deviation of 0.500 with a minimum value of 1 and a maximum value of 3. For the post-test results on the right foot obtained an average value of 2.81, a standard deviation of 0.403 with a minimum value of 1 and a maximum value of 3. While the pre-test results on the Left Foot obtained a Mean value or average value of 1.69, a standard deviation of 0.479 with a minimum value of 1 and a maximum value of 2. For the post-test results on the left foot, the average value was 2.81, standard deviation 0.403 with a minimum value of 1 and a maximum value of 3. The results of the statistical test using the Wilcoxon Test obtained a p value = 0.000 (p value <0.05), so it was concluded that Ha was accepted and H0 was rejected, which means that there is an effect of Diabetic Foot SPA on Neuropathy in Type 2 Diabetes Mellitus Patients in the Bailang Health Center Work Area.This is in line with research conducted by Mona Hastuti and Rinawati Tarigan (2020) entitled "Effectiveness of Foot Spa Therapy in Reducing Diabetic Neuropathy Complaints in Diabetes Mellitus Patients". The results of the analysis using the independent sample t-test obtained a p value (0.000) <0.05, meaning that there is a significant difference in the pretest and pretest diabetic neuropathy sensation scores in the intervention group. The average value of the posttest sensation was 16.36 in the intervention group, while in the control group it was 13.64. This means that in substance it can be said that the group that received Diabetic Foot SPA had better sensation.

DISCUSSION

This study used the Wilcoxon test. After processing the data, the researcher obtained the results of the statistical test regarding the effect of Diabetic Foot SPA on neuropathy in patients with type 2 Diabetes Mellitus in the work area of the Bailang Manado Health Center, there was a difference before and after being given Diabetic Foot SPA with a p value = 0.000 so it was concluded that there was an effect of Diabetic Foot SPA on neuropathy in patients with type 2 Diabetes Mellitus in the work area of the Bailang Manado Health Center. This Diabetic Foot SPA can be used as a foot treatment which includes a series of foot exercise activities, cleaning, and soaking in warm water which usually uses a special salt mixture for foot spa and massage. In addition to being able to smooth blood flow which aims to reduce foot pain, DM sufferers can also feel relaxed. Soaking feet in warm water can cause blood vasodilation and widen the lumen of the arteries, thereby reducing blood flow resistance, so that blood flow becomes smoother (Aisyah, 2020). Foot care is a primary prevention effort that can be done by people with diabetes mellitus. The purpose of this foot care is to prevent complications in the feet of people with diabetes mellitus. Foot care Regular foot massage can reduce the incidence of diabetic feet by 50-60% and to improve foot care vascularization (Baiq Ruli Fatmawati et al., 2020).

Diabetic Foot SPA has better benefits for increasing foot sensitivity in people with diabetes mellitus. The stimulation given during foot massage provides a relaxing effect and smooths blood circulation which causes the blood to channel more oxygen and nutrients to the body's cells so that the sensation of protection on the skin will increase. Foot spa is a foot treatment that can affect circulation from the periphery with a series of gymnastics activities, cleaning the feet, and massage. In addition to smoothing blood flow, foot spa also makes patients feel comfortable and relaxed (Rinawati, 2020). This is also supported by the statement (Djafar et al., 2019) that diabetic foot spa can improve peripheral blood circulation because diabetic foot spa consists of various activities, namely diabetic foot exercises, soaking in warm water and skin cleansing, namely cleaning the feet using baby soap or high pH soap that is soft and light, pedicure, namely cutting and filing nails if the respondent has medium-long nails, and finally

foot massage, namely superficial massage on the feet to improve blood circulation, the more often diabetic foot spa is done, the smoother the peripheral blood circulation will be, so that it can prevent complications from diabetes mellitus.

Based on research from (Mu et al., 2024) that Diabetic Foot SPA plays a role in increasing foot sensitivity in people with diabetes mellitus. This therapy can be recommended for non-pharmacological treatment of foot sensitivity in patients with foot protection activities that combine three interventions, namely foot care, foot exercises and foot massage will increase foot sensitivity because there is an improvement in blood perfusion in the feet so that it can reduce the risk of neuropathy and can prevent complications that result in diabetic ulcers or amputation. Foot exercise in the Diabetic Foot SPA series is one of the 4 pillars of diabetes mellitus management, namely physical exercise. The movements in foot exercises can increase glucose utilization in muscles, many cell capillaries are open so that insulin receptors become more active, this can affect controlled blood glucose levels (Angraini Simamora et al., 2020). . Foot exercise movements also include leg stretching. Stretching the feet is considered effective in improving blood circulation to the feet, increasing insulin action, reducing the risk of arteriosclerosis, and can increase blood flow to the lower extremities and play a role in increasing systolic pressure in the feet (Rasyid et al., 2019)

Soaking feet in warm water for 5-10 minutes aims to soften dead skin cells or dirt that is difficult to reach with a brush or cleaning tool. The activity of soaking feet in warm water can also improve blood circulation, relieve aches, cramps and tingling, soaking in warm water can also increase foot sensitivity, This is in line with research conducted by (Djafar et al., 2019) that in the SPA therapy procedure carried out by combining foot exercises, soaking in warm water with a foot temperature of 37 C for 5-10 minutes can cause blood vasodilation and can widen the lumen of the arteries thereby reducing blood flow resistance which will increase blood flow so that foot sensitivity improves. In the third stage of foot spa, namely massage, there are certain points that are related to the pancreas to stimulate insulin production. The massage area on the left side of the foot can stimulate the pancreas to produce insulin. Foot massage is also very popular because in addition to being useful for improving blood circulation, it also provides a relaxing effect (Shourabi P, et al 2020). According to (Indrayanti and Diani., 2023) Massage on the left sole of the foot can stimulate the pancreas to produce insulin. This is reinforced by (Wicaksono, 2012; Djafar et al., 2019) that the pancreatic nerve points are related to the insulin hormone which affects blood sugar levels (glucose) in the body. If the reflex points on the feet, especially the pancreas points, are pressured, the receptor nerves will work and stimulation will occur.

Based on the description and facts of the theory, the researcher assumes that by providing this Diabetic Foot SPA, it can have a significant effect on neuropathy in Type 2 Diabetes Mellitus patients. Foot SPA can repair the nerves in the feet which aims to smooth blood flow to the periphery so that there is no blockage in the nerves in the feet which can cause foot sensitivity problems. By providing this Diabetic Foot SPA, it can increase foot sensitivity because there is an improvement in blood perfusion in the feet.

CONCLUSION

From the results of observations and interventions given by researchers showed that respondents had changes in foot sensitivity so that it can be concluded that foot spa done for 30 minutes once a week for 4 weeks will increase foot sensitivity in patients with diabetes mellitus, this is evident from before the diabetic foot SPA was performed in the first week of observation, the average sensitivity value of the right foot was 1.88 and the left foot was 1.69

after being given diabetic foot SPA in the 4th week, observations were made again, the average value of the right foot was from 1.88 to 2.81, while the left foot was from 1.69 to 2.81. This is also evidenced by the results of the statistical test analysis obtained p value = 0.000 (p value <0.05), so it is concluded that there is an effect of Diabetic Foot SPA on Neuropathy in Type 2 Diabetes Mellitus Patients in the Bailang Manado Health Center Work Area.

REFERENCES

ADA (American Diabetes Association). (2020). Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes-2020. Diabetes Care, 43(January), S14–S31. https://doi.org/10.2337/dc20-S002.

Angraini Simamora, F., Royani Siregar, H., Hidayah, A (2020). Health, F., & Aufa Royhani Padangsidimpuan City, U. (n.d.). The Effect of Diabetic Foot Exercise on Reducing Neuropathy in Patients with Type 2 Diabetes Mellitus.

Ariyani, I., Widiyanto, B., Pascasarjana, P., MST Nursing, F., Kemenkes Semarang, P., & Author, C. (2023). The Effect of Foot Care with Foot Exercise on the Risk of Foot Ulcers.

Aisyah, N, A, I. (2020). Diabetic Foot SPA for Neuropathy Complications. Makassar: Malahayati Nursing Journal. Volume 2 Number 1. Pages 180 – 187

Baiq Ruli Fatmawati, Marthilda Suprayitna, Kurnia Prihatin, Zuliardi, Zaenal Arifin, & Zuhratul Hajri. (2020). Foot and Ankle Exercises Care Education for the Prevention of Diabetic Foot Complications in Patients with Diabetes Mellitus. Journal of Character Education Society, 3(3), 727–735.

Balgis, Sumardiyono, & Indraswari Kirana Suri. (2022). Diabetic Neuropathy: Contribution of Individual Characteristics, Duration of Illness, Smoking, and Hyperglycemia. Indonesian Public Health Journal, 7(2), 1–5.

Central Statistics Agency of Manado City. (2020). Official statistical news. https://manadokota.bps.go.id/. (Accessed on May 18, 2024).

Djafar, R. H., Nur, B. M., & Azzam, R. (2019). Effectiveness of Diabetic Foot Spa on Ankle Brachial Index Values in Type II Diabetes Mellitus Patients. Silampari Nursing Journal, 3(1), 312–321. https://doi.org/10.31539/jks.v3i1.821

Hastuti, M., & Tarigan, R. (2020). Effectiveness of Foot Spa Therapy in Reducing Diabetic Neuropathy Complaints in Diabetes Mellitus Patients. Maternity and Midwifery Journal, 5(2).

Indrayanti, and Noor Diani. (2023). Study, P., Nursing, I., Medicine, F., Mangkurat, L., Yani, J. A., & 36 Banjarbaru, K. M. (n.d.). Effectiveness of Foot Spa on Reducing Glucose and Reducing Neuropathy Symptoms in Mrs. F with Type 2 Diabetes Mellitus.

International Diabetes Federation. (2021). Diabetes Atlas Eighth edition (Eighth edition). International Diabetes Federation. https://doi.org/http://dx.doi. org/10.1016/S0140-6736(16)31679- 8. (Accessed May 16, 2024).

Ministry of Health of the Republic of Indonesia. Infodatin 2020 Diabetes Melitus Data and Information Center of the Ministry of Health of the Republic of Indonesia. Jakarta: Ministry of Health of the Republic of Indonesia; 2020.

Lemone, P., Burke, K. M., & Bauldoff, G. (2020). Medical surgical nursing textbook (5th ed.). Jakarta: EGC.

Mu, A., Mufida, N. (2024) Nursing Profession Study of STIKes Medika Nurul Islam, P., & Nursing Science Study of STIKes Medika Nurul Islam. The Effect of Diabetic Foot Spa on Foot Sensitivity in Diabetes Mellitus Patients in the Bandar Baru Health Center Work Area, Pidie Jaya Regency. In Assyifa' Journal of Health Sciences (Vol. 9, Issue 1).

M.Clevo Rendy Margaret. (2019). Medical Surgical and Internal Medicine Nursing Care. Yogyakarta: Nuha Medika.

Pamungkas, Adi. R.P.H & Usman, M.A. (2021). Practical Guide to Diabetes and Neuropathy Risk Screening, Bondowoso: CV KHD Production.

Purwanto, B. (2016). Diabetic Foot Spa (Aesthetic Services for the Feet of Diabetes Patients) (2nd Edition). Yogyakarta: Gava Medika.

PERKENI. (2021). Guidelines for the Management and Prevention of Type 2 Diabetes Mellitus in Adults in Indonesia (1st ed.). PB. PERKENI. https://pbperkeni.or.id/unduhan accessed on May 21, 2024

Rinawati, T, H, M. (2020). Effectiveness of Foot SPA Therapy in Reducing Diabetic Neuropathy Complaints in Diabetes Mellitus Patients. Medan: Journal of Maternity and Midwifery. Volume 5 Number 2. Pages 11 – 20

Rasyid, A. N., Yulanda, N. A., Fauzan, S., & Nursing, P. (n.d.). Foot Care On Changes In Foot Sensitivity Test In Type 2 Diabetic Patients In Southern Pontianak Public Health Center.

Shourabi, P., Bagheri, R., Ashtary-Larky, D., Wong, A., Motevalli, M. S., Hedayati, A., ... & Rashidlamir, A. (2020). Effects of Hydrotherapy with Massage on Serum Nerve Growth Factor Concentration and Balance in Middle-Aged Diabetic Neuropathy Patients. Complementary therapies in clinical practice, 39, 101141. https://doi.org/10.1016/j.ctcp.2020.101141

Suryati, I. (2021). Effective nursing practice book for diabetes mellitus patients based on research results (1st ed.). Deepublish.

Sri Rahmi, A., Syafrita, Y., & Susanti, R. (2020). The Relationship Between Duration of Type 2 DM and the Incidence of Diabetic Neuropathy.

Tofure, I. R., Huwae, L. B., & Astuty, E. (2021). Characteristics of Patients with Diabetic Peripheral Neuropathy at the Neurology Polyclinic of Dr. M. Haulussy Ambon Hospital in 2016-2019. Molucca Medica, 97-108. https://ojs3.unpatti.ac.id/index.php/moluccamedica/article/view/4380. accessed on April 10, 2023.

Wertiningtyas, P. W. D. (2020). Family Support for the Quality of Life of Diabetic Ulcer Patients in Semarang City. Muhammadiyah University of Semarang. Retrieved from http://repository.unimus.ac.id/4532/5.