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The effects of self-administered acupressure on fasting blood sugar, glycosylated hemoglobin, and anxiety levels in prediabetic women

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Abstract

Background: Several studies have investigated the effects of acupressure in patients with known diabetes. However, no studies have investigated the effects of acupressure on women with prediabetes.

Objectives: The present study aimed to investigate the effects of self-administered acupressure on fasting blood sugar (FBS), glycosylated hemoglobin (HbA1c), and anxiety levels in prediabetic women.

Methods: This randomized controlled trial was carried out on 50 women with prediabetes who referred to the Diabetes Clinic of Mazandaran University of Medical Sciences, Sari, Iran, from September 4, 2021, to February 20, 2023. Participants were randomly assigned to two groups of 25 to receive either metformin and self-administered acupressure or metformin and sham point pressure. FBS, HbA1c, and anxiety levels were measured in both groups before and 12 weeks after the intervention. All patients also received routine training. Data were analyzed using chi-square test and Fisher's exact test, independent samples t-test and analysis of covariance (ANCOVA).

Results: The two groups did not differ significantly in their mean baseline FBS and HbA1c values. However, the mean baseline anxiety was significantly higher in the control group (P=0.009). After the intervention, the mean FBS, HbA1c, and anxiety were significantly lower in the intervention group (P<0.001). After controlling for the effect of baseline anxiety scores using ANCOVA, we found that the intervention was effective in reducing mean anxiety (P<0.001).

Conclusion: Self-administered acupressure reduced FBS, HbA1c, and anxiety levels in prediabetic women. Therefore, it is recommended that nurses and physicians train prediabetic patients to use self-administered acupressure to manage their anxiety and prediabetic symptoms.

Keywords: Prediabetic state, Acupressure, Fasting blood sugar, Anxiety.

Introduction

Prediabetes refers to the intermediate stage between normal glucose tolerance and overt type-2 diabetes (T2D).[1] People with prediabetes and diabetes are more susceptible to mental health problems,[2] particularly anxiety disorders, which significantly affect their social and occupational performance.[3,4] Highly anxious prediabetics are more prone to developing T2D.[5, 6] Some

studies also reported that diabetic women are more anxious than men.[7, 8]

Medical advances have significantly reduced the side effects of diabetes, although cannot completely eliminate them.[9] Weight loss, regular exercise, and diet and lifestyle modifications can help patients manage diabetes and prevent its complications.[10] A normal glycosylated hemoglobin (HbA1c) level is an ideal indicator for the treatment and long-term management of diabetes, regardless of daily fluctuations in blood glucose levels.[11]

In addition to medical treatments, nonpharmacological and complementary therapies such as acupressure may be useful in the management of diabetes and prediabetes due to their low side effects and risks.[12,13] Acupressure is a non-invasive application of pressure to specific areas of the body and people can do it themselves.[14]

Acupressure is a traditional Chinese medicine derived from the science of acupuncture.[15] Simplicity and the potential for learning and using it by patients are among the advantages of acupressure.[16] Previous studies have demonstrated the positive effects of acupressure on relieving anxiety and promoting quality of life in patients with diabetes.[17, 18] A study reported that acupressure reduced FBS and stress levels in patients with T2D, but did not affect HbA1c levels.[19] In another study, acupressure at the ST36 acupoint decreased HbA1c levels but had no effect on FBS.[20] All of the abovementioned studies were conducted in patients with known diabetes. No study addressed the effects of acupressure on FBS, HbA1c, and anxiety levels in prediabetic people. Since anxiety levels are higher in women with diabetes than in men,[7,8] the question arises as whether acupressure can affect FBS, HbA1c, and anxiety levels in prediabetic women.

Objectives

The present study investigated the effects of self-administered acupressure on FBS, HbA1c, and anxiety levels in prediabetic women.

Methods

Study design and participants

This randomized controlled trial was carried out from Sep. 4, 2021, to Feb. 20, 2023, with prediabetic women referred to the Diabetes Clinic of Mazandaran University of Medical Sciences, Sari, Iran.

The sample size was estimated based on the results of a former study[21] where the pre- and post-intervention FBS of the group undergoing mindfulness-based stress reduction was 175.35±34.76 and 146.32±22.34, respectively. Using the formula for comparing two means and considering a type I error of 0.05, a power of 0.80, S1 of 34.76, S2 of 22.34, μ1 of 175.35, and μ2 of 146.32, 16 patients were required in each study group. However, considering the possible dropouts we recruited 25 subjects in each group.

Inclusion criteria were access to a smartphone, ability to use a common mobile-based social network, a medical diagnosis of prediabetes according to FBS and HbA1c test results[22] (i.e. a FBS ranging between 100 and 125 mg/dL or oral glucose tolerance test values between 140 and 199 mg/dL, a HbA1c value of 5.7-6.4),[1,23] willingness to participate in the study, age of 18 years and older, ability to communicate, no neuropathy confirmed by a specialist, no known psychological disorders, allergies, hepatic, renal, and heart failure, no wounds, body defects, and fractures at the acupressure points, no concurrent participation in other intervention studies, no pregnancy and lactation. Exclusion criteria were a patient's decision to withdraw from the study, failure to perform acupressure correctly, getting a serious condition needing hospitalization during the study, change in medications, taking other hypoglycemic or anxiolytic medications, failure to practice acupressure for three consecutive or alternate days, and patient death.

By referring to the diabetes clinic, 50 eligible women who had been registered at the concerned diabetes clinic were conveniently selected and using a random numbers generator software randomly allocated into two groups of 25. The patients were then assigned to the study groups according to this predetermined sequence [Figure 1].

Data collection instruments

A demographic and medical information questionnaire, the Symptom Checklist-90 (SCL-90), and a checklist were used to collect the data. The demographic and medical information questionnaire included questions on the participant's age, gender, education level, marital status, weight, blood pressure, disease duration, medications used, concomitant diseases, family history of diabetes, and the use of other complementary therapies to lower blood sugar.

The FBS and HbA1c were recorded in the checklist. The FBS was measured in a laboratory (using a Prestige 24i system) and with a fasting blood glucose kit (Pars Azmoun). The HbA1c was measured using an Optec HbA1c kit.

The anxiety subscale of the SCL-90 was used to measure the anxiety level. The SCL-90 has 90 items in 9 subscales, namely physical complaints, obsessive-compulsive

symptoms, interpersonal sensitivity, depression, anxiety, aggression, morbid fear, paranoid ideation, and psychoticism. The anxiety subscale includes 10 items that are scored on a five-point Likert scale ranging from "None=0" to "Very much=4". The total score ranges between 0 and 40, indicating no anxiety and the highest anxiety, respectively Khani *et al.,* have translated the SCL-90 into Persian and reported its cronbach's alpha as 0.82.[24]

Intervention

All patients completed the study instruments and their FBS and HbA1c were measured at baseline. To train the patients, each of the intervention and control groups was divided into small groups of 7 to 8 people, and the training took place within these small groups. All patients received education on diabetes management, dietary modification, and regular exercise. The intervention group received metformin 500 mg (as prescribed by their physicians) and self-cupressure. Participants in this group were first trained on how to find the ST36, LIV3, KD3, and SP6 acupoints on both legs and the P6 acupoint on both hands [Figure 2]. To teach acupressure to the patients, the researcher first demonstrated it, and then the patients were trained to practice this technique at home. The acupoints were detected by the patients' own fingers, and marked with a pen. The patients were then trained to perform the acupressure. The researcher applied pressure to each point for two seconds, then released the pressure for one second, and repeated the pressure. A cycle of five presses was followed by a 2-second pause. This process was repeated for five minutes at each acupoint. Similar acupoints on the legs were pressed simultaneously, but acupoints on the hands were pressed separately. The massage was performed in a circular and clockwise direction, and the pressure was applied at a depth of 1.5 cm and 3-5 kg/cm^2.[25,26] Each patient was then asked to repeat the same procedure for herself several times. The researcher observed her, gave her feedback on her performance, and finally approved her performance. Patients were asked to rub their hands together to make them warm before starting, and to perform self-acupressure on all points, once a day, for 12 consecutive weeks. All participants were phoned weekly for follow-up and to answer their questions (if any). They were also sent daily reinforcing training messages and video clips (on how to find and press each acupoint) via a social networking group (i.e. WhatsApp and Telegram messengers). Most patients owned smartphones and were members of a common social network. If the patient did not own a smartphone or was not a member of the online group, the video clips were sent to a family member so that the training could be delivered to the patient.

Patients in the control group also received metformin 500 mg (as prescribed by their physicians) and were trained to press sham points (points at a distance of 1.5 cm from the main point. FBS, HbA1c, and anxiety levels were measured again for both groups after 12 weeks.

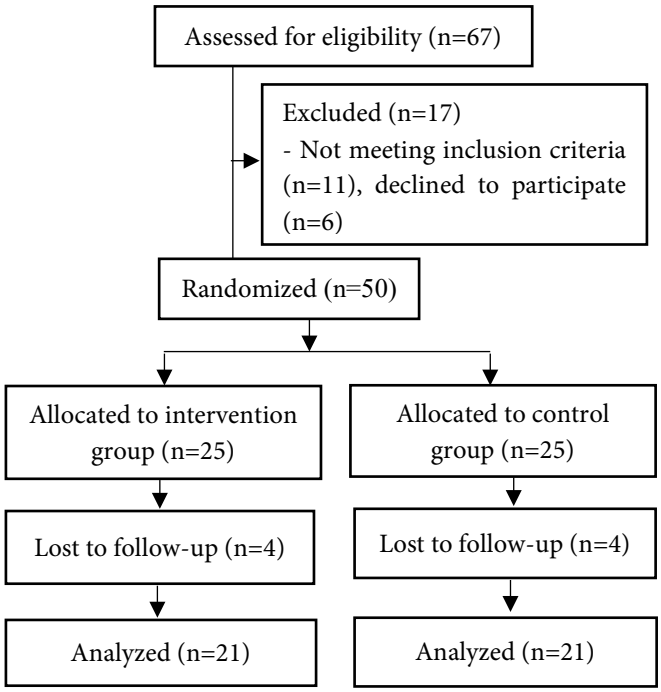

Figure 1. The study flow diagram

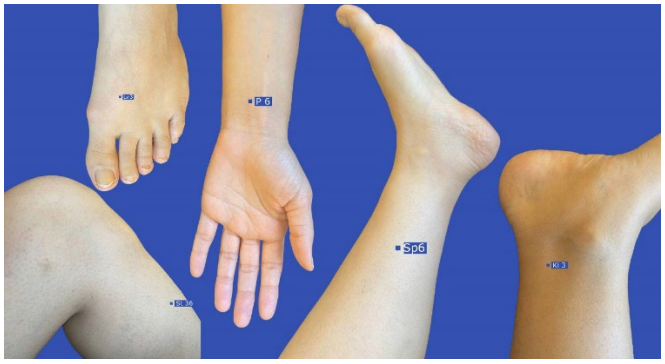

Figure 2. Acupressure points: SP6, ST36, KD3, LIV3, and P6

Ethical considerations

This study was approved by the Ethics Committee affiliated with the Research and Technology Deputy at MUMS, Sari, Iran, with ethics code no. IR.MAZUMS.REC.1398.1393. The study was also registered in the Iranian Registry of Clinical Trials (IRCT) with the code: IRCT20110906007494N36 (31-01-2021). The objectives of the study and procedures were presented to the participants, they were required to provide written and oral consent, were assured that their information

would be kept confidential, and that they could withdraw from the study at any time they desired.

Data analysis

The statistical analyses were performed using SPSS version 16. Descriptive statistics, including frequency, percentage, and mean and standard deviation were utilized to describe the data. The Shapiro–Wilk test was used to determine if the quantitative data followed a normal distribution. The chi-square test, Fisher's exact test, and independent samples *t*-test were employed to compare both study groups in terms of marital status, job, education level, and prediabetes duration. The independent samples *t*-test was also used to compare the study groups' means of FBS, HbA1c, and anxiety. To adjust for the confounding effect of anxiety, an analysis of covariance (ANCOVA) was conducted. *P* values <0.05 were considered to be statistically significant.

Results

The mean ages of the intervention and control groups were 49.57±10.47 and 48.86±8.54 years, respectively (P=0.81). The two groups did not differ significantly in their demographic variables (P>0.05) [Table 1].

The two groups did not differ significantly in their mean baseline FBS and HbA1c values. However, the mean baseline anxiety was significantly higher in the control group (P=0.009). After the intervention, the mean FBS, HbA1c, and anxiety were significantly lower in the intervention group [Table 2]. The ANCOVA was used to examine the confounding effect of baseline anxiety. After adjusting for this effect, the intervention was found to be effective in reducing mean anxiety in the intervention group (P<0.001).

Discussion

The results suggest that self-administered acupressure could significantly reduce the mean FBS value. Similar results were reported in a study that examined the effects of self-administered acupressure on FBS and insulin levels in patients with T2D.[26] Another study also compared the effects of resistive exercise and acupressure on blood glucose levels in T2D and reported that the group receiving acupressure had a significant decrease in mean FBS after the intervention.[27] A study also investigated the effect of acupressure on BS levels in patients with T2D and reported that eight weeks of acupressure significantly reduced BS levels.[28] A systematic review also concluded that acupressure can reduce BS levels in patients with diabetes.[13] Another systematic review of eight studies also concluded that acupressure had a positive effect on BS and FBS levels, but not on HbA1c levels. Researchers have attributed the lack of change in HbA1c levels to the short intervention and follow-up period of the studies.[29] The 12-week intervention and follow-up period in our study may have been sufficiently long to reveal the effect of acupressure on HbA1c levels.

The present study indicated that self-administered acupressure significantly reduced the HbA1c level. This finding contradicts the results of a previous study.[27] The discrepancy might be attributed to several factors. The latter study was conducted in patients with known diabetes and only the SP-6 acupoint was used for acupressure, whereas we studied prediabetic women and our participants pressed several acupoints. However, our study, together with other studies, signifies the beneficial effects of acupressure, especially self-administered acupressure in decreasing the FBS and HbA1c. Such positive effects may also help physicians reduce the dosage of hypoglycemic medications and minimize their side effects.

Table 1. Comparison the demographic variables between the study groups

Variables	Group [a]		P-value
	Intervention	Control	
Disease duration (month)	6.95±5.20	8.04±4.48	0.46[b]
Age (yrs.)	49.57±10.47	48.86±8.54	0.81
Marital status			
Single	4 (50)	4 (50)	>0.99[c]
Married	17 (50)	17 (50)	
Occupation			
Housewife	8 (53.3)	7 (46.7)	0.74[d]
Employed	13 (48.1)	14 (51.9)	
Education			
High school diploma or lower	12 (57.1)	9 (42.9)	0.35[d]
Academic degree	9 (42.9)	12 (57.1)	

[a] Data presented as Mean±SD or n (%), [b] Independent-samples t test, [c]Fisher's exact test, [d]Chi-square test

Table 2. Comparing pre- and postintervention FBS, HbA1c, and anxiety mean values between the study groups

Variables		Group [a]		P-value [b]
		Intervention	Control	
FBS				
	Baseline	114.85±6.31	112.09±7.98	0.221
	Post-intervention	99.61±8.57	116.28±10.55	<0.001
	P-value [c]	<0.001	0.002	
HbA1c				
	Baseline	5.96±0.25	5.88±0.19	0.247
	Post-intervention	5.54±0.38	5.99±0.29	<0.001
	P-value [c]	<0.001	0.028	
Anxiety				
	Baseline	30.95±7.37	36.19±4.45	0.009
	Post-intervention	22.33±9.07	36.66±4.29	<0.001
	P-value [c]	<0.001	0.557	

[a] Data presented as Mean±SD, [b] t-test, [c] Paired t-test

The present study showed that acupressure significantly reduces anxiety levels. This finding is consistent with some previous studies examining the effect of acupressure on anxiety in patients with T2D.[17,30] High anxiety can negatively affect patients' quality of life and even increase their blood sugar levels. Considering the deteriorating effects of high anxiety in all patients, including diabetics and prediabetics,[3,4,31] our study, along with other studies signifies the importance and beneficial effects of acupressure, especially self-administered acupressure in relieving this mental health problem.

This study had some limitations. The study was conducted in women with prediabetes. Therefore, the results may not be generalizable to prediabetic men or patients with diabetes. Furthermore, participants were only followed for 12 weeks. Longer follow-up periods may be helpful to determine the long-term effects of the intervention. Acupressure was also performed by the patients themselves. Although we trained and tested our participants and checked them regularly for correct performance, we cannot guarantee the accurate performance of our participants. Frequent contact with patients through mobile network may also have affected their anxiety level. Further studies in prediabetic men and larger sample sizes are recommended.

Conclusions

Self-administered acupressure reduced FBS, HbA1c, and anxiety levels in prediabetic women. Therefore, it is recommended that nurses and physicians train prediabetic patients to use self-administered acupressure to manage their anxiety and prediabetic symptoms.

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Competing interests

The authors declare that they have no competing interests.

Abbreviations

Fasting blood sugar: FBS;
Glycosylated hemoglobin: HbA1c;
Analysis of covariance: ANCOVA;
Type-2 diabetes: T2D;
Symptom Checklist-90: SCL-90.

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Role of the funding source

None.

Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki. This study followed the project approved by the Ethics Committee affiliated with the

Research and Technology Deputy at MUMS, Sari, Iran, with ethics code no. IR.MAZUMS.REC.1398.1393. Before the study, the patients were required to provide informed written and oral consent.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

References

1. Echouffo-Tcheugui JB, Selvin E. Prediabetes and what it means: the epidemiological evidence. Annu Rev Public Health 2021:42:59-77. doi: 10.1146/annurev-publhealth-090419-102644 PMID: 33355476 PMCID: PMC8026645
2. Graham EA, Deschenes SS, Khalil MN, Danna S, Filion KB, Schmitz N. Measures of depression and risk of type 2 diabetes: A systematic review and meta-analysis. J Affect Disord 2020: 265:224-232. doi: 10.1016/j.jad.2020.01.053 PMID: 32090745.
3. Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. Dialogues Clin Neurosci 2015 ;17(3):327-35. doi: 10.31887/DCNS.2015.17.3/bbandelow PMID: 26487813 PMCID: PMC4610617.
4. Gariepy G, Nitka D, Schmitz N. The association between obesity and anxiety disorders in the population: a systematic review and meta-analysis. Int J Obes (Lond) 2010;34(3):407-19. doi: 10.1038/ijo.2009.252 PMID: 19997072.
5. Jiang L, Atasoy S, Johar H, Herder C, Peters A, Kruse J, et al. Anxiety boosts progression of prediabetes to type 2 diabetes: findings from the prospective Cooperative Health Research in the Region of Augsburg F4 and FF4 studies. Diabet Med 2020;37(10):1737-1741. doi: 10.1111/dme.14232 PMID: 31943340.
6. Deschênes SS, Burns RJ, Graham E, Schmitz N. Prediabetes, depressive and anxiety symptoms, and risk of type 2 diabetes: A community-based cohort study. J Psychosom Res 2016:89:85-90. doi: 10.1016/j.jpsychores.2016.08.011 PMID: 27663115.
7. Collins M, Corcoran P, Perry I. Anxiety and depression symptoms in patients with diabetes. Diabet Med 2009; 26 (2): 153-61. doi: 10.1111/j.1464-5491.2008.02648.x PMID: 19236618.
8. Roupa Z, Koulouri A, Sotiropoulou P, Makrinika E, Marneras X, Lahana I, et al. Anxiety and depression in patients with type 2 diabetes mellitus, depending on sex and body mass index. Health Sci J 2009;3(1):32-40.
9. Barsun A, Sen S, Palmieri TL, Greenhalgh DG. A ten-year review of lower extremity burns in diabetics: small burns that lead to major problems. J Burn Care Res 2013;34(2):255-60. doi: 10.1097/BCR.0b013e318257d85b PMID: 22929524.
10. La Sala L, Pontiroli AE. Prevention of Diabetes and cardiovascular disease in obesity. Int J Mol Sci 2020;21(21):8178. doi: 10.3390/ijms21218178 PMID: 33142938 PMCID: PMC7663329.
11. Liu X, Wu N, Al-Mureish A. A review on research progress in the application of glycosylated hemoglobin and glycated albumin in the screening and monitoring of gestational diabetes. Int J Gen Med 2021;14:1155-1165. doi: 10.2147/IJGM.S296316 PMID: 33833555 PMCID: PMC8019620.
12. Bastani F. Effect of acupressure on maternal anxiety in women with gestational diabetes mellitus: a randomized clinical trial. Clin Nurs Res 2016;25(3):325-41. doi: 10.1177/1054773815579344 PMID: 25848127.
13. Dadkhah-Tehrani M, Adib-Hajbaghery M, Safa A. The effect of acupressure on blood sugar reduction in diabetic patients: A systematic review and meta-analysis. J Integrative Med Ther 2020;6(1): 4.
14. Mehta P, Dhapte V, Kadam S, Dhapte V. Contemporary acupressure therapy: adroit cure for painless recovery of therapeutic ailments. J Tradit Complement Med 2017;7(2):251–63. doi: 10.1016/j.jtcme.2016.06.004.
15. Musmuliadin R, Pujiastuti SE, Rumohorbo H. The influence of acupressure therapy against blood glucose levels in patients of type 2 diabetes mellitus in the Prolanis program (a study on health in Ambalawi). Warmadewa Med J 2018;3(2):65-72. doi:10.22225/wmj.3.2.804.65-72.
16. Lee EJ, Frazier SK. The efficacy of acupressure for symptom management: a systematic review. J Pain Symptom Manage 2011;42(4):589-603. doi:10.1016/j.jpainsymman.2011.01.007 PMID: 21531533 PMCID: PMC3154967
17. Shahdadi H, Shirani N, Mansouri A. The effect of acupressure on anxiety and quality of life in patients with type II diabetes. J Diabetes Nurs 2017;5(4):263-72.
18. Wang S, Chen Z, Fu P, Zang L, Wang L, Zhai X, et al. Use of auricular acupressure to improve the quality of life in diabetic patients with chronic kidney diseases: a prospective randomized controlled trial. Evid Based Complement Alternat Med 2014; 2014: 343608.doi: 10.1155/2014/343608 PMCID: PMC4276331 PMID: 25574180
19. Mood MS, Yavari Z, Taghanaki HB, Mahmoudirad G. The effect of acupressure on fasting blood glucose, glycosylated hemoglobin and stress in patients with type 2 diabetes. Complement Ther Clin Pract 2021:43:101393. doi: 10.1016/j.ctcp.2021.101393 PMID: 33894577.
20. Najafi SS, Ghorbani H, Yoosefinejad AK, Kalyani MN. The effect of acupressure on fasting blood glucose and glycosylated hemoglobin levels in diabetic patients: A randomized controlled trial. Int J Community Based Nurs Midwifery 2021; 9(2):152-158. doi: 10.30476/ijcbnm.2021.86059.1318 PMID: 33875967 PMCID: PMC8053207
21. Nikkhah Ravari O, Mousavi SZ, Babak A. Evaluation of the effects of 12 weeks mindfulness-based stress reduction on glycemic control and mental health indices in women with diabetes mellitus type 2. Adv Biomed Res 2020 ;9:61. doi: 10.4103/abr.abr_133_20 PMID: 33457344 PMCID: PMC7792882
22. Smulders Y, Serné E. Is HbA1c a good diagnostic test for (pre)diabetes in cardiac rehabilitation patients? Eur J Prev

Cardiol 2018 ;25(5):462-463. doi: 10.1177/2047487318757553 PMID: 29411623 PMCID: PMC5833023.
23. Yazdani A, Mansourian M, Faghihimani E, Zareh M, Amini M. the effects of macronutrient intake on the risk of pre-diabetes in first-degree relatives of patients with type 2 diabetes. J Isfahan Med Sch 2014; 32(301): 1475-86.
24. Khani F, Samsam Shariat MR, Mehdad A, Taki F, Kourang Beheshti M, Hekmatravan R. The effect of life skills training on improving SCL-90 psychological indicators and quality of life in patients with diabetes. Knowl Res Applied Psychol 2014;15(57):81-91.
25. Chao HL, Miao SJ, Liu PF, Lee HH, Chen YM, Yao CT,et al. The beneficial effect of ST-36 (Zusanli) acupressure on postoperative gastrointestinal function in patients with colorectal cancer. Oncol Nurs Forum 2013;40(2):E61-8. doi: 10.1188/13.ONF.E61-E68 PMID: 23448746.
26. Zarvasi A, Jaberi AA, Bonabi TN, Tashakori M. Effect of self-acupressure on fasting blood sugar (FBS) and insulin level in type 2 diabetes patients: a randomized clinical trial. Electron Physician 2018;10(8):7155-7163. doi: 10.19082/7155 PMID: 30214697 PMCID: PMC6122868.
27. Akram As, Amany Ya, Abo Eneh, Nasif Nl. Resistive exercise versus acupressure on blood glucose level in type 2 diabetes. Med J Cairo Univ 2021;89:1855-62. doi: 10.21608/mjcu.2021.203295.
28. Illahika AP, Safira H. Effects of acupressure therapy period toward blood sugar level in type 2 diabetes mellitus patients at Lumajang acupressure clinic. Qanun Medika 2021;5(1):61-7. doi:10.30651/jqm.v5i1.5097.
29. Ghorbani H, Najafi Kalyani M, Dehghan A, Kazemi Ara F. Effectiveness of acupressure on reducing blood sugar and glycosylated hemoglobin levels in patients with type 2 diabetes: A Rapid Systematic Review and Meta-analysis. Evid Based Care J 2023;13(1):35-43. doi:10.22038/EBCJ.2023.68945.2808.
30. Au DW, Tsang HW, Ling PP, Leung CH, Ip PK, Cheung WM. Effects of acupressure on anxiety: a systematic review and meta-analysis. Acupunct Med 2015;33(5):353-9. doi: 10.1136/acupmed-2014-010720 PMID: 26002571.
31. Wong H, Singh J, Go RM, Ahluwalia N, Guerrero-Go MA. The effects of mental stress on non-insulin-dependent diabetes: Determining the relationship between catecholamine and adrenergic signals from stress, anxiety, and depression on the physiological changes in the pancreatic hormone secretion. Cureus 2019;11(8):e5474. doi: 10.7759/cureus.5474 PMID: 31485387 PMCID: PMC6710489

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