Pubsains

OPEN ACCESS

Journal of Pubnursing Sciences, 2026, 04 (01): 24-30
eISSN 2988-4330; pISSN 3025-3330; https://doi.org/10.69606/jps.v4i01.424

[Original Research]

Journal of Pubnursing Sciences

The Effect of the Combination of Buerger Allen Exercise and Acupressure on Reducing Blood Glucose Levels in Type 2 Diabetes: A Quasi-experimental Study

Lulu Mardiah[1], Asep Kuswandi[1], Dewi Aryanti[1], Yanti Cahyati[1]
[1]Nursing Department, Poltekkes Kemenkes Tasikmalaya, Indonesia
*Corresponding author: dewi.aryanti@dosen.poltekkestasikmalaya.ac.id

Article Info:

Received: (2025-12-13)

Revised: (2026-02-12)

Approved: (2026-03-29)

Published: (2026-03-30)

Abstract

Background: Diabetes Mellitus (DM) is a chronic metabolic disease characterised by elevated blood glucose levels and is currently on the rise in prevalence, both globally and nationally. The management of DM is not only pharmacological but also includes non-pharmacological therapies such as physical exercise and complementary treatments. Buerger Allen Exercise and acupressure are known to lower blood glucose levels by improving blood circulation and increasing insulin sensitivity. **Aims:** To determine the effect of the combination of Buerger Allen Exercise and acupressure on blood glucose levels in patients with type 2 DM at a primary healthcare facility in Tasikmalaya City. **Methods:** This study used a quasi-experimental design with a one-group pretest-posttest approach. A total of 30 respondents were selected using purposive sampling. Blood glucose levels were measured before and after the intervention. Data were analysed using the Friedman test. **Results:** There was a significant decrease in blood sugar levels before and after the combination intervention of Buerger Allen Exercise and acupressure; the average blood sugar level of pretest 1 was 254.00 mg/dL and pretest 2 was 263.50 mg/dL decreasing to 222.00 mg/dL with a significant value of Chi-Square Calculation > Chi Square Table value (42.467 > 5.991) and p-value (0.000 < 0.05). **Conclusion:** The combination of Buerger Allen Exercise and acupressure has a significant effect in reducing blood sugar levels in patients with type 2 DM at a primary healthcare facility in Tasikmalaya City.

Keywords: Acupressure; Blood Glucose Levels; Buerger Allen Exercise; Diabetes Mellitus

Cite this as: Mardiah, L, Kuswandi, A., Aryanti, A., & Cahyati, Y. (2026). The Effect of the Combination of Buerger Allen Exercise and Acupressure on Reducing Blood Glucose Levels in Type 2 Diabetes: A Quasi-experimental Study. *Journal of Pubnursing Sciences*, 4(01), 24–30. https://doi.org/10.69606/jps.v4i01.424

Introduction

Diabetes Mellitus (DM) is classified as a Non-Communicable Disease (NCD) with a prevalence that continues to increase each year, both globally and nationally (Wijayanti, 2022). DM ranks eighth among NCDs as the leading cause of death globally (World Health Organisation, 2021). DM is a metabolic disorder characterised by elevated blood glucose levels caused by insufficient insulin production by the pancreas or the body's inability to use insulin effectively (International Diabetes Federation, 2021). The International Diabetes Federation (IDF) reported in 2021 that the global prevalence of DM reached 537 million people (7.27%) out of a total population of 7.8 billion. The incidence of DM is projected to rise to 643 million (11%) by 2030 and to 783 million (12%) by 2045. Indonesia is the only Southeast Asian country included in the list of countries

with the highest number of DM cases globally, underscoring its significant contribution to global prevalence (Riset Kesehatan Dasar, 2018). Based on the 2018 Basic Health Research (Riskesdas), DM ranks third as the leading cause of death after stroke and heart disease in the NCD category. This is further supported by the fact that 8.5%, or approximately 24.4 million individuals of the national population in Indonesia, are living with DM.

West Java, one of the most populous provinces in Indonesia, has also experienced an increase in the number of people with Diabetes Mellitus (DM). The prevalence rose from 1.3% to 1.7% in 2018 (Riskesdas, 2018). Tasikmalaya is one of the cities contributing to this number in West Java. According to preliminary data from the Tasikmalaya City Health Office on January 16, 2025, the number of DM cases among adults aged 15 and above in Tasikmalaya City reached 13,691 by the end of 2024, with prevalence continuing to rise each year. Of the 22 primary healthcare facilities in Tasikmalaya City, Bungursari ranked first with the highest number of DM patients, totalling 521 individuals in 2024. (Tasikmalaya City Health Office, 2024).

The high prevalence of DM in the community can be attributed to various factors, including a lack of effective modalities or management efforts to control blood glucose levels, particularly at the community level. Many individuals with DM remain heavily dependent on pharmacological therapy, while non-pharmacological approaches that offer long-term benefits are often overlooked. Numerous studies have shown that non-pharmacological therapies, such as physical activity and complementary treatments, have significant potential to lower blood glucose levels. For example, exercises such as foot exercises, Range of Motion (ROM), and Buerger Allen Exercise (BAE) have been proven to improve insulin sensitivity and help regulate blood glucose levels (Mataputun et al., 2020). In addition, traditional therapies such as hypnotherapy, acupuncture, and acupressure are recognised for their ability to significantly reduce blood glucose levels in patients with DM (Jumari et al., 2019). Integrating non-pharmacological therapies into community-based approaches is a crucial strategy in addressing the challenges of DM management holistically and sustainably (Hasibuan, 2021). However, existing studies have primarily focused on single interventions (Isnayati et al., 2025). This study introduces a novel approach by combining the Buerger Allen Exercise and acupressure, which has not been previously explored, to achieve a more optimal reduction in blood glucose levels in patients with type 2 DM.

The Buerger Allen Exercise is a non-pharmacological physical activity that effectively lowers blood glucose levels in patients with type 2 DM. This exercise utilises gravity to improve blood flow to the lower extremities and can be performed independently without special equipment (Ahmad et al., 2022). It also stimulates nitric oxide (NO) release from the endothelium, thereby supporting insulin production and enhancing glucose metabolism (Isnayati et al., 2025). According to Ibrahim (2021), Buerger Allen Exercise has been proven to be more effective than Range of Motion in reducing blood glucose levels.

Another therapy that can help lower blood glucose levels is acupressure. Acupressure is a technique that applies pressure to specific points on the body, which can stimulate the endocrine system and enhance insulin sensitivity. This technique is effective at lowering blood glucose levels in patients with type 2 DM (Herlina et al., 2023). Jamaluddin and Prasetyo (2019) stated that acupressure works by activating the enzyme glucose-6-phosphate and improving the body's metabolic function. Furthermore, acupressure is considered a safe, low-cost, and easily practised complementary therapy that can be performed independently by patients (Masithoh et al., 2016).

Interviews with the person in charge of the NCD program at a primary healthcare facility in Tasikmalaya City revealed that Buerger Allen Exercise and acupressure therapies have never been implemented, despite the routine conduct of Prolanis activities and DM Education. Preliminary studies also showed that DM patients have low knowledge regarding these interventions and tend to be physically inactive. Accordingly, this study aims to determine the effect of combining Buerger Allen Exercise and acupressure on blood glucose levels among patients with type 2 Diabetes Mellitus.

Methods

This study used a quantitative, quasi-experimental, one-group pretest-posttest design. A total of 30 respondents were selected using purposive sampling based on the following inclusion criteria: 1) Willing to participate in the study and signed the informed consent, 2) Had random blood glucose levels ≥ 200 mg/dL, 3) Had no allergy to olive oil, 4) Did not have diabetic ulcers, and 5) Did not have acute disease complications. The exclusion criteria were patients experiencing dyspnea or shortness of breath and chest pain, as well as those with depression or anxiety.

This study was conducted at a primary healthcare facility in Tasikmalaya City. Blood glucose levels were measured using a calibrated EasyTouch glucometer to ensure accuracy. Pretest blood glucose measurements were taken twice to assess the trend before the intervention. Posttest measurements were taken after the patients completed the 7-day intervention. The Buerger Allen

Exercise was performed twice daily, in the morning and afternoon, while acupressure was performed once daily, 15 minutes after the morning Buerger Allen Exercise session.

Data processing included editing, coding, entry, and tabulation. Statistical analysis was performed using IBM SPSS Statistics version 25. Since the data were not normally distributed, the Friedman test was applied, followed by post-hoc analysis using the Wilcoxon signed-rank test. This study adhered to the ethical principles of research and was approved by the Health Research Ethics Committee of the Tasikmalaya Health Polytechnic, with approval number No. DP.04.03/F.XVIII.20/KEPK/37/2025.

The research framework of this study consists of an independent variable, namely the combination of Buerger Allen Exercise and acupressure, and a dependent variable, namely blood glucose levels. Potential confounding variables include age, gender, highest level of education, duration of diabetes mellitus and comorbidities.

Results

Table 1. Demographic and Clinical Characteristics of Respondents (n=30)

Characteristics	Frequency (f)	Percentage (%)
Age		
Age 26-35 years	0	0
Age 36-45 years	3	10.0
Age 46-55 years	9	30.0
Age 56-65 years	14	46.7
Age >65 years	4	13.3
Gender		
Male	4	13.3
Female	26	86.7
Last Education Level		
Elementary School/Equivalent	22	73.3
Junior High School/Equivalent	1	3.3
Senior High School/Equivalent	5	16.7
College/University	2	6.7
Duration of Having Diabetes Mellitus		
≤5 years	28	93.3
>5 years	2	6.7
Comorbidities		
Present	17	56.7
Absent	13	43.3

Table 1 above presents the demographic and clinical characteristics of respondents by age, with the majority in the 56–65 age group, totalling 14 respondents (46.7%). Most respondents were female, totalling 26 individuals (86.7%). The majority of respondents had an elementary school or equivalent educational background, with 22 respondents (73.3%). Most had been diagnosed with Diabetes for less than 5 years, totalling 28 individuals (93.3%), and more than half of the respondents had comorbid conditions, specifically hypertension, with 17 respondents (56.7%).

Table 2. Overview of the Average Blood Glucose Levels Before and After the Combination Intervention of Buerger Allen Exercise and Acupressure (n=30)

Blood Glucose Level Variable	Median	Min	Max
Pretest 1	254.00	201	494
Pretest 2	263.50	186	496
Posttest	222.00	164	355

Table 2 above shows the average blood glucose levels of 30 respondents before and after being given the combined intervention of Buerger Allen Exercise and acupressure. The pretest was conducted twice to observe trends in blood glucose levels prior to the intervention. The results showed that the average for Pretest 1 was 254.00 mg/dL. The average for Pretest 2 was 263.50 mg/dL. Meanwhile, the average blood glucose level after the intervention decreased to 222.00 mg/dL.

The normality test was conducted using the Shapiro-Wilk test. The results for blood glucose measurements in pretest 1, pretest 2, and posttest ($p > 0.05$) indicate that the data were not normally distributed. Thus, statistical analysis was performed using the Friedman test.

Table 3. Friedman Test Results (n=30)

Chi-square	df	Asymp. Sig
42.467	2	0.000

Based on the statistical output in Table 3 above, the calculated Chi-Square value (42.467) is greater than the Chi-Square table value (5.991). The p-value is 0.000 (< 0.05), which means that the alternative hypothesis (Ha) is accepted and the null hypothesis (Ho) is rejected. This indicates a difference in blood glucose levels among DM patients between the pretest and posttest. It can be concluded that the combination of Buerger Allen Exercise and Acupressure has a significant effect in reducing blood glucose levels in patients with type 2 DM at a primary healthcare facility in Tasikmalaya City.

To determine whether the data were significantly different, a post-hoc analysis was conducted using the Wilcoxon signed-rank test between measurement times to determine where the differences occurred.

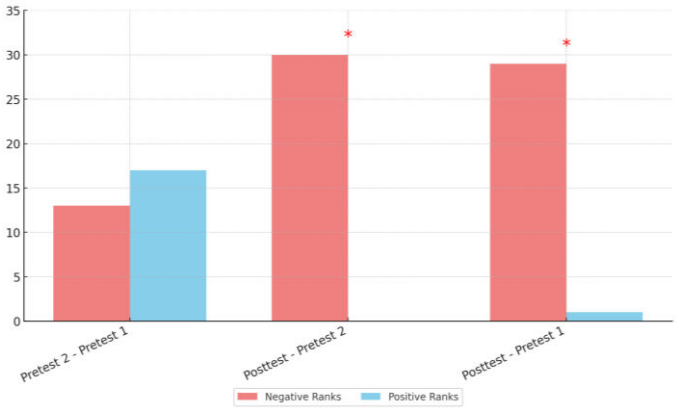

Figure 1. Post-Hoc Wilcoxon Test Results

Based on the statistical test output in Figure 1, the comparison between Pretest 2 and Pretest 1 shows that the number of positive ranks exceeds the number of negative ranks, indicating a tendency toward higher blood glucose levels in some respondents before the intervention. However, the range of changes among respondents remains quite wide, reflecting individual variability in blood glucose levels during the initial measurement phase.

In the comparisons between Posttest and Pretest 2 as well as Posttest and Pretest 1, the graph is dominated by negative ranks, indicating that nearly all respondents experienced a decrease in blood glucose levels after the intervention. Although several extreme values are visible on the graph, the overall pattern reinforces the finding that the intervention had a consistent effect in reducing blood glucose levels, despite differences in the magnitude of reduction among individuals.

Table 4. Wilcoxon Statistical Test on the Effect of the Combination of Buerger Allen Exercise and Acupressure on Blood Glucose Levels in Patients with Type 2 Diabetes Mellitus (n=30)

	Pretest 2–Pretest 1	Posttest–Pretest 2	Posttest–Pretest 1
Asymp. Sig. (2-tailed)	0.959	0.000	0.000

Based on the statistical test output in Table 4, the results showed significant differences between Pretest 2 and Posttest (p-value = 0.000 < 0.0167) and between Pretest 1 and Posttest (p = 0.000 < 0.0167). This indicates that the patient's blood glucose levels decreased significantly after the intervention. Thus, after applying the Bonferroni correction (α = 0.05/3 comparisons = 0.0167), it can be concluded that the combined intervention of Buerger Allen Exercise and acupressure significantly reduced blood glucose levels in patients with type 2 DM in the working area of Puskesmas T.

Discussion

This study aimed to examine the effect of a combination of Buerger Allen Exercise and acupressure on blood glucose levels in patients with type 2 diabetes mellitus. The findings demonstrate that this combined non-pharmacological intervention improved blood glucose control, as evidenced by a significant reduction in average random blood glucose levels. The decrease observed between pretest and posttest measurements indicates that integrating physical exercise with complementary therapy can enhance glucose metabolism and insulin sensitivity. These results support the rationale presented in the introduction, emphasising the potential of simple, cost-effective, and independently performed interventions as part of community-based diabetes management strategies.

The majority of respondents were aged between 56 and 65 years (46.7%), supporting the view that older age is a major risk factor for the onset of type 2 diabetes mellitus (DM). As individuals age, pancreatic beta-cell function and mitochondrial activity in muscles decline by up to 35%, and muscle fat content increases by 30%, contributing to insulin resistance and impaired insulin secretion (Mataputun et al., 2020). This explains the elderly's vulnerability to metabolic disorders such as DM (Budiman et al., 2023). This finding is supported by Herlina et al. (2023), who stated that individuals over 45 years old are at high risk of developing DM. Arania et al. (2021) also noted that the prevalence of DM in the adult population can reach up to 87%. Furthermore, Gunawan and Rahmawati (2021) found that individuals aged 45 and older are 18 times more likely to develop type 2 DM (OR = 18.143). Older age, especially over 45 years, has been proven to be a significant risk factor and should be a key focus in type 2 DM prevention efforts.

Gender is also an important risk factor in the incidence of type 2 DM. Women are at higher risk due to higher body mass index (BMI), uneven fat distribution, and decreased estrogen levels during menopause, which affect glucose balance (Mataputun et al., 2020). This study shows that the majority of respondents were women (86.7%). This finding aligns with Mataputun et al. (2020), who reported that 77.6% of patients with DM were female. Nurjannah (2022) also noted that women have a higher body fat percentage (20–25%) than men (15–20%), and this greater fat accumulation contributes to elevated blood lipid levels and insulin resistance. Another study by Arania et al. (2021) stated that the risk of DM in women could be 3–7 times greater. This highlights the importance of paying special attention to women, especially postmenopausal women, in efforts to prevent type 2 DM.

Education plays a crucial role in determining an individual's understanding of health, including the prevention and management of type 2 DM. The results of this study indicate that the majority of respondents had completed only elementary school, with 22 respondents (61.9%). According to Hasibuan (2021), low Education levels can limit access to health information. The Indonesian Ministry of Health (2018) also reported that most DM patients have low educational attainment. Arania et al. (2021) supported this finding by showing that most DM sufferers come from the low-education group. Marbun et al. (2021) added that Education influences the effectiveness of Diabetes Self-Management Education (DSME), which is essential for patients to manage DM independently. Nurjannah (2022) stated that DSME includes self-care such as diet, physical activity, medication intake, blood glucose control, and foot care. This finding shows that low Education is an important risk factor in the incidence of type 2 DM.

Duration of Diabetes is an important factor in the risk of complications. This study showed that the majority of respondents (93.3%) had been living with DM for less than 5 years. Hariani et al. (2020) stated that the duration of DM influences the potential for complications due to long-term hyperglycemia. Nurjannah (2022) explained that chronic hyperglycemia can damage blood vessels and organs. Melinda et al. (2022) added that complications can occur even before five years if blood sugar levels are not well-controlled. This contrasts with research by Purwandari et al. (2022), which showed that complications typically arise after 5–10 years. Hariani et al. (2020) also found that complications increase in patients with a duration of ≥10 years. Although most respondents in this study had DM for less than 5 years, the risk persists if blood glucose levels are not well controlled. Based on these findings, early intervention through Education, monitoring, and appropriate disease management is crucial, especially for newly diagnosed patients, to prevent long-term complications.

Comorbid conditions, particularly hypertension, are common among individuals with diabetes mellitus (DM) and can worsen clinical outcomes. In this study, more than half of the respondents (56.7%) had hypertension as a comorbid condition. This high prevalence indicates a strong link between DM and hypertension, given that both share similar pathophysiological pathways, such as insulin resistance, oxidative stress, and endothelial dysfunction. Chronic hyperglycemia in DM causes damage to blood vessel walls, while hypertension exacerbates this through increased blood pressure and stimulation of angiotensin II, which triggers oxidative stress. Mataputun et al. (2020) stated that individuals with a history of hypertension have a fivefold higher risk of developing type 2 DM than those without hypertension. Additionally, uncontrolled hypertension can increase the incidence of atherosclerosis in large blood vessels by 2–3 times. These findings underscore the importance of a holistic approach to DM management that not only focuses on blood glucose levels but also accounts for comorbidities such as hypertension to prevent more severe macrovascular complications.

In efforts to control DM, non-pharmacological approaches are increasingly being implemented because they are considered easier, lower-risk, and can be done independently. The intervention used in this study was a combination of Buerger Allen Exercise and acupressure. To assess its effectiveness, random blood glucose levels were measured twice before the intervention and once after seven days of intervention. The results showed a decrease in the average blood glucose level from 254.00 mg/dL (pretest 1) and 263.50 mg/dL (pretest 2) to 222.00 mg/dL (posttest), indicating a positive effect of the intervention.

Buerger Allen Exercise was performed twice daily, in the morning and evening. This exercise involves specific ankle movements to improve blood flow to the lower extremities. It helps enhance glucose utilisation by muscles. Ibrahim (2021) noted that this exercise facilitates circulation and boosts glucose metabolism. Physiologically, Buerger Allen Exercise stimulates contraction and relaxation of lower leg muscles, which can increase insulin sensitivity. The exercise promotes the release of nitric oxide (NO), which acts as a vasodilator and improves peripheral blood flow. Increased blood flow facilitates glucose uptake by muscles through activation of the PI3Kinase pathway, which stimulates GLUT4 translocation to the muscle cell membrane, thereby enabling more efficient glucose utilisation (Rahmi & Rasyid, 2023).

Meanwhile, acupressure was performed once daily in the morning, about 15 minutes after the Buerger Allen Exercise. It involved applying pressure to the points BL-20, BL-23, ST-36, SP-6, KI-3, LR-3, and LI-4 (Ministry of Health, 2014, as cited in Gani, 2023). These points function to stimulate the pancreas and enhance insulin production. This aligns with the study by Masithoh et al. (2016), which reported that stimulation of points SP-6 and ST-36 helps activate metabolic enzymes and balance the body's energy. Acupressure stimulates specific points in the body, which can activate sensory nerves and enhance hypothalamic activity. This stimulation triggers the release of serotonin, which improves blood flow and supports glucose metabolism. Additionally, acupressure contributes to increased insulin production in the pancreas, increased insulin receptors and faster glucose utilisation by body cells (Herlina et al., 2023).

In conclusion, the combination of Buerger Allen Exercise and acupressure was shown to reduce blood

glucose levels significantly. This intervention may serve as an easily applicable non-pharmacological alternative therapy to aid in DM management. These results further strengthen the previous evidence that light physical exercise and stimulation of specific body points can positively affect glucose metabolism.

Conclusion

The majority of respondents were aged between 56 and 65 years, most were female, had an elementary school Education background, had been diagnosed with Diabetes mellitus for less than 5 years, and most had a comorbid condition, namely hypertension. The average blood glucose level before the combined intervention of Buerger Allen Exercise and acupressure was 254.00 mg/dL for pretest 1 and 263.50 mg/dL for pretest 2. The average blood glucose level after the combined intervention of Buerger Allen Exercise and acupressure decreased to 222.00 mg/dL.

There was a difference in the average blood glucose level before and after the combined intervention of the Buerger Allen Exercise and acupressure. It can be concluded that the combined intervention had a significant effect in reducing blood glucose levels among patients with type 2 diabetes mellitus at a primary healthcare facility in Tasikmalaya City.

Declaration of Conflicting Interest

No conflict of interest to declare.

Funding

No funding

Acknowledgment

The authors sincerely express their gratitude to the management and medical staff of the Bungursari Public Health Centre, Tasikmalaya, for their support and cooperation during the research process. The authors also convey deep appreciation to all participating patients for their involvement and valuable contributions to this study.

Author's Contribution

LM was responsible for the conception and design of the study, data collection, data analysis, and interpretation of the results. DA drafted and revised the manuscript. AK and YC have read and approved the final version of the manuscript.

Data Availability Statement

The dataset generated and analysed during the current study is available from the corresponding author upon reasonable request.

Declaration of Use of AI in Academic Writing

Nothing to declare

References

Ahmad, A. M., Abdel-Aziz, A., Mohamed Khalifa, W. A., & Mohammed, A. A. (2022). Benefits of Buerger-Allen Exercises for Diabetic People: a mini-review. Archives of Medical and Clinical Research, 02(01), 1–3. https://doi.org/10.51941/amcr.2022.2104

Arania, R., Triwahyuni, T., Esfandiari, F., & Nugraha, F. R. (2021). Hubungan antara usia, jenis kelamin, dan tingkat pendidikan dengan kejadian diabetes melitus di Klinik Mardi Waluyo Lampung Tengah. 5(September), 1–23. https://doi.org/10.33024/jmm.v5i3.4200

Budiman, B., Ramadhani, N. R., & Ruliani, S. N. (2023). Hubungan kualitas tidur, obesitas dan stres dengan kejadian hipertensi pada usia lansia awal (46-55 tahun). Open Access Jakarta Journal of Health Sciences, 2(5), 717–725. https://doi.org/10.53801/oajjhs.v2i5.135

Gani, R. R. (2023). Pengaruh terapi akupresur terhadap kadar gula darah pada pasien diabetes Melitus tipe 2 di Kelurahan Andalas Wilayah Kerja Puskesmas Andalas Kota Padang. Skripsi. Politeknik Kesehatan Kementrian Kesehatan Padang. http://repositoryperpustakaanpoltekkespadang.site/id/eprint/1331/

Gunawan, S., & Rahmawati, R. (2021). Hubungan usia, jenis kelamin dan hipertensi dengan kejadian diabetes melitus tipe 2 di Puskesmas Tugu, Kecamatan Cimanggis, Kota Depok, tahun 2019. ARKESMAS (Arsip Kesehatan Masyarakat), 6(1), 15–22. https://doi.org/10.22236/arkesmas.v6i1.5829

Hariani, A. Hady, Nuraeni Jalil, & Surya Arya Putra. (2020). Hubungan lama menderita dan komplikasi DM terhadap kualitas hidup pasien DM tipe 2 di Wilayah Puskesmas Batua Kota Makassar. Jurnal Ilmiah Kesehatan Diagnosis, 15(1), 56–63. https://doi.org/10.35892/jikd.v15i1.330

Hasibuan, H. J. (2021). Pengaruh Diabetes Self Management Education terhadap Self Efficacy pasien Diabetes Melitus tipe 2 di Wilayah Kerja Puskesmas Batunadua Kota Padangsidimpuan. Skripsi. Universitas Aufa Rohyan. https://repository.unar.ac.id/jspui/handle/123456789/180

Herlina, M., Berutu, H., Suryani Mastari, E., Handayani Siburian, C., Silalahi, B., & Ria Simarmata, E. (2023). Pengaruh terapi akupresur terhadap penurunan kadar gula darah pada pasien DM tipe 2 di Poliklinik Rumah Sakit Umum Imelda Pekerja Indonesia Medan tahun 2022. Jurnal Ilmiah Keperawatan IMELDA, 9(1), 82–90. https://doi.org/10.52943/jikeperawatan.v9i1.1168

Ibrahim, I. (2021). Perbandingan Buerger Allen Exercise dan Range Of Motion (ROM) terhadap kadar gula darah sewaktu pada pasien Diabetes Melitus tipe 2 di Wilayah Kerja Puskesmas Tanpa Padang Kecamatan Kalukku Kabupaten Mamuju Tahun 2021 Ikhsan Ibrahim. Jurnal Antara Keperawatan, 2(2), 262–267. http://dx.doi.org/10.37063/jurnalantarakeperawatan.v2i2.186

Isnayati, Rahmawati, E. A., & Ningrum, S. (2025). Buerger Allen Exercise terhadap penurunan kadar gula darah di Kelurahan Slipi Jakarta Barat. Jurnal Keperawatan Degeneratif, 1(2), 39–50. https://doi.org/10.64069/jkd.v1i1.5

Jamaluddin, M., & Prasetyo, W. M. (2019). Terapi Akupresure terhadap keseimbangan glukosa darah pada pasien DM tipe 2 di Wilayah Kerja Puskesmas Jumpandang Baru Makassar. Media Kesehatan Politeknik Kesehatan Makassar, 14(2), 181–185. https://doi.org/10.32382/medkes.v14i2.1126

Jumari, Waluyo, A., J., W., & Natashia, D. (2019). Pengaruh Akupresur terhadap kadar glukosa darah pasien Diabetes Melitus Tipe 2. Journal of Telenursing (JOTING), 1(1), 38–50. https://doi.org/10.31539/joting.v1i1.536

Marbun, A. S., Siregar, R., Harefa, K., & Sinabutar, T. Y. F. (2021). Pengaruh Diabetes Self Management Education (DSME) berbasis aplikasi Whatsapp terhadap Self Efficacy pada pasien DM tipe 2 di Puskesmas Hamparan Perak. Jurnal Mutiara Ners, 4(2), 128–139. https://doi.org/10.51544/jmn.v4i2.2071

Masithoh, R. F., Ropi, H., & Kurniawan, T. (2016). Pengaruh terapi Akupresur terhadap kadar gula darah pada pasien Diabetes Melitus tipe 2 di Poliklinik Penyakit Dalam RS Tingkat 2 Dr. Soedjono Magelang. https://journal.unimma.ac.id/index.php/nursing/article/view/872

Mataputun, D. R., Prabawati, D., Tjandrarini, D. H., Program, M., Magister, S., Sint, S., Jakarta, C., & Program, D. (2020). Efektivitas Buerger Allen exercise dibandingkan dengan rendam kaki air hangat terhadap Nilai Ankle Brachial Index dan gula darah pada pasien Diabetes Melitus tipe 2 di Poli Penyakit Dalam RS Sumber Waras. MPPKI, 3(3). https://doi.org/10.56338/mppki.v3i3.1330

Melinda, Khasanah, S., & Susanto, A. (2022). Gambaran kadar gula darah penderita Diabetes Melitus peserta Prolanis di Puskesmas 1 Sumbang Kabupaten Banyumas. Jurnal Inovasi Penelitian, 3(6), 6657–6670. https://stpmataram.e-journal.id/JIP/article/view/2128/1652

Nurjannah, A. (2022). Pengaruh Diabetes Self Management Education (DSME) melalui WatsApp di masa pandemi Covid-19 terhadap Self Care pasien DM Tipe 2 di Puskesmas Seyegan. Skripsi. Politeknik Kesehatan Kementrian Kesehatan Yogyakarta. https://eprints.poltekkesjogja.ac.id/8178/

Purwandari, C. A. A., Wirjatmadi, B., & Mahmudiono, T. (2022). Faktor risiko terjadinya komplikasi kronis Diabetes Melitus Tipe 2 pada pra lansia. Amerta Nutrition, 6(3), 262–271. https://doi.org/10.20473/amnt.v6i3.2022.262-271

Rahmi, H., & Rasyid, W. (2023). Buerger Allen Exercise dalam tatalaksana gangguan perfusi perifer pada pasien Diabetes Melitus tipe 2. Jurnal Pengabdian Ilmu Kesehatan) | Desember, 2(2), 83–89. https://doi.org/10.33757/jpik.v2i2.46

Wijayanti, D. (2022). The effect of health Education on knowledge of the prevention of Diabetes Mellitus. Babali Nursing Research, 3(1), 23–29. https://doi.org/10.37363/bnr.2022.3176