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Effectiveness of Acupressure on Reducing Blood Sugar and Glycosylated Hemoglobin Levels in Patients with Type 2 Diabetes: A Rapid Systematic Review and Meta-analysis

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Abstract

Background: Acupressure as one of the complementary and alternative medicine (CAM) has become very popular in the management of various diseases such as diabetes. Although the increasing use of acupuncture, there are limited systematic reviews and meta-analyses in this field.

Aim: The present study was performed with aim to investigate the effectiveness of acupressure on the blood sugar parameters of patients with type 2 diabetes.

Method: In this rapid systematic review and meta-analysis, the studies published globally between 2010 and 2022 were searched in the PubMed, Google Scholar, and Science Direct databases with the keywords of acupressure, diabetes, complementary medicine, blood sugar and glycosylated hemoglobin as separately and in combination. To analyze data, STATA software version 11 was used to analyze data, and the random effect model method was applied for meta-analysis of the studies.

Results: Among the 411 articles found in the initial search, finally 8 articles were selected for this study. The results of the meta-analysis of studies showed that acupressure had a positive effect on blood sugar (95% CI = 0.816-1.553, P < 0.001, OR = 1.18) and fasting blood sugar (95% CI = 0.260 - 0.857, P<0.001, OR = 0.559) in diabetic patients, while it had no effect on the level of glycosylated hemoglobin (95% CI = -0.139 - 0.389, P = 0.355, OR = 0.559).

Implications for Practice: This study showed the positive effect of acupressure in reducing blood sugar and fasting blood sugar in patients with diabetes, however more studies are required to confirm the effect of acupressure on glycosylated hemoglobin.

Keywords: Acupressure, Blood sugar, Diabetes, Glycosylated hemoglobin, Meta-analysis, Systematic review

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Introduction

Diabetes mellitus (DM) is one of the most common metabolic disorders and is classified into two main types of type 1 and type 2 based on the pathological processes creating hyperglycemia (1). This disorder is a highly common chronic disease all over the world, and type 2 DM accounts for 90% of DM cases (2). Type 2 DM is a chronic and progressive disorder characterized by impaired insulin secretion and insulin resistance in the liver, adipose tissue, and skeletal muscle (3, 4). DM is the third leading cause of death worldwide (5). The International Diabetes Federation (IDF) reported that 415 million adults worldwide suffer from diabetes in 2015, and the rate is expected to increase to 642 million by 2040 (6). Poor blood sugar control leads to chronic complications, including microvascular diseases such as peripheral neuropathy, nephropathy, and retinopathy, as well as macrovascular diseases such as peripheral and central vascular diseases, which profoundly affect the quality of life of patients and their families (7). In a healthy person, fasting blood sugar is 70-99 mg/dL and glycosylated hemoglobin is less than 5.6%. Overt DM is diagnosed with fasting sugar equal to or more than 126 mg/dL or with glycosylated hemoglobin ≥6.5% (8,9). Management and treatment of DM include a wide range of pharmaceutical and non-pharmaceutical methods (10,11). The use of non-pharmaceutical methods including CAM such as acupuncture, massage, acupressure, yoga, and herbal medicines has increased in recent years. These methods play an important role in reducing blood sugar (10). CAM includes a wide range of interventions, actions, and exercises to prevent and treat diseases and improve health (11).

Among the methods of complementary medicine, acupressure by putting pressure on the body's reflex points is applied to relieve pain (12,13), control anxiety (14) and reduce blood sugar in patients (15). In this method, the whole human body is considered a cluster of pressure points, which are close to the surface of the skin (16). Also, non-invasive finger pressure on meridian channels or pressure points is applied to release endorphins in the brain, relax muscles, reduce pain, and create a comfortable feeling (15). Moreover, acupuncture increases the flow of energy in the body, which can be effective to manage diseases (17).

The results of various studies demonstrated that acupressure can affect diabetic patients (18,19). Considering the different results in this field and the need to evaluate and analyze the therapeutic effects of acupressure in type 2 diabetic patients, this study was conducted with aim to investigate the effectiveness of acupressure on the blood sugar parameters of patients with type 2 diabetes.

Methods

This rapid systematic review and meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

All globally published articles related to the purpose of this systematic and meta-analysis review were searched in in databases of PubMed, Google Scholar, and Science Direct with keywords of acupressure, blood sugar level, glycosylated hemoglobin, and type 2 DM individually and in combination. In the first step, 411 articles were obtained by simple and advanced search in the databases. Finally, 8 articles were included in the study based on the inclusion criteria.

Two members of the research team separately examined the studies based on the inclusion and exclusion criteria. The collected studies were entered into Endnote software version 8, and then those which met the inclusion criteria were selected for the review study (Figure 1).

Then two other researchers separately reviewed the finally selected studies and extracted the data including the author's name, year of publication, country, study design, participants, type of intervention, blood sugar or glycosylated hemoglobin before and after the intervention, and presented the results in the tables. Then, in cases where there was a difference between the extracted data of the two researchers, another member of the research team was consulted to solve the problem.

The studies which were conducted under the following conditions were included in this systematic review and meta-analysis:

- Studies with a clinical trial design and intervention published in Persian and English from 2010 to 2022 which were conducted on the effect of acupressure on reducing blood sugar and glycosylated hemoglobin of type 2 diabetic patients. Studies published in other languages were excluded.
- Studies conducted on type 2 diabetic patients regardless of gender, nationality, literacy level, and socio-economic status of participating patients.

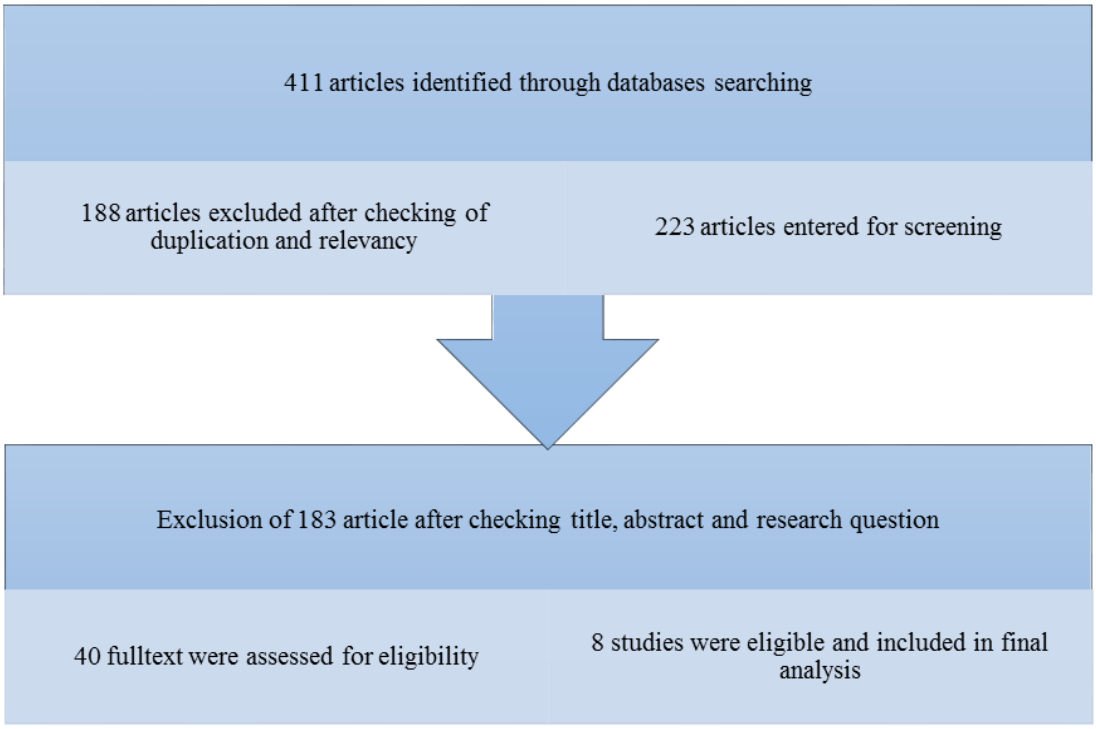

Figure 1. Flow diagram of the study

- Studies conducted using different acupressure methods and on different pressure points of the body. Studies in which other complementary and alternative medicinal methods were applied for diabetic patients were excluded from the study.

Data were analyzed by STATA software (version 11). Data meta-analysis was performed using the random effect model method. To check the homogeneity of the studies, the I^2 index was calculated. $P<0.05$ was considered statistically significant.

This study has been approved by the Ethics Committee of Shiraz University of Medical Sciences. The ethical considerations in conducting systematic review and meta-analysis studies were observed in this study.

Results

In the initial search, 411 articles were found, and after checking the inclusion and exclusion criteria, the quality of the studies, as well as the elimination of overlapping studies, finally 8 articles which met the study criteria were selected from Iran, Indonesia, Egypt, and China. The collected data included author's name, year of publication of the article, location, type of study, participants, intervention, target variable, and result, which is briefly illustrated in Tables 1, 2, and 3.

The blood sugar changes in four studies varied from 0.086 to 3.309 mg/dl. As presented in Table 1, there was a statistically significant relationship between the use of acupressure and the blood sugar in diabetic patients (CI 95=0.816-1.553, P<0.001, OR=1.18). According to chi-square = 8.86 and I square = 66.2%, heterogeneity between the studies was not significant (P=0.031). Also, Egger's test rejected the possibility of publication bias (P=0.187). The fixed effect model was used due to the homogeneity of the studies. Figure 2 showed the cumulative graph of the relationship between acupressure and blood sugar in diabetic patients based on the fixed effects model. The rhombus symbol indicated the confidence interval for 4 studies. As it is clear in the graph, since the rhombus does not cut the zero line, it can be concluded that there is a statistically significant relationship between the use of acupressure and the blood sugar in diabetic patients.

The level of changes in fasting blood sugar in the included 3 studies varied from -0.255 to 1.707. As can be seen in Table 2, there was a statistically significant relationship between the use of acupressure and fasting blood sugar in diabetic patients (CI 95=0.260-0.857, P<0.001, OR=0.559). According to chi-square = 6.62 and I square = 69.8%, heterogeneity between the studies was not significant (P=0.036). Also, Egger's test rejected the possibility of publication bias (P=0.315). the fixed effect

Table 1. Level of Blood Sugar in the analyzed studies

Authors	Year of publication	Country	Type of Study	Participants		Intervention	BS		Result
							pre	post	
Guirguis et al.	2016	Egypt	Clinical Trial	40	Experimental group: 20	Experiment: performing acupressure + routine treatments	317.5	217.9	statistically significant difference between the two groups p-value: 0.03
					Control Group: 20	Control: routine treatments	321	313.1	
Fitrullah et al.	2017	Indonesia	Pilot Experimental	30	Experimental group: 15	Experiment: performing acupressure + routine treatments	351.53	111.07	statistically significant difference between the two groups p-value: 0.0001
					Control Group: 15	Control: routine treatments	261.67	225.87	
Musmuliadin et al.	2018	Indonesia	Quasi Experimental	34	Experimental group: 17	Experiment: performing acupressure + chronic disease care program	157.88	139.53	statistically significant difference between the two groups p-value: 0.002
					Control Group: 17	Control: chronic disease care program	164.59	157.47	
Illahika et al.	2021	Indonesia	Clinical Trial	36	Control Group: 18	Experiment: 7 weeks of acupressure	278	194.83	statistically significant difference between the two groups p-value: 0.036
					Control Group: 18	Control: 3 weeks of acupressure	245.72	200.5	

Table 2. Level of Fasting Blood Sugar in the analyzed studies

Authors	Year of publication	Country	Type of study	Participants		Intervention	FBS		Result
							pre	post	
Zarvasi et al.	2018	Iran	Randomized Controlled Clinical	60	Experimental group: 30	Experiment: performing acupressure + routine treatments	128.3	122.23	no statistically significant difference between the two groups p-value: 0.25
					Control Group: 30	Control: routine treatments	139.63	142.53	
Najafi et al.	2021	Iran	Clinical Trial	102	Experimental group: 34	Experiment: performing acupressure in ST36 point + routine treatments	162.75	143.34	no statistically significant difference between the three groups p-value: 0.36
					Placebo group: 34	Placebo: performing acupressure at a wrong point + routine treatments	154.58	146.45	
					Control Group: 34	Control: routine treatments	160.1	165	
Salmani et al.	2021	Iran	Randomized controlled clinical trial	60	Experimental group: 30	Experiment: acupressure	178.23	140.63	statistically significant difference between the two groups p-value: 0.001
					Placebo group: 30	Placebo: Touching similar points	152.37	156.53	

Table 3. Level of Glycosylated Hemoglobin (HbA1c) in the analyzed studies

Authors	Year of publication	Country	Type of study	Participants		Intervention	HbA1c		Result
							pre	post	
Wang et al.	2014	China	Prospective Randomized Controlled	62	Experimental group: 31	Experiment: performing acupressure + routine treatments	8.7	8.9	no statistically significant difference between the two groups p-value: 0.536
					Control Group: 31	Control: routine treatments	9	8.3	
Sandra et al.	2016	Egypt	Clinical Trial	40	Experimental group: 20	Experiment: acupressure + routine treatments	9.305	8.105	statistically significant difference between the two groups p-value: 0.0233
					Control Group: 20	Control: routine treatments	9.39	9.045	
Najafi et al.	2021	Iran	Clinical Trial	102	Experimental group: 34	Experiment: performing acupressure in ST36 point + routine treatments	8.61	8.1	statistically significant difference between the two groups .p-value: 0.6
					Placebo group: 34	Placebo: performing acupressure at a wrong point + routine treatments	8.07	7.99	
					Control Group: 34	Control: routine treatments	8.06	8.39	
Salmani et al.	2021	Iran	randomized controlled clinical trial	60	Experimental group: 30	Experiment: performing acupressure	8.38	8.7	no statistically significant difference between the two groups p-value: 0.78
					Placebo group: 30	Placebo: Touching similar points	8.43	8.67	

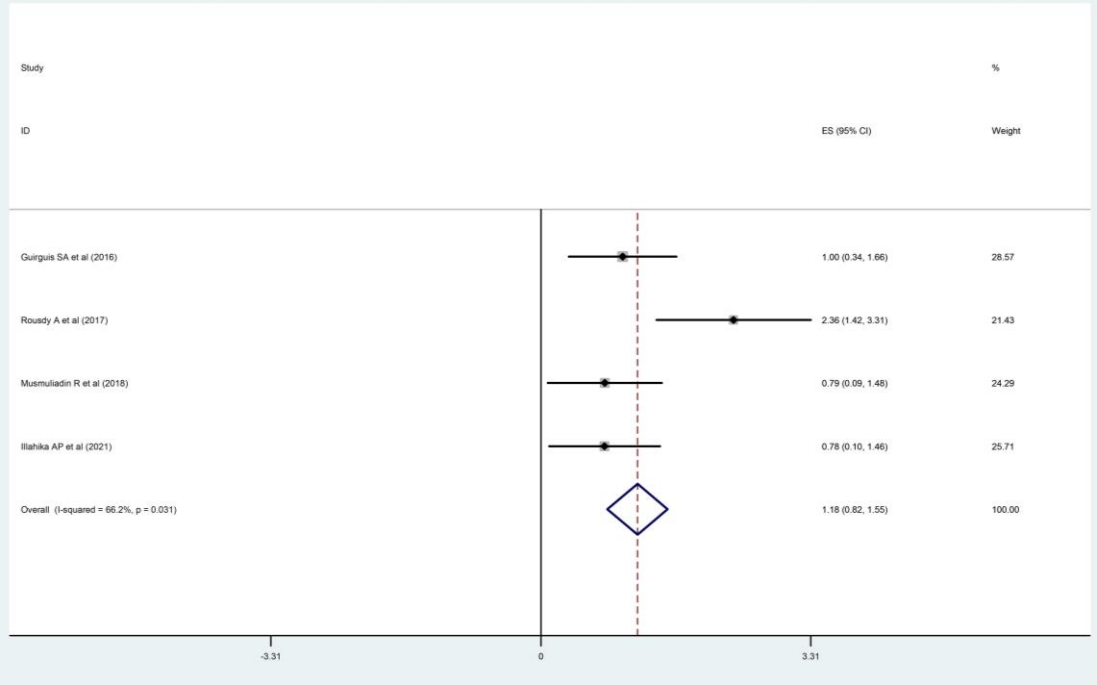

Figure 2. Effectiveness of acupressure on blood sugar in reviewed studies

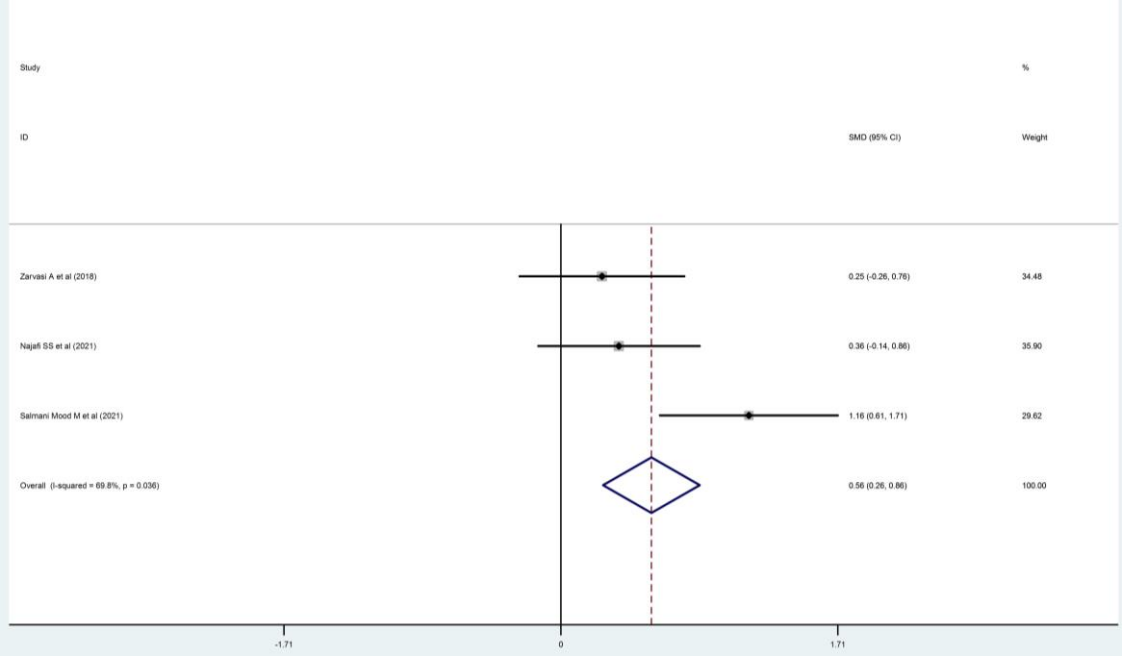

Figure 3. Effectiveness of acupressure on fasting blood sugar in reviewed studies

model was used due to the homogeneity of the studies. Figure 3 showed the cumulative graph of the relationship between acupressure and fasting blood sugar in diabetic patients based on the fixed effects model. The rhombus symbol indicated the confidence interval for 3 studies. As it is clear in this graph, since the rhombus does not intersect the zero line, it can be concluded that there is a statistically significant relationship between the use of acupressure and fasting blood sugar in diabetic patients.

In the 4 studies included in this meta-analysis, the glycosylated hemoglobin level varied from -.025 to 1.219. As shown in Table 3, there was no statistically significant relationship between the use of acupressure and glycosylated hemoglobin in diabetic patients (CI 95 = -0.139 - 0.389, P = 0.355, OR = 0.559). According to chi-square = 7.75 and I square = 61.3%, heterogeneity between the studies was not significant (P=0.05). Also, Egger's test rejected the possibility of publication bias (P=0.246). The fixed effect model was used due to the homogeneity of the studies. Figure 4 showed the accumulation

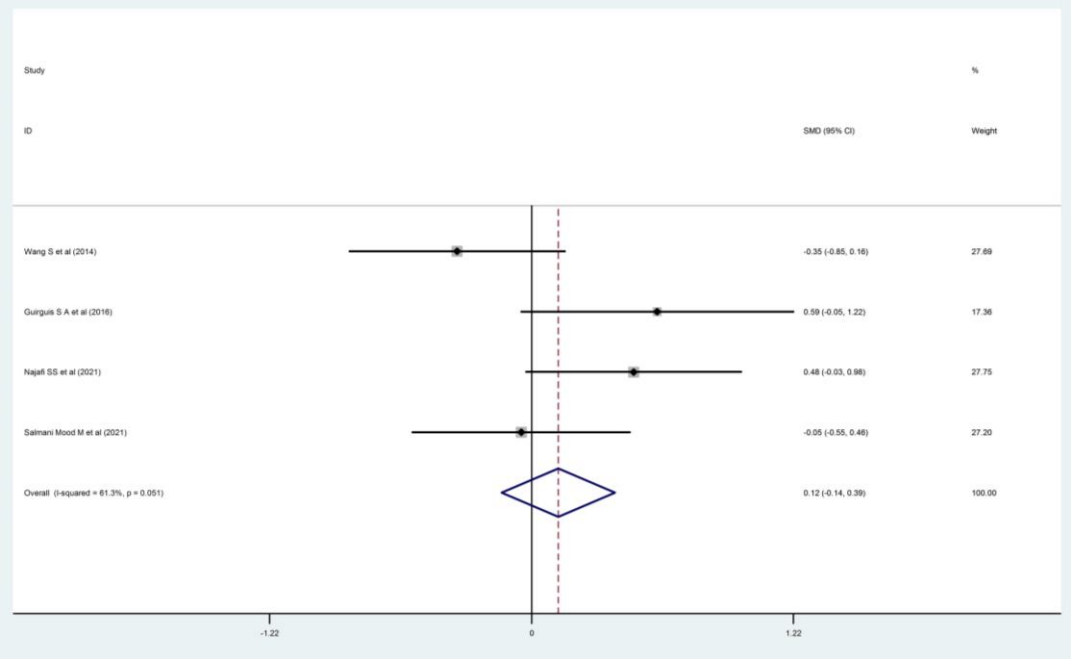

Figure 4. Effectiveness of acupressure on Glycosylated Hemoglobin in reviewed studies

diagram of the relationship between acupressure and glycosylated hemoglobin in diabetic patients based on the fixed effects model. The rhombus symbol indicated the confidence interval for 4 studies. As demonstrated in this graph, since the rhombus intersects the zero line, it can be concluded that there is no statistically significant relationship between the use of acupressure and glycosylated hemoglobin in diabetic patients. Among the 4 studies included in the final meta-analysis, the effectiveness of acupressure on glycosylated hemoglobin was reported only in the study of Guirguis et al. (20).

Discussion

The results of the present meta-analysis review of the selected studies showed that acupressure reduced blood sugar and fasting blood sugar in diabetic patients; however, it had no statistically significant effect on the glycosylated hemoglobin of these patients.

Guirguis et al. proved that the use of acupressure at the SP-6 point for 12 weeks and 3 sessions of 3 minutes every week significantly decreased blood sugar in diabetic patients compared to the control group (20). Also, Fitrullah and colleagues in their study on 30 diabetic patients demonstrated that applying acupressure at the ST-36 point for 30 minutes daily for 11 weeks significantly decreased blood sugar in the intervention group compared to the control group (15). Moreover, Musmuliadin et al. found that acupressure on the ST-36 point 3 times a week for three weeks significantly decreased blood sugar in the intervention group, but compared to other studies, this study showed less reduction (21). Also, Illahika et al. reported that applying acupressure on the SP-6 point for 8 weeks and 3 times a week for 20 minutes each time was associated with a significant decrease in blood sugar (22). Despite the differences in the acupressure points in these studies, as well as the different duration of acupressure, this intervention significantly decreased blood sugar in diabetic patients. In line with the results obtained from the present meta-analysis, Bay and colleagues demonstrated that combined treatment including acupressure and hypnotherapy caused a significant decrease in the blood level of diabetic patients (23).

Despite the difference in the duration of the intervention as well as different pressure points, the results of the present meta-analysis indicated that acupressure causes a significant decrease in fasting blood sugar in diabetic patients. Mood et al. showed that applying acupressure on LR2 and LI4 pressure points for 20 minutes every day for up to one month was effective in reducing the fasting blood sugar level of diabetic patients (19). On the contrary, Najafi et al. (18) and Zarvasi et al. (24) reported that the use of acupressure did not have a significant effect on fasting blood sugar in diabetic patients. In the study of Zarvasi and colleagues, acupressure was applied on pressure points St-36, Sp-6 and Liv-3 every day for 5 minutes for 3 weeks (24). In the study by Najafi et al., acupressure was applied on the St-36 point for 12 weeks and three sessions per week, each session lasting 3 minutes (16). Researchers believe that the use of acupressure causes the release of neurochemical mediators, and then regulates blood sugar by regulating the function of the glands, especially the pituitary-hypothalamus-adrenal axis (15). In addition, since acupressure reduces stress and relaxes patients, therefore stress control treatments have been reported to be effective on diabetic patients (25). Acupressure medicine believed that diseases are caused by energy imbalances (26), and using pressure on certain points leads to endorphin release from the brain, relaxing muscles, and as a result, the patient’s feeling comfortable (15).

Wang et al. demonstrated that the use of acupressure on ear pressure points for 3-5 minutes for 3 months didn't significantly decrease glycosylated hemoglobin level (27). Moreover, Najafi et al. showed that the use of acupressure on the St-36 point for up to 12 weeks and three sessions of 3 minutes per week did not reduce glycosylated hemoglobin (16). Also, Salmani and colleagues investigated the effect of acupressure on LR2 and LI4 pressure points for 20 minutes every day for up to one month and concluded that it was not associated with a significant decrease in glycosylated hemoglobin (19). Unlike the mentioned three studies, the study conducted by Guirguis et al. in Egypt indicated that acupressure on the Sp-6 pressure point for 12 weeks and 3 sessions of 3 minutes per week significantly reduced the level of glycosylated hemoglobin in diabetic patients (20). The results of the present meta-analysis demonstrated that acupressure did not significantly decrease glycosylated hemoglobin in diabetic patients. Contrary to the results of the present study, the results of Tur et al.'s study showed that applying acupressure in obese people decreased the level of glycosylated hemoglobin (28). Lack of statistical significance of the effect of acupressure on glycosylated

hemoglobin can be attributed to the difference in the duration of using acupressure and different points in the 4 reviewed studies.

Implications for practice

The results of this rapid systematic review and meta-analysis showed that the use of acupressure has a positive effect on blood sugar and fasting blood sugar of diabetic patients. The results of the present study can be used as reliable evidence for use in patients. According to the results obtained and considering the difference in pressure points as well as the duration of the intervention in the reviewed studies, it is suggested that in future research, a standard methodology be designed and performed with the same pressure points and the same duration of acupressure for blood sugar parameters, especially the glycosylated hemoglobin level in diabetic patients.

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Conflicts of interest

The authors declared no conflict of interest.

References

1. Kasper D, Fauci A, Hauser S, Longo D, Jameson J, Loscalzo J. Harrison's principles of internal medicine, 19e. New York, NY, USA:: Mcgraw-hill; 2015.
2. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes research and clinical practice. 2010; 87(1): 4-14.
3. Badran M, Laher I. Type II diabetes mellitus in Arabic-speaking countries. International journal of endocrinology. 2012; 2012: 902873.
4. Hussain AM, Hydrie MZ, Claussen B, Asghar S. Type 2 Diabetes and obesity: A review. Journal of Diabetology. 2010; 2(1):1-7.
5. Hinkle JL, Cheever KH. Brunner and Suddarth's textbook of medical-surgical nursing. Wolters kluwer india Pvt Ltd; 2018.
6. Atlas D. International diabetes federation. IDF diabetes atlas. Brussels: international diabetes federation. 2015;33: 2.
7. Papatheodorou K, Banach M, Bekiari E, Rizzo M, Edmonds M. Complications of diabetes 2017. Journal of diabetes research. 2018;2018: 3086167.
8. Petersmann A, Müller-Wieland D, Müller UA, Landgraf R, Nauck M, Freckmann G, et al. Definition, classification and diagnosis of diabetes mellitus. Experimental and Clinical Endocrinology & Diabetes. 2019;127(S 01):S1-7.
9. Care D. Standards of medical care in diabetes 2019. Diabetes Care. 2019;42(Suppl 1):S124-38.
10. Medagama AB, Bandara R. The use of complementary and alternative medicines (CAMs) in the treatment of diabetes mellitus: is continued use safe and effective? Nutrition journal. 2014;13:1-9.
11. Eardley S, Bishop FL, Prescott P, Cardini F, Brinkhaus B, Santos-Rey K, et aql. A systematic literature review of complementary and alternative medicine prevalence in EU. Complementary Medicine Research. 2012;19(Suppl. 2):18-28.
12. J Jalilabadi Ashtarkan M, Amir Ali Akbari S, Nasiri M, Heshmat R, Eshraghi N. Comparison of the Effect of Acupressure at SP6 and SP8 Points on Pain Intensity and Duration of the First Stage of Labor. *Evidence Based Care*. 2021; 11(2): 25-34.
13. Mansouri E, Kordi M, Badiee Aval S, Shakeri MT, Mirteimouri M. Comparison of the Effect of Pressure on Bladder-GV20 and Gallbladder-GV20 on Labor Pain Intensity among the Primiparous Women: A Randomized Clinical Trial. *Evidence Based Care*. 2018; 8(3): 7-16.
14. Akbarzadeh M, Ghaem Maghami M, Yazdan Panahi Z, Zare N, Azizi A, Mohagheghzade A. Comparative Effects of Dry Cupping Therapy and Acupressure at Acupoint (BL23) on Postpartum Anxiety in Nulliparous Women. *Evidence Based Care*. 2013; 3(2): 37-48.

15. Fitrullah RA, Rousdy A. Effectiveness of Acupressure at the Zusanli (ST-36) Acupoint as a Comfortable Treatment for Diabetes Mellitus: A Pilot Study in Indonesia. Journal of acupuncture and meridian studies. 2017; 10 (2): 96–103.
16. Kwan RY, Leung MC, Lai CK. Acupressure for agitation in nursing home residents with dementia: study protocol for a randomized controlled trial. Trials. 2014;15:1-7.
17. Song HJ, Seo HJ, Lee H, Son H, Choi SM, Lee S. Effect of self-acupressure for symptom management: a systematic review. Complementary therapies in medicine. 2015;23(1):68-78.
18. Najafi SS, Ghorbani H, Kordi Yoosefinejad A, Najafi Kalyani M. The Effect of Acupressure on Fasting Blood Glucose and Glycosylated Hemoglobin Levels in Diabetic Patients: A Randomized Controlled Trial. International Journal of Community Based Nursing and Midwifery. 2021;9(2):152-158.
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. Complementary Therapies in Clinical Practice. 2021;43:101393.
20. Guirguis SA, El-Sisi HF, Aly FA, Aly YS. Effect of Acupressure on Glycated Hemoglobin and Lipids Profile in Type 2 Diabetic Women. Med J Cairo Univ. 2016; 84:69–75.
21. 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). WMJ (Warmadewa Medical Journal). 2018;3(2):65-72.
22. Illahika AP, Safira H. Effects of acupressure therapy period towards blood sugar level in type 2 diabetes mellitus patients at Lumajang acupressure clinic. Qanun Medika. 2021;5(1):61-7.
23. Bay R, Bay F. Combined therapy using acupressure therapy, hypnotherapy, and transcendental meditation versus placebo in type 2 diabetes. Journal of acupuncture and meridian studies. 2011;4(3):183-6.
24. 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. Electronic physician. 2018;10(8):7155-7163.
25. Wändell PE, Ärnlöv J, Andreasson AN, Andersson K, Törnkvist L, Carlsson AC. Effects of tactile massage on metabolic biomarkers in patients with type 2 diabetes. Diabetes & metabolism. 2013;39(5):411-7.
26. Olsen SA. A review of complementary and alternative medicine (CAM) by people with multiple sclerosis. Occupational Therapy International. 2009;16(1):57-70.
27. 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. Evidence-Based Complementary and Alternative Medicine. 20141;2014: 343608.
28. Tür FÇ, Aksay E, Kılıç TY, Temizyürek Z. Therapeutic effects of acupuncture on obesity and HbA1c. European Journal of Integrative Medicine. 2015;7(2):88-93.