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The Effectiveness of Combining Acupressure and Bengkuang Extract in Reducing Blood Sugar Levels in Diabetes Mellitus

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Abstract

Background: Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels and is associated with an increased risk of various complications when not adequately controlled. In addition to pharmacological treatment, several complementary interventions, such as acupressure and the consumption of functional foods bengkoang extract (Pachyrhizus erosus), have been explored to support glycemic control. However, evidence regarding the combined use of these two interventions remains limited.
Objectives: To analyze the effect of combined acupressure and bengkoang extract (Pachyrhizus erosus) on blood glucose levels among patients with type 2 diabetes mellitus.
Methods: The research design applied was pre-experimental with a one group pre-test and post-test design approach without control. The study had 30 participants chosen through non-probability purposive sampling. It involved two variables: the independent variable being the intervention combination of acupressure and bengkuang extract, and the dependent variable being the reduction in blood sugar levels.
Results: The results of the statistical test showed a p value of 0.000 (<0.05), in other words, the intervention provided had a substantial influence on changes so that it can be concluded that there is an influence of the combined intervention of acupressure and bengkoang extract on reducing blood sugar in diabetes mellitus sufferers.
Conclusion: Combination therapy of acupressure and bengkoang extract is effective in reducing blood sugar levels in diabetes sufferers.

Keywords: acupressure, bengkuang extract, blood sugar levels, diabetes mellitus.

Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The International Diabetes Federation (IDF) reported that approximately 537 million adults were living with diabetes worldwide in 2021, and this number is projected to increase to 643 million by 2030 and 783 million by 2045. Diabetes remains a major public health concern in Indonesia, contributing substantially to morbidity, mortality, and healthcare expenditures. In the Special Capital Region of Jakarta, the number of individuals diagnosed with diabetes reached 290,948 in 2022, with a relatively high concentration of cases reported in Cipayung District, East Jakarta, particularly in Pondok Ranggon Village (Badan Pusat Statistik Provinsi DKI Jakarta, 2023). Chronic hyperglycemia contributes to the development of macrovascular and microvascular complications, making optimal glycemic control a primary goal in diabetes management to prevent disease progression and improve patients' quality of life (Davies et al., 2022).

In addition to pharmacological treatment, complementary approaches have been developed to support glycemic control (Setiyorini et al., 2022). One of the most widely studied interventions is acupressure, a non-invasive technique involving pressure on specific meridian points to restore physiological balance and promote the body's natural healing processes (Douglas Dupler, 2018). Previous studies have shown that stimulation of the Zusanli (ST-36) and Sanyinjiao (SP-6) acupoints may enhance insulin sensitivity, improve glucose metabolism, increase peripheral blood circulation, and modulate autonomic nervous system activity involved in glucose regulation (Abo Almaali et al., 2023; Man et al., 2021). Furthermore, Herlina et al. (2023) reported that acupressure therapy significantly reduced blood glucose levels among patients with diabetes mellitus. Acupressure is believed to stimulate neural pathways that activate endocrine responses and support organ function regulation (Herlina et al., 2023).

Another complementary approach that has gained increasing attention in diabetes management is the use of functional foods derived from natural sources (Carvalho et al., 2023; Matsinkou Soh et al., 2024). Bengkoang extract (Pachyrhizus erosus) is rich in soluble dietary fiber, particularly inulin, and contains vitamin C, B-complex vitamins, and other bioactive compounds (Jaiswal et al., 2021). Inulin is known to delay gastric emptying and glucose absorption, thereby contributing to improved glycemic control. Moreover, inulin consumption has been associated with enhanced insulin sensitivity and improved metabolic profiles among individuals with diabetes (Kaur et al., 2021). (Safitri & Nurhayati, 2019) reported that the administration of 250 g (150 mL) of bengkoang extract for seven days significantly reduced blood glucose levels in patients with type 2 diabetes mellitus.

Although previous studies have demonstrated the effectiveness of acupressure and bengkoang extract independently in reducing blood glucose levels, evidence regarding their combined use remains limited. Most studies have focused on single interventions without considering the potential synergistic effects between complementary therapy and functional food-based approaches (Abo Almaali et al., 2023; Kaur et al., 2021). To the best of our knowledge, no previous study has evaluated the combined effect of acupressure at the ST-36 and SP-6 acupoints and bengkoang (Pachyrhizus erosus) extract on blood glucose control among patients with type 2 diabetes mellitus. Therefore, this study aimed to examine the effect of combined acupressure and bengkoang extract on blood glucose levels in patients with type 2 diabetes mellitus.

Methods

The research design applied was pre-experimental with a one-group pre-test and post-test design approach without a control group. The research instruments used included an action procedure sheet and an observation sheet to evaluate changes before and after the implementation of the combined intervention of acupressure and yam extract. Blood sugar

levels were measured using a calibrated glucometer with the Nesco MultiCheck brand. The study took place in Cipayung District, East Jakarta, with a population of 6,538 people with diabetes. The sample calculation was based on the theory that for research using experimental analysis, the minimum sample size is 30 samples. This study used a sample of 30 respondents using a purposive sampling technique with inclusion criteria: 1) Type 2 diabetes mellitus sufferers with blood sugar levels > 200-400 mg / d; 2) Respondents with female gender; 3) Respondents who are willing not to consume anti-diabetic drugs during the intervention; and 4) Respondents who do not experience complications of diabetes mellitus. Exclusion criteria in this study: 1) Respondents with neuropathy complications or Gangrene wounds and 2) Respondents with a habit of never having massaged or feeling uncomfortable during acupressure massage. Respondents who were sampled did not experience drop-out in the implementation of this study.

The research process began with a pre-test to measure blood sugar levels in the intervention group using an observation sheet. Afterward, a combination of acupressure and yam extract was administered for 7 days. The acupressure was focused on the ST-36 (zusanli) and SP-6 (Sanyinjiao) points for 10 minutes on the left and right sides of the participants. This therapy was scheduled seven times (once daily). The yam extract was administered by preparing 250 grams of yam, peeling the skin using a knife, washing it thoroughly, cutting it into several pieces, then grating or blending the yam, filtering it, and pouring the extract into a glass. After reaching 150 ml, the yam extract was ready to be consumed. The yam extract was consumed once daily after lunch. After the combination of acupressure and yam extract was administered, a post-test was conducted by re-measuring blood sugar levels in the intervention group using an observation sheet. This research was conducted directly by researchers without an enumerator.

Data analysis was conducted through univariate and bivariate analysis. Univariate analysis in this study describes the characteristics of the respondents studied, followed by normality and homogeneity testing. Meanwhile, bivariate analysis was conducted to identify differences in the effect of the combination of acupressure and yam extract on reducing blood sugar levels before and after the intervention, which was analyzed using the paired sample T-test because the resulting data analysis was normally distributed and homogeneous. Data were stored using a computerized system and analyzed using SPPS. The Directorate of Research and Community Service of Bhakti Kencana University Jakarta has issued a letter of assignment and passed the research ethics test with Number: 254/08.CAB-JKT/UBK/VII/2025.

Results

A total of 30 respondents were included in this study. The demographic characteristics of the participants, including age, gender, and occupation, are presented in Table 1. Most respondents were aged 50-59 years (60.0%; n = 18), female (66.7%; n = 20), and housewives (33.3%; n = 10). As presented in Table 2, the mean blood glucose level decreased from 266.07 mg/dL before the intervention to 226.00 mg/dL after the intervention. Similarly, the median value decreased from 260.00 mg/dL to 207.50 mg/dL. The minimum and maximum blood glucose levels also declined from 205-378 mg/dL to 132-340 mg/dL, respectively, while the standard deviation increased from 43.388 to 51.759. The Shapiro-Wilk test indicated that both pre- and post-intervention blood glucose data were normally distributed ($p > 0.05$), supporting the use of a paired t-test for further analysis. As shown in Table 3, the mean difference in blood glucose levels before and after the intervention was 40.07 mg/dL, with a statistically significant result ($p = 0.000$), indicating that the combined intervention of acupressure and bengkoang extract significantly reduced blood glucose levels among patients with diabetes mellitus.

Table 1. Frequency distribution based on age, gender, and occupation (N=30)

Variabel	N	%	Total
Age			
Ages 40 - 49	7	23.3	
Ages 50 - 59	18	60.0	100 %
Ages >60	5	16.7	
Gender			
Female	20	66.7	100%
Male	10	33.3	
Occupation			
Civil servant	4	13.3	
Merchant	7	23.3	
Housewife	10	33.3	100%
Entrepreneur	9	30.0	

Table 2. Distribution of blood sugar measurements before and after the intervention in the intervention group (N=30)

Variable	Mean	Median	SD	Min	Max
Blood Sugar					
Pre intervention	266.07	260.00	43.388	205	378
Post intervention	226.00	207.50	51.759	132	340

Table 3. Average difference in blood sugar levels before and after in the intervention group (N=30)

Variabel		Mean	SD	95% CI	*P Value*
Blood Sugar	Pre	266.07	43.388	30.100-49.967	0.000
	Post	226.00	51.759		
	Difference	**40.07**			

Discussion

The results showed that the majority of respondents were aged 50–59 years (60%), female (66.7%), and housewives (33.3%). These characteristics align with the epidemiology of type 2 diabetes mellitus (DM), which shows an increased prevalence in the elderly due to decreased pancreatic β-cell function, increased insulin resistance, and metabolic changes that occur with aging. Furthermore, postmenopausal women are at higher risk of developing impaired glucose metabolism due to hormonal changes, increased visceral fat accumulation, and decreased insulin sensitivity.

Based on the results of blood sugar level measurements, an average decrease in blood sugar levels was obtained from 266.07 mg/dl before the intervention to 226.00 mg/dl after the intervention, with an average difference of 40.07 mg/dl. This decrease was confirmed by the results of the paired t-test which showed a p value = 0.000 ($p < 0.05$), so it can be concluded that the combination of acupressure at the Zusanli point (ST36) and administration of jicama extract is effective in reducing blood sugar levels in Diabetes Mellitus patients. These findings suggest that a complementary therapy approach combining physical stimulation through acupressure and nutritional intervention through jicama extract provides a synergistic effect in helping control blood glucose. The resulting reduction in blood sugar levels can be explained by several physiological mechanisms. In

acupressure therapy, stimulation of the Zusanli point (ST36) is known to activate the autonomic nervous system and increase neuroendocrine activity involving the hypothalamus, pituitary gland, and pancreas. This activation can increase insulin receptor sensitivity and stimulate insulin secretion, allowing glucose to more easily enter cells and be utilized as an energy source.

The results of this study are in line with research conducted by Jumari et al. (2019) which found a significant decrease in blood glucose levels in a group of DM patients after being given acupressure therapy, with a p value = 0.001. The study showed that stimulation of certain acupressure points can improve glucose metabolism regulation and improve glycemic control in diabetes sufferers. Similarly, research by Ingle et al. (2011) explained that acupressure plays a role in stimulating the activity of the glucose-6-phosphate enzyme involved in carbohydrate metabolism, improving pancreatic function, and accelerating glucose utilization by body tissues. The findings of this study are also supported by several international studies on the effectiveness of acupuncture or acupressure therapy in controlling diabetes. Research conducted by Chen et al. (2019) in a systematic review showed that stimulation of certain acupuncture points can increase insulin sensitivity and help lower blood glucose levels in patients with type 2 diabetes. The results of this meta-analysis concluded that acupuncture therapy can be used as a safe and effective complementary therapy to help control blood glucose levels. In addition, research by Xu et al. (2020) reported that stimulation of the ST36 point can increase the expression of glucose transporters (GLUT-4) in peripheral tissues, thereby increasing glucose uptake by cells and significantly lowering blood sugar levels.

In addition to the acupressure effect, the reduction in blood sugar levels in this study is also thought to be influenced by the bioactive compounds in jicama (Pachyrhizus erosus). Jicama is a source of dietary fiber, particularly inulin, a water-soluble prebiotic. Inulin is known to have a low glycemic index and can slow gastric emptying and reduce the rate of glucose absorption in the intestine. As a result, the increase in blood glucose levels after meals can be suppressed, helping to maintain stable blood sugar levels. The results of this study are consistent with the research of Safitri & Nurhayati, (2019) which showed that administering 250 grams or 150 ml of jicama extract for one week was able to reduce the average blood glucose level from 259.90 mg/dl to 185.40 mg/dl in type 2 DM patients. The study concluded that the inulin and antioxidant content in jicama contributed to improving glucose metabolism.

Similar findings were also reported in an international study by Ooi & Liong, (2010), which explained that consuming inulin-rich foods can increase insulin sensitivity, improve glucose metabolism, and help lower blood glucose levels in individuals with metabolic disorders. Another study by Roberfroid, (2007) showed that inulin plays a role in improving the health of gut microbiota, which in turn produces short-chain fatty acids, which contribute to increased insulin sensitivity and regulation of glucose homeostasis. Compared with previous studies, this study has the advantage of using a combination of two interventions that work through different but complementary mechanisms. Acupressure focuses on neuroendocrine stimulation and improving pancreatic function, while jicama extract works by regulating glucose absorption and increasing insulin sensitivity. The combination of these two therapies is thought to produce a greater synergistic effect than either therapy alone.

The increase in the standard deviation value after the intervention (from 43.388 to 51.759) indicates variation in response between respondents. This could be due to differences in adherence to therapy, diet, physical activity, duration of diabetes, use of antidiabetic medications, and metabolic conditions of each respondent. Nevertheless, overall, all groups showed a statistically significant trend toward lower blood sugar levels. From a health practice perspective, the results of this study have important implications: the combination of acupressure and yam bean extract can be used as a relatively safe, easy-to-perform, low-cost, non-pharmacological complementary therapy, potentially applicable

in primary healthcare and chronic disease management programs in the community. This intervention can complement pharmacological therapy to help improve glycemic control in patients with diabetes mellitus, particularly in groups requiring a holistic and sustainable approach.

Conclusion

This study demonstrated a reduction in blood glucose levels among patients with diabetes mellitus following the administration of a combined acupressure and bengkoang extract (Pachyrhizus erosus) intervention. These findings suggest that the combination of both interventions may have potential as a complementary non-pharmacological approach for supporting glycemic management in individuals with diabetes mellitus. However, given the limitations of the study design, further research employing more rigorous experimental methods and larger sample sizes is needed to confirm the potential benefits and effectiveness of this intervention.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this study.

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References

Abo Almaali, H. M., Cani, M. M., & Zghair, M. A. (2023). Effects of acupuncture at ST-36, SP-6 and ear shenmen on glucose levels in Wistar Rats with type two diabetes. *Revista Internacional de Acupuntura*, *17*(1), 100232. https://doi.org/10.1016/j.acu.2023.100232

Badan Pusat Statistik Provinsi DKI Jakarta. (2023). *Health Profile of DKI Jakarta Province 2022*. Badan Pusat Statistik Provinsi DKI Jakarta. https://jakarta.bps.go.id/en/publication/2023/09/22/62609a4f84e46e6c7cf5ca60/health-profile-of-dki-jakarta-province-2022.html

Carvalho, F., Lahlou, R. A., Pires, P., Salgado, M., & Silva, L. R. (2023). Natural Functional Beverages as an Approach to Manage Diabetes. *International Journal of Molecular Sciences*, *24*(23), 16977. https://doi.org/10.3390/ijms242316977

Chen, C., Liu, J., Sun, M., Liu, W., Han, J., & Wang, H. (2019). Acupuncture for type 2 diabetes mellitus: A systematic review and meta-analysis of randomized controlled trials. *Complementary Therapies in Clinical Practice*, *36*, 100–112. https://doi.org/10.1016/j.ctcp.2019.04.004

Davies, M. J., Aroda, V. R., Collins, B. S., Gabbay, R. A., Green, J., Maruthur, N. M., Rosas, S. E., Del Prato, S., Mathieu, C., Mingrone, G., Rossing, P., Tankova, T., Tsapas, A., & Buse, J. B. (2022). Management of Hyperglycemia in Type 2 Diabetes, 2022. A Consensus Report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*, *45*(11), 2753–2786. https://doi.org/10.2337/dci22-0034

Douglas Dupler. (2018). Acupressure. In *The Gale Encyclopedia of Alternative Medicine*. https://www.encyclopedia.com/medicine/divisions-diagnostics-and-procedures/medicine/acupressure

Herlina, M., Berutu, H., Mastari, E. S., Siburian, C. H., Silalahi, B., Noradina, N., & Simarmata, E. R. (2023). Pengaruh Terapi Akupresur Terhadap Penurunan Kadar Gula Darah Pada Pasien Dm Tipe Ii 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

Ingle, P. V., Samdani, N. R., Patil, P. H., Pardeshi, M. S., & Surana, S. J. (2011). Application of acupuncture therapy in type 2 diabetes mellitus patients. *Pharma Science Monitor*, *2*(1), 18–26. https://europub.co.uk/articles/application-of-acupuncture-therapy-in-type-2-diabetes-mellitus-patients-A-102902

Jaiswal, V., Chauhan, S., & Lee, H.-J. (2021). The Bioactivity and Phytochemicals of Pachyrhizus erosus (L.) Urb.: A Multifunctional Underutilized Crop Plant. *Antioxidants*, *11*(1), 58. https://doi.org/10.3390/antiox11010058

Jumari, J., Waluyo, A., Jumaiyah, W., & Natashia, D. (2019). Pengaruh Akupresur terhadap Kadar Glukosa Darah Pasien Diabetes Melitus Tipe 2 di Persadia RS Islam Jakarta Cempaka Putih. *Journal of Telenursing (JOTING)*, *1*(1), 38–50. https://doi.org/10.31539/joting.v1i1.536

Kaur, B., Gupta, A., & Singla, R. K. (2021). Prediction Models for Accurate Data Analysis: Innovations in Data Science. In *Data Science and Innovations for Intelligent Systems*. CRC Press.

Man, K.-M., Lee, Y.-C., Chen, Y.-I., Chen, Y. H., Chang, S. L., & Huang, C.-C. (2021). Electroacupuncture at Bilateral ST36 Acupoints: Inducing the Hypoglycemic Effect through Enhancing Insulin Signal Proteins in a Streptozotocin-Induced Rat Model during Isoflurane Anesthesia. *Evidence-Based Complementary and Alternative Medicine*, *2021*(1), 5852599. https://doi.org/10.1155/2021/5852599

Matsinkou Soh, R., Ngaha Damndja, W., & Njintang Yanou, N. (2024). Functional foods of sub-Saharan Africa and their implications in the management of type 2 diabetes: A review. *Food Science & Nutrition*, *12*(1), 24–34. https://doi.org/10.1002/fsn3.3764

Ooi, L.-G., & Liong, M.-T. (2010). Cholesterol-Lowering Effects of Probiotics and Prebiotics: A Review of in Vivo and in Vitro Findings. *International Journal of Molecular Sciences*, *11*(6), 2499–2522. https://doi.org/10.3390/ijms11062499

Roberfroid, M. B. (2007). Inulin-type fructans: Functional food ingredients. *The Journal of Nutrition*, *137*(11 Suppl), 2493S-2502S. https://doi.org/10.1093/jn/137.11.2493S

Safitri, Y., & Nurhayati, I. (2019). Pengaruh Pemberian Sari Pati Bengkuang (Pachyrhizus Erosus) Terhadap Kadar Glukosa Darah Pada Penderita Diabetes Mellitus Tipe Ii Usia 40-50 Tahun Di Kelurahan Bangkinang Wilayah Kerja Puskesmas Bangkinang Kota Tahun 2018. *Jurnal Ners*, *3*(1), 69–81. https://doi.org/10.31004/jn.v3i1.401

Setiyorini, E., Qomaruddin, M. B., Wibisono, S., Juwariah, T., Setyowati, A., Wulandari, N. A., Sari, Y. K., & Sari, L. T. (2022). Complementary and alternative medicine for glycemic control of diabetes mellitus: A systematic review. *Journal of Public Health Research*, *11*(3), 22799036221106582. https://doi.org/10.1177/22799036221106582

Xu, F., Chen, R., Ma, C., Tang, L., Wan, W., You, F., Chen, L., Li, J., Chen, Z., & Liang, F. (2020). Electroacupuncture Improves Insulin Sensitivity In High-Fat Diet-Induced Insulin Resistant Rats By Activating Sirt1 And Glut4 In Quadriceps Femoris. *Acta Endocrinologica*, *16*(3), 280–287. https://doi.org/10.4183/aeb.2020.280