UNIVERSITAS NAHDLATUL ULAMA SURABAYA
LEMBAGA PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT
Kampus A Wonokromo : Jl. SMEA No.57 Tlp. 031-8291920, 8284508 Fax. 031-8298582 – Surabaya 60243
Kampus B RSIJemursari : Jl. Jemursari NO.51-57 Tlp. 031-8479070 Fax. 031-8433670 – Surabaya 60237
Website : unusa.ac.id Email: info@unusa.ac.id

SURAT KETERANGAN

Nomor: 139-UNUSA-LPPM/Adm-I/II/2024

Lembaga Penelitian dan Pengabdin Kepada Masyarakat (LPPM) Universitas Nahdlatul Ulama Surabaya menerangkan telah selesai melakukan pemeriksaan duplikasi dengan membandingkan artikel-artikel lain menggunakan perangkat lunak **Turnitin** pada tanggal 05 Februari 2024

Judul	: Diabetic foot spa, bueger's allen exercise and music therapy on foot sensitivity, the ankle brachial index and sleep quality for diabetes mellitus in Indonesia
Penulis	: Erika Martining Wardani, Riezky Faisal Nugroho, Eppy Setiyowati, Nur Ainiyah, Difran Nobel Bistara, Siti Nur Hasina
No. Pemeriksaan	: 2024.02.06.078

Dengan Hasil sebagai Berikut:

Tingkat Kesamaan diseluruh artikel (*Similarity Index*) yaitu 21%

Demikian surat keterangan ini dibuat untuk digunakan sebagaimana mestinya.

Surabaya, 6 Februari 2024

Ketua LPPM

Achmad Syafiuddin, Ph.D
NPP: 20071300

Diabetic foot spa, bueger’s allen exercise and music therapy on foot sensitivity, the ankle brachial index and sleep quality for diabetes mellitus in Indonesia

by Erika Martining Wardani

Submission date: 05-Feb-2024 12:05PM (UTC+0700)
Submission ID: 2286642240
File name: l_index_and_sleep_quality_for_diabetes_mellitus_in_Indonesia.pdf (461.82K)
Word count: 6264
Character count: 33087

Original article

Diabetic foot spa, bueger's allen exercise and music therapy on foot sensitivity, the ankle brachial index and sleep quality for diabetes mellitus in Indonesia

Erika Martining Wardani[1], Riezky Faisal Nugroho[2], Eppy Setiyowati[3], Nur Ainiyah[4], Difran Nobel Bistara[5], Siti Nur Hasina[6]

Abstract:

Background **:** One of metabolic disease disorders is Diabetes Mellitus (DM) with signs of hyperglycemia due to impaired insulin secretion and/or cellular insulin resistance. Diabetic ulcers are a complication of DM on the skin, beginning with a feeling of numbness and tingling. Symptoms or signs and symptoms of DM cause symptoms that occur because these clinical symptoms are often on a daily basis so that this can interfere with sleep. ***Objective*** **:** analyzed the effect of diabetic foot spa, bueger's allen exercise and music therapy on foot sensitivity, ankle brachial index and sleep quality. ***Methods*** **:** This study with *quasy experiment* pre-post control group design. The population in were DM type 2 with sample 150 respondents, who were divided to intervention and control group. Collecting data using the observation sheet for diabetic foot SPA; The tools used were hammer reflex and cotton swabs to assess foot sensitivity, sphygmomanometer to measure abi and PQSI questionnaire. Data were analyzed by wilcoxon and t test. ***Results :*** The test results showed that foot sensitivity with p value = 0.000 (p>0.05), ankle brachial index with p-value = 0.001 (p>0.05) and sleep quality with p value = 0.000 (p>0.05). ***Conclusion :*** Implementation of diabetic foot spa, bueger's allen exercises and music therapy are effective to increase foot sensitivity, ankle brachial index and sleep quality in patients with diabetes mellitus type 2.

Keywords : diabetic foot spa; bueger's allen exercise; music therapy; foot sensitivity; ankle brachial index

Bangladesh Journal of Medical Science Vol. 22 No. 03 July'23 Page : 536-544
DOI: https://doi.org/10.3329/bjms.v22i3.65317

Introduction:

Diabetes (DM) is one of the most common metabolic disorders in the world. Urbanization has brought about dramatic lifestyle changes, especially in developing countries. With this rapid transition, risk factors for non-communicable diseases such as DM increase. DM people rarely do leg exercises because they have a job, are not accustomed to sports, or are inadequate. DM patients should always be careful to keep their feet clean and exercise well,

1. Erika Martining Wardani, Department of Nursing, Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, East Java, Indonesia
2. Riezky Faisal Nugroho, Department of Nutrition, Politeknik Kesehatan Kemenkes Surabaya, Surabaya, East Java Indonesia
3. Eppy Setiyowati, Department of Nursing, Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, East Java, Indonesia
4. Nur Ainiyah, Department of Nursing, Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, East Java, Indonesia
5. Difran Nobel Bistara, Department of Nursing, Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, East Java, Indonesia
6. Siti Nur Hasina, Department of Nursing, Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, East Java, Indonesia

Correspondence: Erika Martining Wardani, Departemen of Nursing, Faculty of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, East Java, Indonesia. *e-mail : erika@unusa.ac.id*

even if there are no complications yet. Without treatment or treatment such as foot movement, one day a circulatory disorder may occur, causing blood and nerve damage to the patient's foot, reducing sensitivity to pain and making it more likely to be injured unknowingly. [1,2,3] Type 2 diabetes causes a variety of complications in people affected both acutely and chronically. The chronic complications that occur are peripheral vascular disease and sensory and motor neuropathy. These complications occur in almost 60% of patients. [4]

The 8th edition of the 2019 Diabetes Atlas by the IDF (International Diabetes Federation) found that 425 million or about (8.8%) people between the ages of 20 and 79 are DM patients worldwide. IDF states that the number of DM patients in Indonesia was 10.3 million in 2017 and is estimated to increase to 16.7 million in 2045. According to WHO 2018, 1.6 million people (4%) worldwide have died from DM. East Java ranks 10th in Indonesia with the highest number of diabetics. The prevalence of diabetics in East Java increased from 1.8% in 2007 to 2.8% in 2013. Bondowoso's public health results in 69,335 visits to diabetics in 2018. [5,6,7]

High blood sugar levels and last a long time will trigger complications and other metabolic disorders. Patients with type 2 DM experience clinical and psychological symptoms that result in sleep disturbances. The cronic symptoms can be in the form of itching on the skin, polyuria, polyphagia and polydipsia, while psychological symptoms include stress, emotional and cognitive disorders. [8,9,10,11] The occurrence of sleep disturbances will have an impact on increasing the frequency of awakening and difficulty falling back asleep. This sleep dissatisfaction ultimately results in a decrease in sleep quality. Decreased sleep quality can cause endocrine and metabolic disorders such as impaired glucose tolerance, insulin resistance, and reduced response to insulin. [3,12,13] Non-Rapid Eye Movements (NREM) sleep disturbances during the day can result in a decrease in insulin sensitivity of about 25%.

Non-conventional complementary therapies that can improve public health conditions, including supportive, curative, and rehabilitation efforts with high quality, safety, and effectiveness.[14,15,16] Buerger Allen, foot spa, acupressure and exercise training are complementary treatments. [1,17,18,19] Based on the above background, the researcher is interested in conducting a study with the title "Diabetic foot spa, bueger's allen exercise and music therapy on foot sensitivity, the ankle brachial index and sleep quality for diabetes mellitus in Indonesia".

Material and method:

This study uses a quasi-experimental method with a pre-experimental design using a pre- and post-test design. The study had a population of all type 2 DM patients in the Kotakulon Bondowoso Public Health Center in 2022 totaling 230 people (January-March 2022). The average number of type 2 DM patients per month is 75 people.

This study used a simple random sampling technique. The number obtained in this study was 150 respondents, the criteria for respondents were patients with type 2 diabetes who did not have disorders in the lower extremities. The instrument used to measure foot sensitivity was the hammer reflex and cotton swab, the abi score with a sphygmomanometer and sleep quality using the PQSI questionnaire. Based on the normality test of the data with Shapiro-Wilk, it was found that the p value was 0.000 (<0.005), the data was not normally distributed. The data was transformed and the data was transformed and the p-value was 0.000 (<0.005). Because the data was still not normally distributed, the data analysis used an alternative test, namely Wilcoxon. test.

The study was conducted in accordance with the provisions of ICH Good Clinical Practice (1996), International Ethical Guidelines for Biomedical Research Involving Human Subjects of the Council of the International Organization of Medical Sciences, Rules of ethical principles for scientific medical research with human participation approved by the Declaration of Helsinki (1964-2013) .This research has received ethical approval from the ethics committee of the Faculty of Dental Medicine Universitas Airlangga, no: 412/HRECC.FODM/ VII/2022. Before being included in the research, patients had the opportunity and sufficient time to read all elements of the informed consent to voluntary participation.

Result:

1. Demographic data

Table 1 demographic data respondent of diabetes mellitus type 2 (n=150)

No	Variable	Group	
		Intervention (%)	Control (%)
1.	Gender		
	Male	29 (38.7 %)	28 (37.3 %)

No	Variable	Group	
		Intervention (%)	Control (%)
	Female	46 (61.3 %)	47 (62.7 %)
2.	Age (Years)		
	< 45	8 (10.7 %)	10 (13.3 %)
	45-60	58 (77.3 %)	54 (72.0 %)
	> 60	9 (12.0 %)	11 (14.7 %)
3	Marital status		
	Singel	0	0
	Married	100 (100%)	100 (100%)
4	Time of illness (Years)		
	5-10	27 (36.0%)	54 (72.0%)
	10-15	48 (64.0%)	21 (28.0%)
5	Smoke		
	Yes	57 (76.0%)	28 (37.3%)
	No	18 (24.0 %)	47 (62.7%)

Based on table 1 above, it shows that the majority of DM type 2 patients based on gender of the intervention and control groups are almost the same and most of the respondents are female, which is more than 50%. That the characteristics of respondents with Type II DM in the intervention and control groups based on age showed almost the same distribution. Most are in the range of 45-60 years, marital status are married, time of illnes of responden range 5 until 10 years, and history of smoking 85 (42.5%).

2. Foot sensitivity, the ankle brachial index and sleep quality before and after intervention of diabetic foot spa, bueger's allen exercise and music therapy

Table 2 Foot sensitivity, the ankle brachial index and sleep quality before and after intervention of diabetic foot spa, bueger's allen exercise and music therapy

Variable	Mean	Std. Deviation	Std. Error Mean	p-value
Foot sensitivity				
Pre-test	3.50	0.670	0.217	0.000
Post-test	4.00	0.000	0.000	
Ankle brachial index				
Pre-test	4.43	0.853	0.179	0.001
Post-test	4.97	0.470	0.049	
Sleep quality				
Pre-test	2.50	0.437	0.117	0.000
Post-test	2.70	0.219	0.017	

Based on table 2 above, it can be seen that there is an effect of diabetic foot spa, Bueger's Allen exercise and music therapy. Wilcoxon test results for foot sensitivity obtained p value 0.000 (p <0.05); the ankle brachial index obtained p value 0.001 (p <0.05); sleep quality obtained p value 0.000 (p <0.05), it can be concluded that there is a significant effect on the level of foot sensitivity, ankle brachial index, sleep quality before and after being given diabetic foot spa, Bueger's Allen exercise and music therapy in type 2 DM.

Discussion:

1. Demografic data responden

The average age of respondents in both groups showed an age range of 4560 years. Studies by previous researchers also concluded that DM often occurs in the range of 4550 years. [20] This is a study by Jannoo who reported that there is a significant correlation between age and the development of DM in the 45-year-old age group due to the aging process that causes a decline in physiological function, including a decline in pancreatic function. It matches. Retention of insulin hormones occurs and blood sugar regulation becomes ineffective.[21] Uncontrolled hyperglycemia increases the risk of chronic complications of both large and microvessels, one of which is impaired peripheral tissue perfusion. Looking at the survey results, we know that the average respondent has a DM for 510 years. Diabetics with a history of DM over 5 years are at increased risk of complications, one of which is atherosclerosis. Complications of atherosclerosis occur mainly in the legs (large blood vessels). Atherosclerosis, which is not properly treated, causes occlusion (obstruction) of arteries and / or veins in the legs, resulting in impaired blood flow in the legs. Peripheral circulatory disorders of the legs, DM patients who have been suffering for a long time cause nerve death (neuropathy) in the DM patients' feet, resulting in diminished or lost tactile sensation in the feet. [22, 23] Most diabetics who have diminished or lost foot sensation are unaware that their foot is injured and causes ulcers. Studies by previous researchers have shown that there is a fairly strong relationship between the length of people suffering from DM and the degree of risk of complications from diabetes mellitus. One of the diabetics is a complication in the form of perfusion disorders of the peripheral tissues of the foot, even diabetics are ulcers. [24] The effects confirmed that from one hundred fifty respondents in groups, 85 (42.5%). Research with the aid of using Chang, et al concluded that peripheral perfusion

problems will worsen in DM sufferers who've a protracted records of smoking. [25,26] The longer DM patients are uncovered to cigarettes, the more serious the lower in ABI scores. Toxic materials in cigarettes will reason harm to the endothelium of blood vessels which will increase the hazard of atherosclerosis. [27] Nicotine in tobacco causes an increase in the hormone adrenaline. The hormone adrenaline alters blood fat metabolism and lowers HDL levels. An increase in the hormone adrenaline also causes a decrease in the work of the heart and damage to the blood endothelium, narrowing the coronary arteries of the heart (convulsions). In addition, adrenaline plays an important role in the formation of platelets in the blood, which causes the constriction of both microvessels and large blood vessels. [28] The conclusion that can be drawn is that the toxic substance (nicotine) in cigarettes has an impact on the damage to the walls of blood vessels (endothelium) which can increase the risk of atherosclerosis. Atherosclerosis that occurs facilitates the occurrence of peripheral perfusion disorders in the feet of DM patients, resulting in a decrease in the ABI value and making it easier for the feet to develop diabetic ulcers. [29,30,31]

2. Intervention of diabetic foot spa, bueger's allen exercise and music therapy

a. Diabetic foot spa

Based on Figure 2, it can be seen that the average difference in foot sensitivity between pre and post in both the control group and the treatment group. Based on the paired t test on the feet before and after the control group who did foot exercises, it was found that the p value = 0.00 which was smaller than the value of (0.05), that foot exercise had an effect on foot sensitivity. Foot sensitivity in the treatment group who received diabetic foot SPA, based on the Wilcoxon test, p value = 0.01 was obtained which was smaller than the value of (0.05), then diabetic foot SPA had an effect on foot sensitivity. Decreased foot sensitivity is an indication or symptom of peripheral nerve disorder in DM patients.[32,33] Dysfunction results from cell damage and vascular destruction caused by chronic hyperglycemia. Chronic hyperglycemia causes peripheral neurodegenerative disease that begins with axonal injury and continues with myelin sheath lysis. [34,35,36] This degeneration results in a progressive decrease in sensory function. Based at the Wilcoxon test, the value of p = 0.01 is smaller than the value of (0.05). When in comparison among between pre and post values, the diabetic foot spa has an impact on improving foot sensitivity. After doing a foot spa for 6 weeks, there has been an growth in foot sensitivity almost close to normal values. This study is supported by the results of research that foot spa can increase the ankle brachial index (ABI). The study found that after doing a foot spa 91.3% of respondents experienced a normal ABI. [1,2] Leg exercises can improve vascularization in people with diabetes mellitus. Improved vascularization results in increased foot sensitivity in people with diabetes. [37,38] When compared between the control group who did foot exercises and the treatment group who did the foot spa, the Wilcoxon test results with a p value = 0.000, meaning that the group that did the foot exercise and the group that did the diabetic foot spa both experienced an increase in foot sensitivity. This shows that both foot exercise and foot spa have the same results in improving foot sensitivity. Foot spa treatment consisted of foot soaking, massage and foot exercise. [1,2,3] This activity is a footwork exercise with foot exercises then added with immersion and foot massage which together strengthens foot circulation. Foot movements, both gymnastics and walking, are effective in increasing foot sensitivity. [39] Stimulation given in terms of foot movement reflexology relaxes and improves blood circulation. The smooth blood circulation allows the blood to deliver more oxygen and nutrients to the body's cells, while bringing more toxins to be excreted, so that smooth blood flow will increase the protective sensitivity of the skin. During skin cleansing or cleaning activities, the feet are soaked in warm water mixed with salt. Warm water and salt are beneficial for improving blood circulation, because warm water can cause vasodilation of blood vessels. Foot spa which includes soaking, massage and foot exercises directly affects peripheral circulation. Foot massage or foot massage can affect the body's hormones, namely endorphins. Endorphins have a natural narcotic effect, reducing pain and increasing excitement. Endorphins cause vasodilation of blood vessels so as to increase blood circulation. [1,2,3] Foot gymnastics movements can accelerate blood circulation in the legs, improve blood circulation, strengthen leg muscles and facilitate leg joint movement. [39] During physical activity involving muscles, there will be an increase in oxygen uptake by 15-20 times, due to an increase in the metabolic rate of active muscles. Then there will be dilation of arterioles and capillaries. Simultaneously, blood flow to inactive muscles will decrease. The heat generated will accumulate in the body and some will be wasted through evaporation. In hot physical activities, 2 l/

hour of sweat can be produced.[40] This is in line with research conducted by Suza, et al who found that 73.3% of diabetics experienced an increase in blood flow after leg exercise.[41] Soaking your feet in warm water for 5-10 minutes will soften crusty and dry feet making it easier to get rid of dead cells. Cleaning the skin of the feet is very important because the feet are often in contact with dirt. Soaking the feet with warm water and mixed with salt provides good benefits for the feet. Salt works to soften the skin, cleanse the skin and reduce swelling on the feet. Salt which is rich in sodium content can bind water in the intracellular and interstitial spaces due to differences in concentration so that swelling and inflammation can be reduced. This foot soak includes reflection on the feet which can make the feet lighter. The benefits of foot reflexology can indeed eliminate aches, cramps and tingling. Mixing with salt will give different effects according to the properties of the salt. [1,38,39]

b. Bueger's allen exercise

The results showed that the Wilcoxon test results in the ABI value after being given BAE in both groups with a p value of 0.001. Salam, et al research (2020) states that the effect of BAE effectively improves peripheral blood circulation. The effects felt by DM sufferers after doing the burger allen exercise are increased ability to walk, reduce pain (intermittent claudication), reduce tingling sensations, reduce leg edema which can be assessed from increasing peripheral circulation adequacy from changes in the Ankle Brachial Index (ABI) value.[43] The adequacy of peripheral circulation by BAE is the result of methods and variations of exercise by optimizing movements in the lower limbs so that the muscle pump process occurs and movements that utilize the force of gravity so that there is a smooth movement of blood flow in the lower limbs towards the heart and the rest of the body. Movement variations in BAE combine movement techniques that lead to the occurrence of muscle pumps by the movement of the leg muscles and utilize the force of gravity on the feet. Leg movements that utilize gravity facilitate venous return in the legs and help blood vessels to empty and fill the blood column alternately, so that blood transportation in the leg area becomes smooth both towards and direction of venous return to the heart organ. [1,2,3] Standing position causes blood flow to be smooth towards the splanchnic, pelvic and leg veins. This movement is caused by the presence of gravity on the postural changes that result in the movement of blood. In line with previous research, Vijayabarathy (2014) stated that BAE plays an important role in the healing process of diabetic foot wounds. BAE can increase the circulation of peripheral blood vessels with the technique of changing gravity in the lower extremities accompanied by muscle contraction through variations in dorso flexion and plantar flexion movements of the ankles. [44] BAE is one of the exercise modalities that can be applied and taught to someone with impaired foot peripheral tissue perfusion, especially diabetes because the BAE exercise procedure is easy, cheap and efficient to do. Diabetic self-care in caring for and preventing macrovascular complications is important and a concern for nurses considering the complications that will be borne by diabetes will be a burden for themselves and their families. Nurses must be of the view that DM patients who have peripheral perfusion disorders in their feet have the potential to be able to take care of themselves (self care) in meeting the needs of life, maintaining health, and achieving prosperity. Optimal health and well-being can be achieved if a person has the ability and independence to meet their needs. [45]

c. Music therapy

Table 2 it is found that the average blood sugar level before flute music therapy is 2.50 after flute music therapy is obtained the average blood sugar level becomes 2.70 So that a dependent (paired) T-test is carried out, the average difference in blood sugar levels is - 0.20 with a standard deviation of 0.218 and a mean standard error of 0.100 with a p-value of 0.000. The results of this study are in line with research from Castika & Melati (2019) which states that Javanese style music has a relaxing effect to reduce the level of stress experienced by respondents as a result of which it can reduce blood sugar levels.[46] The relaxation process through Mitrit Oxide molecules so that it can balance and suppress ACTH (adrenocorticotropic hormone) stimulates the adrenal glands to release adrenocorticoid hormone, namely cortisol, so that it can suppress the formation of new glucose by the liver, besides that lipolysis and carbohydrate catabolism can be suppressed.[47] Good management is needed to reduce the occurrence of complications in people with diabetes mellitus due to high blood sugar levels. One of them is by doing relaxation techniques to reduce stress levels, namely by listening to flute music. Flute music is music that produces a soft and distinctive melodic sound (such as limp) that can be used as music therapy because

the sound can provide a calming effect for listeners. Music can affect the parasympathetic nervous system which stretches the body and slows the heart rate, and has a relaxing effect on the organs of the body.[47] The results of research from Crews et al which stated that there was an effect of music therapy on reducing blood sugar levels in patients with type 2 diabetes mellitus. music has the effect of reducing stress and decreasing fasting blood sugar levels.[48]. Strengthened by Chittoria et al., (2019) found that music therapy is used as a reference for healing and symptom management, where listening to music can affect physiological parameters including the autonomic nervous system for healing the immune system and reducing stress levels. [49] Music therapy with murottal chanting of Surah Ar Rahman can result in a relaxation response so that blood sugar decreases temporarily. Where in theory, when breathing relaxation in the body in a calm and relaxed state, the production of ACTH (Adrenocorticotrophic Hormone) and CRH (Corticotropin Releasing Hormone) decreases in the hypothalamus resulting in decreased sympathetic nerve work, resulting in a decrease in adrenaline and nonadrenaline which results in a decrease in heart rate , dilation of blood vessels, reduced vascular resistance and decreased heart pump, decreased cardiac arterial blood pressure and finally decreased blood pressure, as well as decreased activity of the sympathetic nervous system so as to reduce metabolic activity resulting in a decrease in blood sugar levels in type II DM patients.[38,50,51] Saccharification status was measured at the level of saccharified albumin and tested at the beginning and end of treatment. [52]

Conclusion:

This study found that the administration of diabetic foot spa combined with Bueger's Allen exercise and music therapy found that there were differences in foot sensitivity, ankle brachial index and sleep quality between the intervention group and the control group. It was concluded that between foot spa, Bueger's Allen exercise and music therapy which were carried out together could increase the sensation of the feet, foot sensitivity, ankle brachial index and sleep quality. It is recommended that people with type 2 diabetes mellitus can do Bueger's Allen exercise and music therapy to improve foot sensation, ankle brachial index scores and better sleep quality.

Declaration of Conflicting Interest

There are no potential conflicts of interest to declare.

Funding

This study received funding from the LPPM Universitas Nahdlatul Ulama Surabaya, Indonesia and Politeknik Kesehatan Kemenkes Surabaya, Surabaya, Indonesia

Acknowledgment

The authors would like to thank all participants for the time and effort dedicated to this research and the puskesmas staff and the community of the Kotakulon Bondowoso, East Java Indonesia district for their assistance during the research process.

Authors' Contribution

All authors contributed equally to the study conceptualization, methodology, article search, data analysis, writing, and editing of the manuscript. All authors approved the final version of the article.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Reference:

1. Wardani, E. M., Zahroh, C., & Ainiyah, N. Diabetic Foot Spa Implementation in Early Neuropathy Diagnosis Based on Blood Glucose Levels, Foot Sensitivity and the Ankle Brachial Index in Patients with Diabetes Mellitus. *Jurnal Ners*. 2019;**14**(1), 106. DOI:10.20473/jn.v14i1.9950
2. Wardani, E. M., Wijayanti, L. & Ainiyah, N. The effect of diabetic foot spa on ankle brachial index and foot sensitivity of diabetes mellitus type 2. *Jurnal Keperawatan Respati Yogyakarta*. 2019; **6**(3), pp. 672-676. DOI: https://doi.org/10.35842/jkry.v6i3.391
3. Wardani, E. M., Wijayanti, L., Ainiyah, N. Pengaruh spa kaki diabetik terhadap kualitas tidur dan sensitivitas kaki penderita diabetes mellitus tipe 2. *Jurnal Ners LENTERA*. 2019; **7**(2): 130-141.
4. Black, J dan Hawks, J. 2014. Keperawatan Medikal Bedah: Manajemen Klinis untuk Hasil yang Diharapkan. Dialihbahasakan oleh Nampira R. Jakarta: Salemba Emban Patria.
5. International Diabetes Federation. (2019). IDF Diabetes Atlas Ninth Edition 2019. International Diabetes Federation. http:// www.idf.org/about-diabetes/facts-figures
6. KEMENKES. (2018). Hasil Utama Riskesdas Tentang Prevalensi Diabetes Mellitus di Indonesia 2018. Hasil Utama Riskesdas Tentang Prevalensi Diabetes Melitus Di Indonesia 2018, **8**.
7. Dinas Kesehatan. (2018). Hasil Utama Riset Kesehatan Dasar Jawa Timur 2018. Jakarta: Badan Penelitian dan Pengembangan Kesehatan, *Kementrian Kesehatan Republik Indonesia*, 1–82
8. Alva, M. L., Hoerger, T. J., Zhang, P., & Gregg, E. W. Identifying Risk for Type 2 Diabetes in Different Age Cohorts: Does One Size Fit all? *BMJ Open Diabetes Research and Care*. 2017; **5**(1), 1–7. https://doi.org/10.1136/bmjdrc-2017000447
9. Carey, IM, Critchley, JA, DeWilde, S, Harris, T, Hosking, FJ, Cook, DG. Risk of Infection in Type 1 and Type 2 Diabetes Compared with The General Population: A Matched Cohort Study. *Diabetes Care*. 2018;**41**(3): pp. 513-521. https://doi.org/10.1016/j.bpsc.2017.12.004
10. Kerner, W. Definition , Classification and Diagnosis of Diabetes Mellitus. German Diabetes Association: Clinical Practice Guidelines Definition. 2014; **122**: 384–386. https://doi.org/http://dx.doi.org/ 10.1055/s-0034-1366278
11. Ozougwu, O. The pathogenesis and pathophysiology of type 1 and type 2 diabetes mellitus. *Journal of Physiology and Pathophysiology*. 2013; **4**(4): 46–57. https://doi.org/10.5897/JPAP2013.0001
12. Azharuddin, M., Kapur, P., Adil, M., Ghosh, P., & Sharma, M. Healthrelated quality of life and sleep quality among North Indian type 2 diabetes mellitus patients : evidence from a cross-sectional study. Sleep Medicine. 2020; **73**: 93–100. https://doi.org/10.1016/j.sleep.2020.04.022
13. Tentero, I. N., Pangemanan, D. H. C., & Polii, H. Hubungan diabetes melitus dengan kualitas tidur. *Jurnal E-Biomedik*. 2016; **4**(2): https://doi.org/10.35790/ebm.4.2.2016.14626
14. Pichon-Riviere, A., Irazola, V., Beratarrechea, A., Alcaraz,A., & Carrara, C. Quality of life in type 2 diabetes mellitus patients requiring insulin treatment in Buenos Aires, Argentina: a cross-sectional study. *International Journal of Health Policy and Management*.2015; **4**(7), 475–480. https://doi.org/10.15171/ijhpm.2015.80
15. Thent, Z. C., Das, S., & Henry, L. J. Role of exercise in the management of diabetes mellitus: The global scenario. *PLoS ONE*. 2013a; **8**(11), 1–9. https://doi.org/10.1371/journal.pone.0080436
16. Thent, Z. C., Das, S., & Henry, L. J. (2013b). Role of exercise in the management of diabetes mellitus: The global scenario. *PLoS ONE*. 2013b; **8**(11), 1–8. https://doi.org/10.1371/journal.pone.0080436
17. Trigoboff, D. K. Management of Lower Extremity Peripheral Arterial Disease: Interpreting the Latest Guidelines for Nurse Practitioners. *Journal for Nurse Practitioners*. 2013; **9**(10), 653–660. https://doi.org/10.1016/j.nurpra.2013.08.026
18. Tummala, R., Banerjee, K., Mahajan, K., Ravakhah, K., & Gupta, A. Utility of ankle-brachial index in screening for peripheral arterial disease in rural India: A cross-sectional study and review of literature. *Indian Heart Journal*. 2018; **70**(2), 323–325. https://doi.org/10.1016/j.ihj.2017.07.012
19. John, J., & Rathiga, A. Effectivenes of buerger allen exercise to improve the lower extremity perfusion among patients with type2 diabetes mellitus. *International Journal of Current Research and Academic Review*. 2015; **3**(4), 252– 263. doi.10.3102/0034654310362998
20. Stoc-Albu M, Iliuta L, Guberna SM, Sinescu C. The role of ankle-brachial index for predicting peripheral arterial disease. *Maedica (Buchar)*. 2014;**9**(3):295-302.
21. Jannoo, Z., Bee, Y., Mohd, A., & Azmi, M. Journal of Clinical & Translational Endocrinology Examining

diabetes distress , medication adherence , diabetes self-care activities , diabetes-specific quality of life and health-related quality of life among type 2 diabetes mellitus patients. *Journal of Clinical & Translational Endocrinology*. 2017; **9**, 48–54. https://doi.org/10.1016/j.jcte.2017.07.003

22. McDermott, M. M. and Criqui, M. H. Ankle-Brachial Index Screening and Improving Peripheral Artery Disease Detection and OutcomesAnkle Brachial Index Screening and Improving Peripheral Artery Disease Detection and OutcomesEditorial, *JAMA*. 2018; **320**(2), pp. 143–145. doi: 10.1001/jama.2018.8953.
23. Thiruvoipati, T. et al., Peripheral artery disease in patients with diabetes : Epidemiology, mechanisms, and outcomes", *World Journal of Diabetes*. 2015**;** **6**(7), pp. 961–969. doi: 10.4239/wjd.v6.i7.961.
24. Sinaga, J., & Hondro, E. Pengaruh Senam Diabetes Melitus Terhadap Kadar Glukosa Darah Pada Penderita Diabetes Melitus Tipe 2 Di Wilayah Kerja Puskesmas Darusalam Medan 2011. *Jurnal Mutiara Ners.* 2012; **1**(7).
25. Chang, Sang Ah. Smoking and Type 2 Diabetes Mellitus, Diabetes & Metabolism Journal. 2012; Vol 36, pp. 399–403. Doi: 10.4093/dmj.2012.36.6.399
26. Maddatu, J., Anderson-Baucum, E., & Evans-Molina, C. Smoking and the risk of type 2 diabetes. Translational Research. 2017;**184**: 101–107. https://doi.org/10.1016/j.trsl.2017.02.004
27. Erismis, B. Management of Hypertriglyceridemia in Uncontrolled Type 2 Diabetes Mellitus Patients: 2 Case Studies. *Journal of Diabetes, Metabolic Disorders & Control*. 2016; **3**(4), pp. 71–72. doi: 10.15406/idmdc.2016.03.00072
28. Chawla, A., Chawla, R., & Jaggi, S. Microvasular and macrovascular complications in diabetes mellitus: Distinct or continuum?. *Indian journal of endocrinology and metabolism*. 2016; **20**(4), 546–551. DOI: 10.4103/2230- 8210.183480
29. Deribe B. Prevalence and Factors Influencing Diabetic Foot Ulcer among Diabetic Patients Attending Arbaminch Hospital, South Ethiopia. *J Diabetes Metab*. 2014;**05**(01). doi:10.4172/2155- 6156.1000322
30. Zhang P, Lu J, Jing Y, Tang S, Zhu D, Bi Y. Global epidemiology of diabetic foot ulceration: a systematic review and metaanalysis. *Ann Med*. 2017;**49**(2):106-116. doi:10.1080/07853890.2016.1231932
31. Yusuf S, Okuwa M, Irwan M, et al., Prevalence and Risk Factor of Diabetic Foot Ulcers in a Regional Hospital, Eastern Indonesia. *Open J Nurs*. 2016;**6**(January):1-10. doi:10.4236/ojn.2016.61001
32. Gogia, S. dan Rao, C. R. (2017) Prevalence and Risk Factors for Peripheral Neuropathy among Type 2 Diabetes Mellitus Patients at a Tertiary Care Hospital in Coastal Karnataka. *Indian journal of endocrinology and metabolism.* 2017; **21**(5), pp.665-669. DOI: 10.4103/ijem.IJEM_43_17
33. Hershey, D. S. Diabetic Peripheral Neuropathy: Evaluation and Management," The Journal for Nurse Practitioners. *Elsevier*. 2017; **13**(3), pp. 199–204.doi: 10.1016/j.nurpra.2016.08.034.
34. Saber, H.J. and Daoud, A.S. Knowledge and practice about the foot care and the prevalence of the neuropathy among a sample of type 2 diabetic patients in Erbil, Iraq: *Journal of Family Medicine and Primary Care.* 2018;**7**(5):967-974. doi: 10.4103/jfmpc.jfmpc_163_18
35. Sallam, S.A. and Edison, J.S. Effect of Nursing Instructions on Diabetic Patient's Knowledge about Peripherl Neuropathy and Foot Care; *American Journal of Nursing Research.* 2019; **7**(4), pp.626-612. https://DOI:10.12691/ajnr-7-4-23
36. Akalu, Y., & Birhan, A. (2020). Peripheral Arterial Disease and Its Associated Factors among Type 2 Diabetes Mellitus Patients at Debre Tabor General Hospital, Northwest Ethiopia. *Journal of Diabetes Research*, 2020. https://doi.org/10.1155/2020/9419413
37. Waspadji S. Kaki Diabetes. In: Buku Ajar Ilmu Penyakit Dalam. VI. Jakarta: Setiati, Siti Alwi, Idrus Sudoyo, Aru W Simadibrata K, Marcellus Setyohadi, Bambang Syam, Ari Fahrial; 2014. p. 2367–74.
38. Kanokphichayakrai, K., Kaewmahanin, W., Tangvarasittichai, O., & Tangvarasittichai, S. Ankle Brachial Index (ABI) Measurement Associated with High Sensitivity-C-Reactive Protein, Insulin Resistance and Pulse Pressure Levels in Type 2 Diabetes Mellitus Patients. *Madridge Journal of Diabetes*. 2018; **2**(1), 31–35. DOI: https://doi.org/10.18689/mjd-1000106
39. Kanchanasamut W, Pensri P. Effects of weight-bearing exercise on a mini-trampoline on foot mobility, plantar pressure and sensation of diabetic neuropathic feet; a preliminary study. Diabet Foot Ankle [Internet]. *Taylor & Francis*; 2017;**8**(1):1–10. DOI: http://dx.doi.org/10.1080/2000625X.2017.1287239
40. Soegondo S. Farmakoterafi pada Pengendalian Glikemia Diabetes Melitus Tipe 2. In: Setiati S, Alwi I, Sudoyo AW, Simadibrata K M, Setyohadi B, Syam AF, editors. Buku Ajar Ilmu Penyakit Dalam. VI. Jakarta: *InternaPublishing*; 2014. p. 2328–35

41. Suza, D. E., Hijriana, I., Ariani, Y., & Hariati, H. Effects Of Lower Extremity Exercises On Ankle-Brachial Index Values Among Type 2 Diabetes Mellitus Patients. Open Access *Macedonian Journal of Medical Sciences*. 2020; **8**: 1–6. Doi: https://doi.org/10.3889/oamjms.2020.4261

42. Muhammad, I. A. Diabetic Foot Ulcer: Synopsis of the Epidemiology and Pathophysiology. *International Journal of Diabetes and Endocrinology*. 2018; 3(2): 23. https://doi.org/10.11648/j.ijde.20180302.11

43. Salam, A. Y., & Laili, N. Efek Buerger Allen Exercise terhadap Perubahan Nilai ABI (Ankle Brachial Index) *Pasien Diabetes Tipe II. JIKES (Jurnal Ilmu Kesehatan)*. 2020; **3**(2): 64–70. Doi: https://doi.org/10.33006/ji-kes.v3i2.149

44. Vijayabarathi, M., & Hemavathy, V. Buerger allen exercise for type 2 diabetes mellitus foot ulcer patients. *International Journal of Innovative Research in Science, Engineering and Technology*. 2014; **3** (12), 17972–17976. doi: 10.15680/ijirset.2014. 0312096.

45. Alligood, & Tomey. Nursing Theorists and Their Work Eighth Edition. USA: Mosby Elseiver; 2014.

46. Castika, Y., & Melati, N. Efektivitas Terapi Musik Langgam Jawa dan Musik Alam Terhadap Perubahan Kadar Gula Dalam Darah Pada Orang dengan Diabetes Mellitus Tipe II Prambanan Klaten Tahun 2019. 2019; **7**(1), 27–36. DOI: https://doi.org/10.35913/jk.v7i1.130

47. Yulastari, P. R., Betriana, F., & Kartika, I. R. Terapi Musik Untuk Pasien Hipertensi: A Literatur Review. *REAL in Nursing Journal (RNJ)*. 2019; **2**(2), 56–65. DOI: http://dx.doi.org/10.32883/rnj.v2i2.436

48. Crews, R.T., Schneider, K.L., Yalla, S.V., Reeves, N.D., & Vileikyte, L. Physiological and psychological challenges of increasing physical activity and exercise in patients at risk of diabetic foot ulcers: a critical review. *Diabetes/Metabolism Research and Reviews* 32. 2016; **32**(8):791-804. doi: 10.1002/dmrr.2817.

49. Chittoria, R. K., K, S., Chavan, V., Aggarwal, A., Gupta, S., Reddy, C. L., Pathan, I., R, P., & Mohan, P. B. Effect of Music *Therapy as an Adjunct in Management of Diabetic Foot Ulcer*. 2019; **5**(1), 23–25. https://doi.org/10.17140/DROJ-5-142

50. Wardani, E. M., Nugroho, R. F., Bistara, D. N., Afiyah, R. K., & Hasina, S. N. Clinical Manifestations of COVID-19 Patients with Comorbid and Non-comorbid at Dr . Soetomo Hospital , Surabaya. Open Access Macedonian Journal of Medical Sciences, 10(G-Nursing). 2022; 330–334. DOI: https://doi.org/10.3889/oamjms.2022.7582

51. Alqahtani, K. M., Bhangoo, M., Vaida, F., Denenberg, J. O., Allison, M. A., & Criqui, M. H. (2018). Predictors of Change in the Ankle Brachial Index with Exercise. *European Journal of Vascular & Endovascular Surgery*; **55**(3): 399–404. https://doi.org/10.1016/j.ejvs.2017.12.004

52. T. A., Prabawati, C. Y., Supratman, .-., Sugiarto, .-., & HS, K. H. N. (2021). The Effect of Bitter Melon (Momordica charantia L.) Leaves Extractonon Glycated Albumin in Diabetic Foot Ulcers: Randomized Controlled Trial. Bangladesh Journal of Medical Science, **20**(2), 281–287. https://doi.org/10.3329/bjms.v20i2.51536

Diabetic foot spa, bueger's allen exercise and music therapy on foot sensitivity, the ankle brachial index and sleep quality for diabetes mellitus in Indonesia

ORIGINALITY REPORT

21%	22%	10%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.scilit.net Internet Source	4%
2	balimedicaljournal.org Internet Source	4%
3	repo.stikesicme-jbg.ac.id Internet Source	4%
4	researchid.co Internet Source	3%
5	repository.poltekkes-manado.ac.id Internet Source	3%
6	repository.ump.ac.id Internet Source	3%

Exclude quotes	Off	Exclude matches	< 3%
Exclude bibliography	Off		