





**Review**

**Reflexology On Blood Sugar Levels In Patients With Diabetes Mellitus: Literature Review**

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ARTICLE INFO	ABSTRACT
<p><b>Article History</b>            Submit : Nov 15, 2023            Revised : Dec 22, 2023            Accepted : Dec 25, 2023</p> <p><b>Keywords:</b>            Blood Sugar,            Diabetes Mellitus,            Reflexology.</p>	<p><b>Background:</b> <i>Diabetes mellitus is a disease that often causes chronic complications if not handled properly and is characterized by an increase in blood sugar levels. This literature review aims to determine the effect of reflexology on blood sugar levels in patients with diabetes mellitus.</i></p> <p><b>Methods:</b> <i>The method used in this article is a literature review using a journal database from Science Direct and Google Scholar from 2020 to 2023 with the keywords "Reflexology" or "Reflexology," "Blood glucose" or "Blood sugar levels," and "Diabetes Mellitus"</i></p> <p><b>Results:</b> <i>obtained results of 1,070 articles. Articles were selected according to the criteria, and ten articles were ready to be reviewed. Reflexology affects lowering blood sugar levels in people with diabetes mellitus by doing it regularly for 20-30 minutes 12 times.</i></p> <p><b>Conclusion:</b> <i>Doing a physical activity, one of which is applying Reflexology 12 times in 3 sessions for four weeks, can control blood sugar levels</i></p>
<p> <i>Corresponding Author</i></p> <p> <i>Affiliation</i></p> <p> <i>Email</i></p> <p> <i>Cite this as</i></p>	<p>: Abdul Muhith</p> <p>: Faculty of Nursing and Midwifery, Nahdlatul Ulama University Surabaya, East Java, Indonesia</p> <p>: <a href="mailto:abdulmuhith@unusa.ac.id">abdulmuhith@unusa.ac.id</a></p> <p>: Wiratama, R. D. ., Muhith, A., &amp; Zahro, C. (2023). Reflexology On Blood Sugar Levels In Patients With Diabetes Mellitus: Literature Review. Journal of Applied Nursing and Health, 5(2), 276–286. <a href="https://doi.org/10.55018/janh.v5i2.157">https://doi.org/10.55018/janh.v5i2.157</a></p>

**Introduction**

Diabetes Mellitus (DM) is a degenerative disease characterized by multifactorial metabolic disorders that account for most of the leading causes of death in Indonesia and worldwide. According to estimates by the International Diabetes Federation (IDF), in 2017, approximately 425 million people worldwide were diagnosed with DM. It should be noted that about 90% of individuals suffering from diabetes mellitus are caused by dysfunction of insulin

secretion and action mechanisms in the body.

The prevalence of diabetes mellitus increases every year; the number of people with diabetes mellitus in the world reaches 425 million people, where the prevalence in men who have diabetes tends to be higher at 221 million people than in women as many as 204 million people. The death rate caused by diabetes mellitus is 4 million people, and it is predicted that the number of people with diabetes mellitus in 2045 will increase to 629 million people. In East Asia, China is in the highest position in the world,



with 114.4 million people with diabetes mellitus. By 2045, it is estimated to increase to 134.3 million people

Globally, the prevalence of diabetes in 2021 among 20-79-year-olds is estimated to be 10.5% (536.6 million people), increasing to 12.2% (783.2 million people) by 2045. Prevalence is similar in men and women and highest in those aged 75-79 ([Sun et al., 2022](#)). According to the 2018 Riskesdas, the prevalence of diabetes is still high at 11.3%, which ranks 7th out of 10 countries with the highest number of sufferers at 10.7 million people. Indonesia is the only country in Southeast Asia that has the highest prevalence of diabetics in the world ([Rumaolat et al., 2022](#)). In East Java, the prevalence of people with diabetes in 2021 reached 867,257 people (93.3%), with the highest number of sufferers in Mojokerto City, 124% of the estimated Diabetes Mellitus sufferers, and the lowest in Probolinggo Regency, 51.7% of the estimated Diabetes Mellitus sufferers ([Dinkes Jatim, 2021](#)).

Patients with diabetes mellitus cannot control blood sugar levels due to disorders in the pancreas, so they will experience hyperglycemia (increased blood sugar levels) due to not correctly absorbed sugar in the cells. Hyperglycemia is when the fasting blood sugar level is more than 125 mg/dl while the sugar level 2 hours after eating is more than 200 mg/dl. There are several impacts caused by chronic hyperglycemia and metabolic disorders in diabetes mellitus that can cause damage to tissues and organs such as the eyes, nerves, kidneys, and the vascular system. Therefore, if the glucose level in the blood is not controlled, it can cause macroscopic and microscopic complications. One of the microscopic complications in patients with diabetes mellitus is diabetic peripheral neuropathy. This is the most common complication in diabetic patients, resulting

in loss of movement perception, plantar skin sensation, and body balance

Pharmacological therapy is in the form of drugs that contain chemicals. If pharmacological therapy is used continuously and for an extended period, it has adverse effects, such as damage to the kidneys and liver. Meanwhile, non-pharmacological therapy is considered to have fewer side effects and is more economical. Based on a literature review, various non-pharmacological therapies, also known as alternative and complementary therapies, are suggested as complementary to medical therapy. Complementary and Alternative Medicine (CAM) is needed in nursing interventions to help improve a person's health status

One of the non-pharmacological methods that is currently the choice of the community is complementary therapy. Complementary therapy is a non-conventional treatment aimed at improving the health status of the community. There are many types of complementary therapy, one of which is reflexology.

The mechanism of Foot reflexology therapy has been designed to treat the patient holistically. The step-by-step procedure is followed uniformly to stimulate the following reflex regions: energy balance, lymphatic system, solar plexus, adrenal glands, spine, urinary system, digestive system, brain, other endocrine glands, sciatic nerve, knee, and hip. By improving circulation, the body's organs receive adequate blood supply, and the adrenal glands reduce the secretion of the hormones epinephrine and norepinephrine, thereby causing the blood vessels to relax due to reduced blood pressure and slowed heart rate with decreased cortisol secretion, resulting in decreased blood glucose and HbA1c. Thus, this literature review aims to see the effectiveness of foot reflexology therapy in

controlling blood glucose levels in patients with diabetes mellitus.

## Methods

This article uses the *literature review* method. Article searches were conducted in October 2023 using Google Scholar and Science Direct journal databases. The search for journal articles was carried out systematically from the last three years, namely 2020-2023, with search keywords namely "*Reflexology*," "*Reflexology*," "*Blood sugar levels*," "*Blood Glucose*," and "*Diabetes Mellitus*" to find relevant articles. Researchers will filter articles from the selected references without exception based on the title and abstract so that more and more relevant articles are obtained.

The inclusion criteria in this *systematic review* are 1) Respondents are patients with diabetes mellitus, 2)

## Results

The initial literature study found 1,074 articles (4 from *Science Direct* and 1,070 from Google Scholar). After selection, ten articles were obtained for review according to the inclusion criteria and the exclusion of inappropriate articles.

Interventions focus on *Reflexology* or Reflexology, "Blood sugar levels," and "Diabetes Mellitus," and 3) Article selection does not limit methodology, population, and results. The exclusion criteria for this *systematic review* are 1) Research that is not related to Reflexology or Reflexology, 2) Research that was not conducted on patients with diabetes mellitus, 3) Unpublished research such as final scientific papers (thesis, thesis, dissertation), conference abstracts, and case reports.

Articles that have been obtained from the database will be assessed using the PICO method by the inclusion and exclusion criteria; the money contains about 1) the Title of the article, 2) the Author and year of publication, 3) the Research methodology (population, sample, intervention, and analysis) 4) Research results.

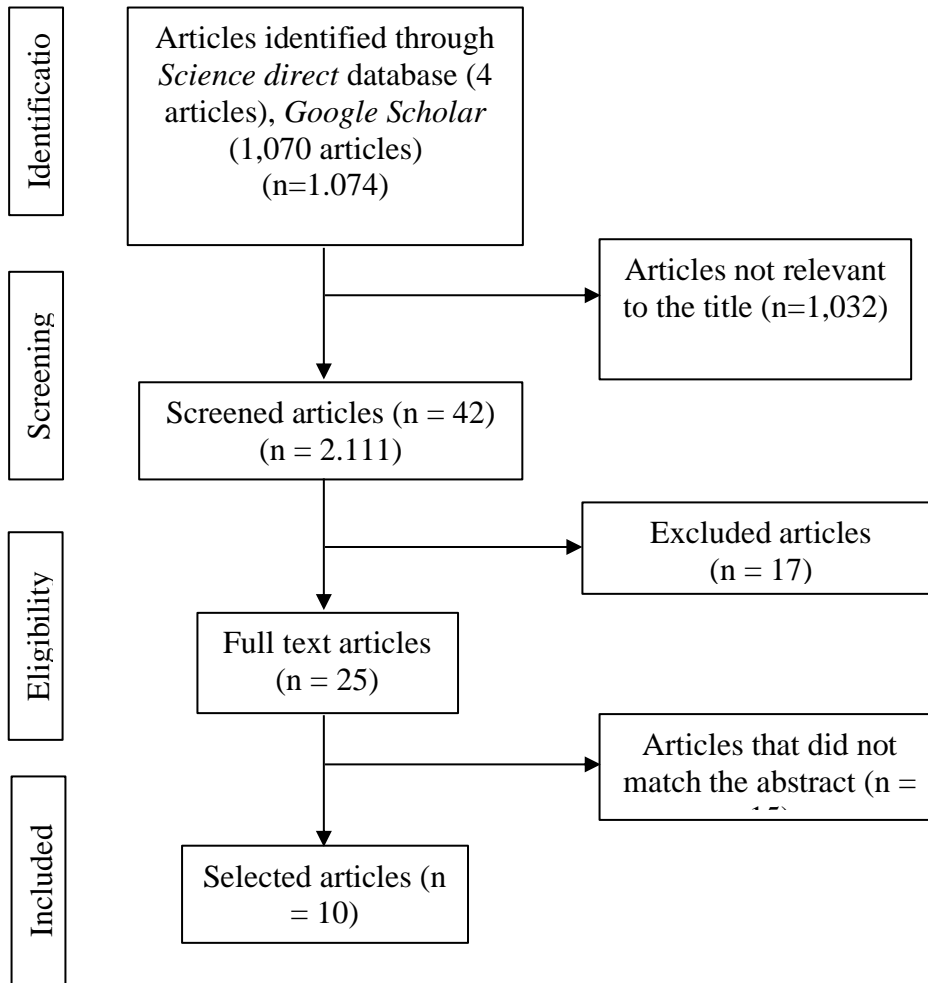


Figure 1. Literature Search Flow Diagram

Table 1. Data Distraction Method

No.	Title, Author, and Year of Publication	Research Methodology	Research Results
1.	Effectiveness of Reflexology on Diabetes Mellitus Type Patients 2 With the Nursing Problem of Blood Sugar Level Instability in RT 10 Rawa Buaya Village, West Jakarta (Lewen, 2022).	Design: pre-experimental with one group pretest-posttest design. Subjects: 21 respondents. Variables: Reflexology and Blood Sugar Instability. Instruments: pre-planning, preparation of leaflet presentation, venue, and other tools. Analysis: Statistical test paired sample t-test.	The paired sample t-test statistical test results obtained a p-value of 0.000 (<0.05%), meaning that foot reflexology affects the decrease in foot reflexology. Blood sugar levels with type II diabetes mellitus in RT 10 Rawa Buaya Village, West Jakarta.
2.	The Effectiveness of Reflexology Massage to The Reduction of Blood Sugar Level of Elderly with Type 2 Diabetes	Design: <i>pre-experimental with one group pretest-posttest design</i> . Subjects: 40 older adults aged > 50 years and above.	There is a point difference between before and after treatment of 36.15 points. There is an effect between reflexology treatment before and after at 0.0001 <0.05. Reflexology can

No.	Title, Author, and Year of Publication	Research Methodology	Research Results
	Mellitus ( <a href="#">Sari et al., 2022</a> ).	Variables: Reflexology and Elderly Blood Sugar Level Reduction. Instrument: Purposive sampling with inclusion criteria for older adults who are willing to become respondents, are not sick, and are exposed to covid 19. Analysis: univariate analysis with frequency distribution and bivariate analysis with paired sample <i>t-test</i> .	respond to the hypothalamus, activate the Hypothalamus-Pituitary-Adrenal AXIS, and produce the corticotropin-releasing factor (CRF), which stimulates the pancreas to increase insulin synthesis. One of the receptors on the target cell is the glucose transporter (GLUT 4), which carries glucose into the cell and accelerates glucose utilization, decreasing blood glucose levels.
3.	I am giving Reflexology to Patients with Type II Diabetes Mellitus with Nursing Problems of Blood Sugar Level Instability in Tiyuh Dayaasri Tumijajar West Tulang Bawang ( <a href="#">Isnainy et al., 2021</a> ).	Design: pre-experiment Subject: 2 people Variables: Reflexology and Blood Sugar Instability Instruments: pre-planning, preparation of leaflets, place, and other tools. Analysis: Diabetes mellitus health counseling and demonstration of non-pharmacological treatment of reflexology therapy.	Blood glucose levels decreased before and after therapy, and data on blood glucose values were obtained before nursing care was given, namely the first day of GDS: 215 mg/dl. After being given reflexology intervention for three days and a break for four days but still in control of diet to provide a relaxing effect, blood sugar was rechecked on day 7 (seven) from the examination results obtained, namely GDS: 189 mg/dl.
4.	Effectiveness of Foot Reflexology Therapy on Blood Glucose Control in Patients with Diabetes Mellitus ( <a href="#">Mardiana, 2021</a> ).	Design: Literature Review. Subject: 5 articles. Variables: Foot Reflexology Therapy and Blood Glucose Control. Instrument: Article search through Pubmed and Google Scholar. Analysis: Journal databases were searched using advanced search with full-text articles that met the relevant inclusion and exclusion criteria and excluded articles that did not match.	Based on the results of the literature search, 331 articles were found, and there were Five articles meet the criteria regarding the effectiveness of foot reflexology therapy. In controlling blood glucose in diabetic patients.
5.	Effect of Foot Reflexology on Neuropathy in Patients with Diabetes Mellitus ( <a href="#">Novita et al., 2023</a> ).	Design: <i>A literature review</i> . Subject: A literature review of 20 international and national indexed journals.	It was found that reflexology can reduce the pain response in the peripheral nerves (lower extremities), increase skin sensation, and reduce blood sugar levels in people with

No.	Title, Author, and Year of Publication	Research Methodology	Research Results
		<p>Variable: Foot Reflexology on Neuropathy and Blood Glucose Control.</p> <p>Instrument: Searches were conducted on international journals such as Science Direct, PubMed, and ProadCast in the range of 2022-2023, and national journals were searched on Google Scholar and journals of lecturers at the nursing faculty of the University of North Sumatra.</p> <p>Analysis: Journal databases were searched using advanced search with full-text articles matching the relevant inclusion and exclusion criteria and excluding articles that did not match.</p>	<p>diabetes mellitus. The 20 journals cited show that giving reflexology regularly can increase skin sensitivity and reduce pain response in the lower extremities. There is one study that can reduce blood sugar levels in people with Diabetes Mellitus.</p>
6.	<p>Effect of Foot Reflexology Technique on Diabetic Neuropathy Patients' Health Outcomes (<a href="#">Gomaa et al., 2022</a>).</p>	<p>Design: Quasi-experimental.</p> <p>Subjects: A purposive sample of 95 patients.</p> <p>Variables: Foot Reflexology Technique and Blood Glucose Control.</p> <p>Instrument: Structured questionnaire assessment.</p> <p>Analysis: T-test and Pearson correlation test.</p>	<p>All (100%) patients studied were aged between 45-≤60 years, all neuropathy-specific quality of life items, modified neuropathy sensory disability, peripheral circulation, and blood glucose levels improved post reflexology intervention for 90%, 87%, 72% &amp; 60% of the patients studied, respectively compared to the baseline.</p> <p>Pre-reflexology intervention with significant difference <math>p \leq 0.01</math>. Reflexology was supported in improving the quality of life and sensory function of diabetic peripheral neuropathy, lowering blood glucose, and improving peripheral circulation of diabetic neuropathy patients studied.</p>
7.	<p>Immediate effect of foot reflexology in patients with diabetic neuropathy: Randomized Clinical</p>	<p>Design: Randomized controlled clinical trial.</p> <p>Subjects: 12 participants.</p> <p>Variables: Foot reflexology in patients with diabetic</p>	<p>There are only differences in EMG (electromyography) of the right lateral gastrocnemius muscle (<math>p=0.04</math>). It is concluded that FR (foot reflexology) can produce a response in muscle</p>

No.	Title, Author, and Year of Publication	Research Methodology	Research Results
	Trial ( <a href="#">Megda et al., 2020</a> ).	neuropathy and blood sugar levels. Instruments: Surface electromyography for lateral and medial gastrocnemius muscle analysis, baropodometry. Analysis: Shapiro-Wilk test, independent t-test, and Mann-Whitney.	electrical activity besides affecting the blood sugar balance of DN2 (diabetic neuropathy type 2) patients.
8.	<b>The Effect of Foot Massage on Decreasing Glucose Levels of Diabetes Type 2 Patients in Kalisidi Village</b> ( <a href="#">Alwiyan &amp; Mukarromah, 2022</a> ).	Design: Survey method with measurement technique. Subjects: 80 people, 31 men and 49 women. Variables: Foot Massage and Glucose Level Decrease. Instrument: purposive sampling. Analysis: descriptive analysis technique.	The results showed that the blood sugar levels of Kalisidi Village residents were in the normal category 25.71% (n=9), pre-diabetes 17.14% (n=6), and the remaining 57.14% (n=20) in the diabetic category. Giving massage treatment and diet showed a decrease in the average blood sugar level of men from 245.81 mg/dl to 204.45 mg/dl and the average blood sugar level of women from 222.45 mg/dl to 182.83 mg/dl. This study concludes that the Body Mass Index (BMI) of the population of Kalisidi Village in 2021 is in the normal category of 45.71% (n = 16), blood sugar levels are in the normal category of 71.66% (n = 43), and the provision of massage and diet treatment shows a decrease in the average male blood sugar level from 245.81 mg/dl to 204.45 mg/dl and the average female blood sugar level from 222.45 mg/dl to 182.83 mg/dl.
9.	The Effectiveness of Massage Therapy on Healing Diabetic Neuropathy in Diabetes Mellitus Patients ( <a href="#">Sunarmi et al., 2022</a> ).	Design: <i>Quasy experimental pre-test and post-test</i> without a control group was used. Subjects: 30 people Variables: Massage therapy and blood sugar levels Instruments: neuropathy assessment instrument and monofilament test	The results showed that the percentage of participants with high and regular blood sugar levels before treatment was the same (50%). Meanwhile, after the intervention, the blood sugar level of participants in the normal category was 73%.

No.	Title, Author, and Year of Publication	Research Methodology	Research Results
		Analysis: Kolmogorov-Smirnov test and Wilcoxon test.	
10.	Immediate Effect of Palm Reflexology Therapy on Pancreas Area on Randomized Blood Glucose Levels in Patients with Type 2 Diabetes Mellitus: A Pilot Study ( <a href="#">Shobanadevi et al., 2022</a> ).	Design: Quasi-experiment with <i>pre-post test with control</i> . Subjects: 15 respondents Variables: Reflexology Therapy and Randomized Blood Glucose Levels Instrument: GlucoRite Portable glucometer Analysis: <i>Statistical Package for Social Sciences 16.0 (SPSS)</i>	Our participants were 15 volunteer patients with type 2 DM, five females and ten males over 18. Their average RBG (Randomized Blood Glucose) values were their average was 253.93 (SD=103.973) before and 212.47 (SD=89.415) after PRT (Palm Reflexology Therapy). This study showed that a one-session reflexology intervention focused on the direct effect of reflexology on the pancreas on both palms on random blood glucose levels in patients with type 2 diabetes mellitus. The results showed a significant reduction in RBG (Random Blood Glucose).

## Discussion

The results of the analysis of 10 journals that have been published have proven that Reflexology Reflexology Therapy can reduce blood sugar levels in people with diabetes mellitus, both controlled and uncontrolled, which is done for 20-30 minutes 12 times. Based on the results of the analysis of 10 journals, more researchers used *quasi-experiment* and *pre-experiment* methods.

Based on the results of research by ([Gomaa et al., 2022](#)) using Quasi-experimental, it was found that blood glucose levels improved after reflexology intervention for 90%, 87%, 72% & 60% of the patients studied, respectively, compared to the pre-reflexology intervention with a significant difference  $p \leq 0.01$ . Research conducted by ([Lewen, 2022](#)) used a *pre-experiment* with one group pretest-posttest design. The results of the paired sample t-test statistical test obtained a p-

value of 0.000 ( $< 0.05\%$ ), meaning that foot reflexology affects reducing blood sugar levels during type II diabetes mellitus in RT 10 Rawa Buaya Village, West Jakarta.

Research results by ([Alwiyan & Mukarromah, 2022](#)).. using descriptive analysis techniques showed that the blood sugar levels of Kalisidi villagers were in the normal category 25.71% (n = 9), pre-diabetes 17.14% (n = 6), and the remaining 57.14% (n = 20) in the diabetic category. Giving massage treatment and diet showed a decrease in the average blood sugar level of men from 245.81 mg/dl to 204.45 mg/dl and the average blood sugar level of women from 222.45 mg/dl to 182.83 mg/dl. Research results by ([Isnainy et al., 2021](#)) with Pre-Experiment shows the results that blood glucose levels decrease, namely between before therapy and after therapy, obtained data on blood glucose values before nursing care is given, namely the first day of GDS: 215 mg/dl. After being given



reflexology interventions for three days and given a break for four days but still in control of diet to provide a relaxing effect, recheck blood sugar on day 7 (seven) from the results of the examination obtained, namely GDS. 189 mg/dl: 189 mg/dl.

Diabetes mellitus is a group of metabolic disorders characterized by impaired insulin action, insulin secretion, or both, resulting in elevated blood glucose levels or hyperglycemia. Diabetes is also often called diabetes. There are several impacts caused by chronic hyperglycemia and metabolic disorders in diabetes mellitus that can cause damage to tissues and organs such as the eyes, nerves, kidneys, and the vascular system. Therefore, if blood glucose levels are not controlled, it can cause macroscopic and microscopic complications. Seeing this incidence rate, health workers, especially nurses, must provide complementary and pharmacological treatment. This complementary therapy is one of the alternative healthcare approaches, as one of the complementary therapy nursing actions that can be given to patients with diabetes mellitus is reflexology therapy. Foot reflexology is a complementary therapy that combines various techniques in nursing, such as relaxation techniques, touch, and distraction techniques. Reflexology stimulates the skin using various levels of hand pressure to improve circulation and relaxation

The previous reflexology technique to the primary technique, trendy to hot massage, is performed for one minute. Then, reflexology is performed for (the head, pituitary gland, diaphragm, lungs, kidneys, solar plexus, brain, pituitary gland, spine, heart, diaphragm, liver, pancreas, adrenal glands, ureters, and bladder). For 10 minutes on the feet to re-stimulate the points that affect the lower blood glucose blood circulation and can reach the cellular

level, resulting in improved nervous system and muscle function. The locations of the reflection points on the exclusive organs are as follows: the head turns into the bottom of the thumb up, inside the pituitary gland into the middle pad of the tip of the thumb, in the diaphragm is along the diaphragm belt, in the lungs, there is along the horizontal line of the fingers and in the kidneys is inside the edge of the large pad under the thumb. Reflexology is done in 20-30 minutes per session. In a week, three sessions are carried out 12 times,

The mechanism of Foot reflexology therapy has been designed to treat the patient holistically. The step-by-step procedure is followed uniformly to stimulate the following reflex areas: energy balance, lymphatic system, solar plexus, adrenal glands, spine, urinary system, digestive system, brain, other endocrine glands, sciatic nerve, knee, and hip. Researchers rely on the hypothesis that stimulation of these specific areas will establish homeostasis in the functional status of the lymphatic, urinary, digestive, and immune systems, along with releasing mental stress, improving diabetes control, and increasing lower limb activity. By improving circulation, the body organs receive adequate blood supply, and the adrenal glands reduce the secretion of the hormones epinephrine and norepinephrine, thus causing the blood vessels to relax as blood pressure is reduced and the heart rate slows down with decreased cortisol secretion, resulting in decreased blood glucose and HbA1c.

In addition, several studies are on the research results above, namely research conducted by (Nuwa, 2018) that the application of reflexology "reflexology" on the feet is 12 times. Namely, three sessions per week for four weeks, reflexology on the feet routinely where each session lasts 20-

30 minutes, found effective in reducing blood sugar levels.

## Conclusion

This *literature review* shows that the application of *reflexology* in patients with diabetes mellitus effectively lowers blood sugar levels, with this reflexology re-stimulate points that affect lower blood glucose, stimulating blood circulation. By improving circulation, the body's organs receive adequate blood supply, and the adrenal glands reduce the secretion of the hormones epinephrine and norepinephrine, with a decrease in cortisol secretion resulting in a decrease in blood glucose and HbA1c. This relaxation therapy can be done regularly on the feet for 12 times. That is three sessions per week for four weeks, reflexology on the feet regularly, each lasting 20-30 minutes; the results show that it effectively reduces blood sugar levels.

## Authors Contributions

The author carries out tasks from data collection, data analysis, and discussions to making manuscripts.

## Conflicts of Interest

There is no conflict of interest.

## Acknowledgment

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## References

- Alwiyan, E., & Mukarromah, S. B. (2022). The Effect of Foot Massage on Decreasing Glucose Levels of Diabetes Types 2 Patients in Kalisidi Village. *Sports Medicine Curiosity Journal*, 1(2), 86–89. <https://doi.org/10.15294/smcj.v1i2.61407>
- Dinkes Jatim. (2021). Profil Kesehatan Dinas Kesehatan Provinsi Jawa Timur

2021. *Dinas Kesehatan Provinsi Jawa Timur*, 1–149.
- Gomaa, W. S., Mohammed, H. G., Taha, A. S., & El-Fadl, N. M. A. (2022). Effect of Foot Reflexology Technique on Diabetic Neuropathy Patients' Health Outcomes Walaa. *Journal of Nursing Science - Benha University*, 3(2), 873–887.
- Isnainy, U. C. A. S., Afira, W., Furqoni, P. D., Elliya, R., Crisanto, E. Y., Novikasi, L., & Triyoso. (2021). Pemberian Pijat Refleksi pada Penderita Diabetes Melitus Tipe II dengan Masalah Keperawatan Ketidakstabilan Gula Darah di Tiyuh Dayaasri Tumijajar Tulang Bawang Barat. *Jurnal Kreativitas Pengabdian Kepada Masyarakat*, 4(1), 26–30.
- Lewen, D. (2022). Efektivitas Pijat Refleksi Pada Pasien Diabetes Mellitus Tipe 2 Dengan Masalah Keperawatan Ketidakstabilan Kadar Gula Darah Di Rt 10 Kelurahan Rawa Buaya Jakarta Barat. *Jurnal Nurse*, 5(1), 6–13. <https://doi.org/10.57213/nurse.v5i1.7>
- Mardiana, M. (2021). Efektifitas Terapi Pijat Refleksi Kaki Terhadap Pengendalian Glukosa Darah Pada Penderita Diabetes Melitus. *Jurnal Keperawatan Muhammadiyah*, 6(2), 114–121. <https://doi.org/10.30651/jkm.v6i1.7666>
- Megda, L. de F., Terra, A. M. S. V., Matos, J. B. de, Taveira, L. de M., Martínez, B. B., Pereira, R. de C., Silva, S. B., Reis, L. M. dos, Kosour, C., & Santos, A. T. S. (2020). Immediate effect of foot reflexology in patients with diabetic neuropathy - Randomized Clinical Trial. *Revista Neurociências*, 28, 1–22. <https://doi.org/10.34024/rnc.2020.v28.10444>
- Novita, A., Hutahaean, R. E., & Tanjung, R. (2023). Pengaruh Pijat Refleksi Kaki Terhadap Neuropati pada Penderita

- Diabetes Melitus. *JKH*, 3(1).
- Nuwa, M. S. (2018). Modul Kombinasi Terapi Progressive Muscle Relaxation dengan Spiritual Guided Imagery and Music (Panduan buat Perawat). In Kusnanto & S. Utami (Eds.), *Fakultas Keperawatan Universitas Airlangga*. Fakultas Keperawatan Universitas Airlangga.
- Rumaolat, W., Rumaolat, W., & Sely, M. D. (2022). The Effect of Progressive Muscle Relaxation Therapy on Reducing Anxiety Levels in Type 2 Diabetes Mellitus Clients in The Work Area of the Karangdoro Public Health Center, Semarang. *International Journal of Medicine and Health (IJMH)*, 3(1), 1–9. <https://doi.org/10.55606/ijmh.v1i4.1210>
- Sari, L. T., Wibisono, W., & Renityas, N. N. (2022). The Effectiveness of Reflexology Massage to The Reduction of Blood Sugar Level of Elderly with Type 2 Diabetes Mellitus. *Jurnal Ners Dan Kebidanan (Journal of Ners and Midwifery)*, 9(2), 142–147. <https://doi.org/10.26699/jnk.v9i2.art.p142-147>
- Shobanadevi, S., Ayda, R., Mangaiarkarasi, N., & N, M. (2022). Immediate Effects of Palm Reflexology Therapy to the Pancreatic Area on Random Blood Glucose Level in Patients with Type 2 Diabetes Mellitus: A Pilot Study *Journal of Traditional Medicine & Clinical Naturopathy*. *Journal of Traditional Medicine & Clinical Naturopathy*, 11(8), 2–4. <https://doi.org/10.4172/2573-4555.1000337>
- Sun, H., Saeedi, P., Karuranga, S., Pinkepank, M., Ogurtsova, K., Duncan, B. B., Stein, C., Basit, A., Chan, J. C. ., Mbanya, J. C., Pavkov, M. E., Ramachandaran, A., Wild, S. H., James, S., Herman, W. H., Zhang, P., Bommer, C., Kuo, S., Boyko, E. J., & Magliano, D. J. (2022). IDF Diabetes Atlas: Global, Regional and Country-Level Diabetes Prevalence Estimates for 2021 and Projections for 2045. *Diabetes Research and Clinical Practice*, 183, 1–13. <https://doi.org/https://doi.org/10.1016/j.diabres.2021.109119>
- Sunarmi, S., Isworo, A., Ari, D., Sitepu, F. Y., & Triredjeki, H. (2022). The Effectiveness of Massage Therapy on Healing of Diabetic Neuropathy in Diabetes Mellitus Patients. *Open Access Macedonian Journal of Medical Sciences*, 10(G), 190–194. <https://doi.org/10.3889/oamjms.2022.8564>