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Diabetes

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1. Systematic Reviews and Meta-Analysis

1.1. Generic Acupuncture

1.1.1. Amelia 2026

Amelia R, Pranata C, Dewi T, Nasution AM. Discovering new challenges in the pharmacological and non-pharmacological management of insulin resistance. Curr Diabetes Rev. 2026;22(7):e15733998379857. https://doi.org/10.2174/0115733998379857251113060856

Introduction	This systematic review aimed to discuss insulin resistance and its comprehensive management using both pharmacological treatments and non-pharmacological interventions applicable to patients with type 2 diabetes.
Methods	Studies published between 2018 and 2023 examining the comprehensive management of insulin resistance with antidiabetic pharmacological drugs and non-pharmaceutical interventions were identified through advanced searches in PubMed and Google Scholar according to predefined inclusion and exclusion criteria.
Results	Twenty studies met the inclusion criteria and had a low risk of bias in most domains. Non-pharmacological interventions, including a ketogenic diet, a vegetarian diet, structured exercise programs, aerobic exercise, continuous positive airway pressure (CPAP), and **electroacupuncture** therapy, were reported to significantly reduce insulin resistance and improve insulin sensitivity. Pharmacological therapies acted by stimulating insulin secretion or increasing insulin sensitivity.
Conclusion	Plant-based diets, ketogenic diets, and physical exercise appear beneficial for reducing insulin resistance through non-pharmacological approaches. Pharmacologically, metformin monotherapy remains the first-line treatment, with combination therapy considered when therapeutic targets are not achieved with monotherapy.

1.1.2. Li 2026

Li N, Xu G, Lin J, Li H, He X, Huang J, Du X, Xiang Z, Shi Z, Wang Y. Effect of acupuncture for type 2 diabetes mellitus: a systematic review and meta-analysis of randomized controlled trials. Postgrad Med J. 2026 Jan 23;102(1204):112-122. https://doi.org/10.1093/postmj/qgaf132

Background	Previous studies suggest acupuncture may be effective for various chronic conditions, but its impact on type 2 diabetes (T2DM) remains debated.
Objective	To evaluate the effect of acupuncture on blood glucose-related outcome indicators in T2DM.

Methods	We searched four databases (PubMed, Embase, Web of Science, and Cochrane Library) from inception to 3 July 2025 to identify randomised controlled trials that enrolled patients with T2DM and compared acupuncture and non-acupuncture. The analysis employed standardized mean differences with 95% confidence intervals and incorporated Prediction Intervals (PI) for each outcome. Subgroup analysis, meta-regression, sensitivity analysis, and publication bias evaluation were also performed.
Results	**Twenty RCTs involved 1479 patients** were included. The results demonstrated that the acupuncture group had significant reduction in FBG (SMD: -0.52; 95% CI:-0.91 to -0.13; P = 0.009), HbA1c (SMD:-0.76; 95% CI:-1.24 to -0.27; P = 0.002), 2hPG (SMD:-0.69; 95% CI:-1.00 to -0.39; P < 0.00001) and HOMA-IR (SMD:-1.72; 95% CI: -2.57 to -0.86; P < 0.0001), but not reveal statistically significant difference in insulin level (SMD:-1.16; 95% CI:-2.36 to 0.04; P = 0.06). The Hartung-Knapp adjustment showed consistent results, with the PI indicating potential variability in future studies.
Conclusion	Acupuncture effectively reduces FBG, HbA1c, 2hPG, and HOMA-IR in patients with T2DM, but does not significantly affect insulin levels. Our study suggests that acupuncture may serve as a valuable complementary treatment for glycemic control in T2DM. Future research should focus on optimizing acupuncture protocols, assessing its long-term effects, and investigating the biological mechanisms behind its impact.

1.1.3. Lyu 2026

Lyu T, Liu D, Li D, He D, Ma C, Li N, Pan Y, Xu Y, Zhang Y, Zhang N, Wu Y. Clinical Effect and Contributing Factors of Acupuncture for Insulin Resistance in Diabetes Mellitus: A Systematic Review and Pairwise and Exploratory Network Meta-Analysis. J Integr Complement Med. 2026;32(6):500-509. https://doi.org/10.1177/27683605251397779

Objective	To investigate whether acupuncture is effective in improving insulin resistance (IR) in patients with diabetes mellitus (DM) and whether the effect varies according to the type and dosage of acupuncture.
Methods	Systematic review with pairwise meta-analysis and exploratory network meta-analysis. PubMed, Embase, Web of Science, Cochrane Library, OpenGrey, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry were searched from inception to April 26, 2025. Risk of bias was assessed using the Revised Cochrane risk-of-bias tool for randomized trials and certainty of evidence using the GRADE approach. Randomized controlled trials evaluating acupuncture for IR in patients with DM were included.
Results	**Sixteen RCTs involving 1087 participants** were included. Compared with usual care, acupuncture significantly improved HOMA-IR (SMD = -1.13, 95% CI: -1.61 to -0.64), fasting blood sugar (FBS; SMD = -0.90, 95% CI: -1.45 to -0.35), and glycated hemoglobin (HbA1c; SMD = -0.66, 95% CI: -1.11 to -0.20), but not 2-h blood glucose (2hBG; SMD = -1.32, 95% CI: -2.83 to 0.19). Compared with sham acupuncture, acupuncture significantly improved FBS (SMD = -0.71, 95% CI: -1.18 to -0.25) but not HbA1c (SMD = -0.14, 95% CI: -0.48 to 0.19). Subgroup analyses indicated that high-dose acupuncture produced greater benefits on HOMA-IR and 2hBG. Network meta-analysis suggested that electroacupuncture (EA) might be the most promising acupuncture modality for improving IR.
Conclusion	The findings suggest that acupuncture may be an effective therapy for improving insulin resistance in patients with diabetes mellitus. Electroacupuncture and high-dose acupuncture appear to be potential contributing factors to treatment effectiveness. Safety outcomes could not be adequately assessed because of insufficient data.

1.1.4. Zhu 2026

Zhu Z, Yu H, Chen S, Wan R, Sun L, Zeng X, Zhang Y, Lai P, Zheng Q, Zhang W, Li Y. Acupuncture Therapy for Type 2 Diabetes Mellitus: A Systematic Review and Network Meta-Analysis. Res Nurs Health. 2026 Feb 3. https://doi.org/10.1002/nur.70054

Background	Type 2 diabetes mellitus (T2DM) affects the patient's quality of life. Currently, hypoglycemic drugs are mainly used for the standard care for T2DM, but they appear to cause many adverse reactions. As a traditional therapy, acupuncture has been gradually applied to the treatment of T2DM. However, the best acupuncture regimen is still uncertain. Therefore, we evaluated the clinical efficacy of various acupuncture therapies in the treatment of T2DM.
Methods	Up to December 2nd, 2024, eight databases were searched. The data were analyzed using Stata 15.1 and R 4.2.1 software. The included studies were assessed for bias using the Cochrane risk of bias tool (RoB2.0).
Results	A total of **139 randomized controlled trial** were included, involving **12,231 patients** with T2DM. The results showed that compared with conventional treatment (CT), body acupuncture + CT had the best effect on improving fasting blood glucose (FBG) (MD = -0.84, 95% CI: -1.01, -0.67; SUCRA = 84.44%) and HbA1c (MD = -1.08, 95% CI: -1.42, -0.76; SUCRA = 87.44%); auricular acupuncture + CT had the best effect on improving 2 h postprandial blood glucose (2hBG) (MD = -1.56, 95% CI: -2.05, -1.06: SUCRA = 82.10%), and laser acupuncture + CT had the best effect on improving homeostasis model assessment for insulin resistance (HOMA-IR) (MD = -2.46, 95% CI: -5.85, 0.96; SUCRA = 83.95%), fasting insulin (FINS) (MD = -7.21, 95% CI: -19, 4.54; SUCRA = 82.00%) and overall response rate (RR = 1.45, 95% CI: 0.97, 2.31; SUCRA = 84.00%) Acupuncture can effectively improve diabetes related indicators.
Conclusion	Body acupuncture, auricular acupuncture, and laser acupuncture appear to be the most advantageous options for managing T2DM. However, due to the low quality of the included studies, more evidence may be needed to verify the conclusions.

1.1.5. Lyu 2025

- Lyu T, Liu D, Li D, He D, Ma C, Li N, Pan Y, Xu Y, Zhang Y, Zhang N, Wu Y. Clinical Effect and Contributing Factors of Acupuncture for Insulin Resistance in Diabetes Mellitus: A Systematic Review and Pairwise and Exploratory Network Meta-Analysis. Diabetes Metab Syndr Obes. 2025;18:???-???. https://doi.org/10.1177/27683605251397779
- Lyu T, Liu D, Wu Y, et al. Clinical Effect and Contributing Factors of Acupuncture for Insulin Resistance in Diabetes Mellitus: A Pairwise and Exploratory Network Meta-Analysis. J Integr Complement Med. 2026. https://doi.org/10.1177/2768360525139779

Objective	The purpose of this study is to investigate whether (1) acupuncture is effective in improving insulin resistance (IR) in patients with diabetes mellitus (DM) and (2) the effect of acupuncture varies depending on the type and dosage of acupuncture.
Methods	PubMed, Embase, Web of Science, Cochrane Library, OpenGrey, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry were searched from their inception up to April 26, 2025. The risk of bias was assessed using the Revised Cochrane risk-of-bias tool for randomized trials. The Grading of Recommendations Assessment, Development and Evaluation approach was used to evaluate the credibility of findings from each outcome. Systematic review and pairwise and exploratory network meta-analysis (NMA) of randomized controlled trials (RCTs) were conducted to investigate the effectiveness and safety of acupuncture on IR in patients with DM.

Results	We included 16 RCTs from 2328 citations with 1087 participants. When compared with usual care, acupuncture had a significant effect on the homeostatic model assessment of IR (HOMA-IR; standardized mean difference [SMD] = −1.13, 95% confidence interval [CI]: −1.61 to −0.64), fasting blood sugar (FBS; SMD = −0.90, 95% CI: −1.45 to −0.35), and glycated hemoglobin (HbA1c; SMD = −0.66, 95% CI: −1.11 to −0.20) but not on 2-h blood glucose (2hBG; SMD = −1.32, 95% CI −2.83 to 0.19). When compared with sham acupuncture, acupuncture had a significant effect on FBS (SMD = −0.71, 95% CI: −1.18 to −0.25) but not on HbA1c (SMD = −0.14, 95% CI: −0.48 to 0.19). Subgroup analysis revealed that high-dose acupuncture had a more beneficial effect on HOMA-IR and 2hBG. According to the NMA, electroacupuncture (EA) might be the most promising acupuncture type for improving IR. However, we failed to analyze safety outcomes due to the inadequate data across the included studies.
Conclusion	The findings suggested that acupuncture could be an effective therapy to improve IR in patients with diabetes. EA and high-dose acupuncture are two potential contributing factors.

Background	The purpose of this study is to investigate whether (1) acupuncture is effective in improving insulin resistance (IR) in patients with diabetes mellitus (DM) and (2) the effect of acupuncture varies depending on the type and dosage of acupuncture.
Methods	PubMed, Embase, Web of Science, Cochrane Library, OpenGrey, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry were searched from their inception up to April 26, 2025. The risk of bias was assessed using the Revised Cochrane risk-of-bias tool for randomized trials. The Grading of Recommendations Assessment, Development and Evaluation approach was used to evaluate the credibility of findings from each outcome. Systematic review and pairwise and exploratory network meta-analysis (NMA) of randomized controlled trials (RCTs) were conducted to investigate the effectiveness and safety of acupuncture on IR in patients with DM.
Results	We included **16 RCTs** from 2328 citations with **1087 participants**. When compared with usual care, acupuncture had a significant effect on the homeostatic model assessment of IR (HOMA-IR; standardized mean difference [SMD] = -1.13, 95% confidence interval [CI]: -1.61 to -0.64), fasting blood sugar (FBS; SMD = -0.90, 95% CI: -1.45 to -0.35), and glycated hemoglobin (HbA1c; SMD = -0.66, 95% CI: -1.11 to -0.20) but not on 2-h blood glucose (2hBG; SMD = -1.32, 95% CI -2.83 to 0.19). When compared with sham acupuncture, acupuncture had a significant effect on FBS (SMD = -0.71, 95% CI: -1.18 to -0.25) but not on HbA1c (SMD = -0.14, 95% CI: -0.48 to 0.19). Subgroup analysis revealed that high-dose acupuncture had a more beneficial effect on HOMA-IR and 2hBG. According to the NMA, electroacupuncture (EA) might be the most promising acupuncture type for improving IR. However, we failed to analyze safety outcomes due to the inadequate data across the included studies.
Conclusion	The findings suggested that acupuncture could be an effective therapy to improve IR in patients with diabetes. EA and high-dose acupuncture are two potential contributing factors.

1.1.6. Si 2025

Si Y, Chen J, Chen L, Zheng Y, Qiu Y, Wang B, Liang Y, Zhang Y, Chen Y. The effect of acupuncture on blood glucose control in patients with type 2 diabetes: a systematic review and meta-analysis of randomized controlled trials. Front Endocrinol (Lausanne). 2025 Jun 11;16:1596062. https://doi.org/10.3389/fendo.2025.1596062

Background	Purpose: This meta-analysis aimed to ascertain the effectiveness of acupuncture in treating clinical symptoms of type 2 diabetes mellitus (T2DM) and to summarize the acupoints and meridians involved.

Methods	PubMed, Web of Science, Cochrane Library, Embase, China National Knowledge Infrastructure (CNKI), and Wanfang were thoroughly retrieved to acquire randomized controlled trials (RCTs) evaluating acupuncture as an adjunct treatment for T2DM. Outcome measures focused on improvements in T2DM clinical symptoms. The meta-analysis was implemented leveraging RevMan 5.4 and Stata 15 software, with sensitivity and subgroup analyses to assess the stability of results and identify heterogeneity sources.
Results	**21 RCTs encompassing 2,117 individuals** with T2DM were analyzed. The results of 2-hour postprandial glucose (2h PG), body mass index (BMI), fasting blood glucose (FBG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), bilateral median nerve motor conduction velocity, and plasma viscosity were reliable. No publication bias was noted, except for Packed Cell Volume (PCV) and Traditional Chinese Medicine Syndrome Score Scale (TCMSS). The meta-analysis showed that acupuncture significantly improved clinical markers such as glycated hemoglobin A1c (HbA1c), 2h PG, FBG, and fasting serum insulin (FINS). Subgroup analysis for FBG, 2h PG, and triglycerides (TG) indicated that the primary source of heterogeneity for FBG was related to participants with uncomplicated T2DM and a treatment duration of less than three months. No significant heterogeneity was observed for 2h PG, while the TG data were unstable.
Conclusion	Acupuncture can significantly alleviate the main clinical symptoms of T2DM, but significant heterogeneity was observed for individual indicators. Further investigation is needed to corroborate its precise therapeutic effectiveness and identify potential influencing factors.

1.1.7. Luo 2023

Luo J, Tao Y, Xu Y, Yang L, Zhang H, Chen Y, Liu X, Zhang Y, Lan R, Chen Y, Liu B, Deng T. Global comparison of the effect of non-pharmacological interventions on glycemic control in patients with type 2 diabetes: A network meta-analysis from 107 randomized controlled trials. J Diabetes Complications. 2023 Jul;37(7):108518. doi: 10.1016/j.jdiacomp.2023.108518

Objective	To investigate the effectiveness of non-pharmacological interventions (NPIs) on glycemic control in patients with type 2 diabetes (T2D) and to provide guidance for clinical healthcare-giver.
Design	Network meta-analysis (NMA).
Setting and participants	Randomized controlled trials comparing the effect of NPIs with usual care, waitlist, or other NPIs on glycemic control in patients with T2D.
Methods	This NMA was guided by frequentist framework. PubMed, Embase, the Cochrane Library Central Register of Controlled Trials, Cumulated Index to Nursing and Allied Health Literature, and Web of Science were searched from their inception until January 2023. The primary outcome was HbA1c and secondary outcomes were cardiovascular risk scores and related psychosocial scores. Mean differences and standardized mean differences were pooled using NMA. Study quality was assessed with the Confidence in Network Meta-analysis.

Results	A total of 107 studies (10,496 participants) were included. The median sample size of the included studies was 64 (range, 10-563) and the median duration was 3 months (range, 1-24). Compared to usual care, all NPIs except **acupuncture** (MD: -0.28; 95 % CI: -1.02, 0.26) and psychological therapy (MD: -0.29; 95 % CI: -0.66, 0.08) showed significantly differences in improving glycemic control in patients with T2D. And according to the results of surface under the cumulative ranking analysis and Cluster ranking, meditation therapy was considered to the best choice when balancing the efficacy of glycemic control with self-efficacy and diabetes related problems, while nutrition therapy was considered to the best choice when balancing quality of life with risk of cardiovascular complications.
Conclusions	These findings validate the efficacy of NPIs for glycemic control in patients with T2D and suggest that healthcare-giver should consider both the efficacy of interventions and the psychosocial needs of patients when developing NPIs programs.

1.1.8. Li 2022

Li SQ, Chen JR, Liu ML, Wang YP, Zhou X, Sun X. Effect and Safety of Acupuncture for Type 2 Diabetes Mellitus: A Systematic Review and Meta-analysis of 21 Randomised Controlled Trials. Chin J Integr Med. 2022 May;28(5):463-471. https://doi.org/10.1007/s11655-021-3450-2

Objective	To evaluate the effects of acupuncture on hypoglycaemic outcomes in type 2 diabetes mellitus (T2DM).
Methods	PubMed, Embase, Cochrane Library, and ClinicalTrials.gov were searched from inception up to July 2020, to identify randomised controlled trials (RCTs) that enrolled patients with T2DM and compared acupuncture combined with antidiabetic drugs to antidiabetic drugs alone. The primary outcomes were haemoglobin A1c (HbA1c) and fasting blood glucose (FBG). The secondary outcomes included 2-h blood glucose (2hBG), fasting insulin (FINS), homeostatic model assessment for insulin resistance (HOMA-IR), and acupuncture-related adverse events. Mean difference (MD) and 95% confidence interval (CI) were used as the effect measure in the meta-analysis. The quality of evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation tool.
Results	**Twenty-one RCTs (n=1,188)** were included. The meta-analytic results showed that the acupuncture group had greater reductions in FBG (MD -6.46 mg/dL, 95% CI -11.95 to -0.98; moderate-quality evidence) and HOMA-IR (MD -1.23, 95% CI -2.16 to -0.31; low-quality evidence), but comparable changes in HbA1c (MD -0.39%, 95% CI -0.84 to 1.61; very-low-quality evidence), 2hBG (MD -4.99 mg/dL, 95% CI -20.74 to 10.76; low-quality evidence), and FINS (MD -1.32 μIU/mL, 95% CI -3.76 to 1.12; low-quality evidence). No data on the incidence of diabetic complications were found. All acupuncture-related adverse events reported were mild.
Conclusions	The current evidence suggests that acupuncture, as a complementary therapy to antidiabetic drugs, has a small but statistically significant effect on decreasing FBG and improving insulin resistance. The effects of acupuncture on HbA1c, 2hBG, and FINS remain uncertain. Acupuncture is generally safe in patients with mild diabetes. More evidence for the long-term effects of acupuncture on T2DM is needed. (Trial registration No. CRD42018115639).

1.1.9. Zhang 2022

Zhang M, Wang CC, Lo J. Should Acupuncture-Related Therapies be Considered in Prediabetes Control? Results From a Systematic Review and Meta-analysis of Randomized Controlled Trials. Holist Nurs Pract. 2022 Jul-Aug 01;36(4):198-208. https://doi.org/10.1097/HNP.0000000000000530

Objective / Methods	To assess the effects and safety of acupuncture-related therapy (AT) interventions on glycemic control for prediabetes, we systematically searched 14 databases and 5 clinical registry platforms from inception to December 2020. Randomized controlled trials involving AT interventions for managing prediabetes were included (PROSPERO registration no. CRD42020209809).
Results	Of the 855 identified trials, **34 articles** were included for qualitative synthesis, 31 of which were included in the final meta-analysis. Compared with usual care, sham intervention, or conventional medicine, AT treatments yielded greater reductions in the primary outcomes, including fasting plasma glucose (FPG) (standard mean difference [SMD] = -0.83; 95% confidence interval [CI], -1.06, -0.61; P < .00001), 2-hour plasma glucose (2hPG) (SMD = -0.88; 95% CI, -1.20, -0.57; P < .00001), and glycated hemoglobin (HbA1c) levels (SMD = -0.91; 95% CI, -1.31, -0.51; P < .00001), as well as a greater decline in the secondary outcome, which is the incidence of prediabetes (RR = 1.43; 95% CI, 1.26, 1.63; P < .00001).
Conclusion	AT is thus a potential strategy that can contribute to better glycemic control in the management of prediabetes. Because of the substantial clinical heterogeneity, the effect estimates should be interpreted with caution. More research is required for different ethnic groups and long-term effectiveness.

1.1.10. Chen 2019

Chen C, Liu J, Sun M, Liu W, Han J, Wang H. Acupuncture for type 2 diabetes mellitus: A systematic review and meta-analysis of randomized controlled trials. Complement Ther Clin Pract. 2019:100-112. [200050].

Background	Acupuncture has been used to treat type 2 diabetes (T2DM) for 2000 years and there are emerging clinical evidence and animal studies for its efficacy. However, we are unable to conclude the effectiveness and safety on this issue yet. OBJECTIVES: To assess the effects and safety of acupuncture for T2DM.
Methods	We systematically searched 5 databases and 2 clinical registry platforms from inception to 2018-6-4. RCTs for acupuncture or its variants compared with sham acupuncture or no acupuncture controls for T2DM were included. The primary outcomes were glycemic control and adverse events.
Results	A total of **21 studies**, which comprised a total of **1943 participants**, were included in the final meta-analysis. Compared with sham acupuncture or no acupuncture plus baseline treatments, acupuncture plus baseline treatments yield reduction in FBG(MD 1.21 mmol/l, 95%CI 1.56 to 0.87), 2 h BG(MD 2.13 mmol/l, 95%CI 2.79 to 1.46), HA1c (MD 1.12%, 95%CI 1.62 to 0.62). Our results also show acupuncture can improve blood lipids and blood pressure control, and reduce weight.
Conclusions	As one type of multifactorial intervention, acupuncture could be recommended as a supplementary treatment in the management of T2DM, especially in those with obesity or metabolic disorders. However, due to the small sample size, poor methodological quality of trials reviewed, the amount of evidence is not fully convincing. There is a need for well-planned, long-term studies.

1.1.11. Wu 2019

Wu L, Chen X, Liu Y, Lan J, Wu C, Li Z, Lu L, Yi W. Role of acupuncture in the treatment of insulin resistance: A systematic review and meta-analysis. Complement Ther Clin Pract. 2019:11-22. [205270]. DOI

Background	and purpose Acupuncture has gained increasing attention in the treatment of insulin resistance (IR). This study systematically reviews the efficacy of acupuncture on clinical IR outcomes.
Methods	Cochrane Central Register of Controlled Trials, Embase, Medline (via OVID), China National Knowledge Infrastructure (CNKI), Wan Fang and China Science and Technology Journal Database (VIP) were searched to collect randomized controlled trials (RCTs) of patients with IR treated by acupuncture. Meta-analysis was performed by RevMan 5.3.
Results	With acupuncture, the homeostasis model assessment of insulin resistance (homa-IR) significantly decreased (mean difference (MD) = -1.04, 95% confidence interval (CI) -1.37 to -0.71; P < 0.00001), as did fasting blood glucose (FBG) (MD = -0.56, 95% CI -0.88 to -0.25; P = 0.0005), 2 h postprandial blood glucose (2hPG) (MD = -0.91, 95% CI -1.62 to -0.20; P = 0.01), and fasting insulin (FINS) (MD = -3.23, 95% CI -4.14 to -2; P < 0.00001). Meanwhile, the insulin sensitivity index (ISI) (MD = 0.36, 95% CI 0.18 to 0.53; P < 0.0001) increased, and fewer adverse events occurred.
Conclusion	Acupuncture may improve homa-IR, ISI, FBG, 2hPG and FINS with fewer adverse events than other treatments, making it a viable treatment for IR.

1.1.12. Shi 2018

Shi Liwei, Ni Qing, Li Xiaowen, Du Lijuan. [Systematic Review of Interventional Effect of Acupuncture and Moxibustion on Impaired Glucose Regulation]. Journal of Fujian University of Traditional Chinese Medicine. 2018;1:60-66. [201789].

Objective	To systematically assess the efficacy and safety of acupuncture and moxibustion on impaired glucose regulation.
Methods	The databases of CNKI, VIP, Wan Fang, CBM, Pub Med,Embase,Clinicaltrails.gov and the Cochrane Library were searched to identify all published randomized controlled trials(RCTs) on acupuncture and moxibustion for treatment of impaired glucose regulation(IGR)from the database inception date to November 8,2016. Eligible studies were included. The Cochrane Risk of Bias tool was used to evaluate the methodological quality of the eligible studies. The statistical analysis was performed by Review Manager 5.3.
Results	**Eleven RCTs with 970 participants** were included. The methodological quality of the included studies was generally low. Six trials reported that its random sequence was generated by a random number table and one trial described the allocation concealment and blinding of outcome assessment. Publication bias was assessed by the funnel plot based on fasting plasma glucose(FPG) reported in the 11 trials. The funnel plot was asymmetrical, indicating that potential publication bias might influence the results of this review. Three trials reported the effect of acupuncture and moxibustion on improving glucose toleration. Two of the three trials showed that acupuncture and moxibustion could promote the normalization of glucose toleration, but the remaining one reported that there was no statistically significant difference between acupuncture plus lifestyle interventions and lifestyle interventions alone in improving glucose toleration(P <0.05). This review also showed that acupuncture and moxibustion were probably associated with the improvement of FPG and 2 h postprandial blood glucose(2 h PG). In view of the limited number of included studies and the significant heterogeneity among these trials, the review couldn’t assess the effects of acupuncture and moxibustion on improving blood glucose, hemoglobin A1 c(Hb A1 c),body mass index(BMI) and insulin resistance. Only one trial clearly reported that no adverse reactions occurred in the trial. Sensitivity analysis and Meta-analysis were not performed due to generally poor methodological quality, potential publication bias and the variety of clinical interventions.

Conclusions	Acupuncture and moxibustion appears to play a role in the treatment of impaired glucose regulation, however, a firm conclusion about the efficacy and safety can not be drawn from this review due to the generally low methodological quality and small sample size. More evidence from high quality trials is needed to support the clinical use of acupuncture and moxibustion.

1.1.13. Song 2018 ☆

Song AQ, Zhang YP, Chen R, Liang FX. Is Acupuncture Effective for Improving Insulin Resistance? A Systematic Review and Meta-analysis. Curr Med Sci. 2018;38(6):1109-1116. [189853].

Objective	This study aimed to evaluate the clinical efficacy of acupuncture for intervening insulin resistance (IR) by meta-analysis of related randomized controlled trials (RCTs).
Methods	Studies published prior to 31 January 2018 were searched on Pubmed, Medline, Cochrane Library, Embase databases and Chinese databases. Only RCTs, which examined acupuncture as the sole or adjunctive treatment for IR-related diseases, were included. The primary outcome was homeostasis model assessment for insulin resistance (HOMA-IR). The secondary outcomes consisted of fasting blood glucose (FBG), fasting insulin (FINS) and 2-h postprandial blood glucose (2h-PBG). The differences between groups were reported as mean differences (MD). All statistical analyses were performed using RevMan software 5.3. After carefully screening relevant studies,
Results	**9 RCTs involving 562 patients** (279 in experimental group and 283 in control group) were enrolled in this study. The pooled results showed that acupuncture had significant effects on HOMA-IR (MD 0.70, 95% CI 0.04 to 1.35, P=0.04<0.05), FINS (MD 3.35 Mu/L, 95% CI 1.99 to 4.7, P<0.001) and 2h-PBG (MD 1.03 mmol/L, 95% CI 0.25 to 1.82, P=0.01). However, the differences in FBG were not significant (MD 0.28 mmol/L, 95% CI-0.28 to 0.84, P=0.32>0.05).
Conclusions	The present meta-analysis indicated that acupuncture can help to improve IR to a certain extent, which remains to be confirmed by further high-quality RCTs.

1.1.14. Zheng 2016 ☆☆

Zheng Qi-Yan, Yang Hui-Sheng, Xiang Rong-Rong, Duyan-Yi, Lu Qin, Zhang Yu-Shuo, Wang Han, Wu Song. [Meta-analysis of acupuncture treatment for type 2 diabetes]. Shanghai Journal of Acupuncture and Moxibustion. 2016;5:618-622. [187053].

Objectives	To systematically assess the efficacy and safety of acupuncture in treating type 2 diabetes.
Methods	Methods Related literature was retrieved with a computer. After the data were sifted out from the literature according to the established criteria, they were collected and crossly checked by two researchers independently. The data were input to RevMan5. 2 for statistical analysis.

Results	A total of **ten studies were included with a total of 743 patients**. The results of Meta-analysis showed 1) Post-treatment total efficacy rate was higher in the acupuncture or combined acupuncture and medicine group than in the control group [OR=3. 60, 95%CI (2. 11, 6. 13)] and there was a statistically significant difference (Z=4. 71, P<0. 00001); 2) Post-treatment range of decrease in fasting blood glucose (FBG) was significantly higher in the experiment group than in the control group [WMD=-1. 20, 95%CI (-1. 38, -1. 02)] and there was a statistically significant difference (Z=12. 88, P<0. 00001); 3) Post-treatment range of decrease in 2-h postprandial blood glucose (2hPBG) was significantly higher in the experiment group than in the control group [WMD=-1. 27, 95%CI (-1. 47, -1. 06)] and there was a statistically significant difference (Z=12. 02, P<0. 00001).
Conclusions	Clinically acupuncture or combined acupuncture and medicine is **more effective than Chinese herbal medicine or Western medication alone** in treating T2DM and has no toxic and side effects.

1.1.15. Xing 2015 ☆

Xing Guo-Chun, Sun Zhi, Ma Yong-Chun, Fan Qun. [Meta-analysis of acupuncture on the pancreas islet function of patients with type-2 diabetes]. Journal of Nanjing University of Traditional Chinese Medicine（Natural Science）. 2015;4:397-400. [187012].

Objectives	To have a systematic evaluation of the influence of acupuncture on patients with type-2diabetes.
Methods	Randomized controlled trials related to this subject were searched. HOMA-IR, ISI were used as the evaluation indexes to conduct the Meta-analysis.
Results	**Eight researches were selected** and the Meta-analysis showed that fasting blood-glucose [WMD=-0. 81, 95%CI (-0. 98, -0. 64), P<0. 01], fasting insulin [WMD=-2. 67, 95%CI= (-3. 35, -1. 98), P<0. 01], insulin resistance index [WMD=-1. 51, 95%CI (-1. 96, -1. 06), P<0. 01], and insulin sensitivity index [WMD=0. 80, 95%CI (0. 36, 1. 24), P<0. 01]showed **better improvement in the acupuncture groups than the control groups**. The difference had statistical significance.
Conclusions	Acupuncture can significantly improve the pancreas islet function of patients with type-2diabetes and is worthy of widely application.

1.1.16. Cai 2010 ☆

Cai Yan, Peng Chu-Xiang. [Meta-analysis on acupuncture treatment of diabetes]. Chinese Archives of Traditional Chinese Medicine. 2010;11:2412-241. [186930].

Objectives	Systematic evaluation of the efficacy of acupuncture treatment of diabetic.
Methods	I electronically searched CNKI, VIP, then the studies meeting the requirement were reviewed by Meta-analysis. Acupuncture retrieval of randomized controlled trials of diabetes and Meta Analysis.
Results	**Seven studies of randomized controlled trials of acupunctuae treatment of diabetes**, Meta-analysis of results showed that acupuncture treatment of diabetes significantly. The total odds ratio (OR) = 7. 55, 95% CL was (4.71 to 12.10), There was a significant difference between the two (P < 0. 00001) " Funnel plot" graphics show the existence of publication bias.
Conclusions	The study shows Clinical efficacy of acupuncture treatment of diabetes significantly.

1.2. Special Acupuncture Techniques

1.2.1. Comparison of Acupuncture techniques

1.2.1.1. Qi 2026

Qi X, Wang T, Liao L. Non-pharmacological therapies of traditional Chinese medicine in prediabetes: a systematic review and network meta-analysis of randomized controlled trials. Front Endocrinol (Lausanne). 2026;17:1907358. https://doi.org/10.3389/fendo.2026.1907358

Background	Prediabetes is an independent risk factor for diabetes complications and all-cause mortality. Non-pharmacological therapies of traditional Chinese medicine (NPTTCM) offer promising alternatives for prediabetes, yet their comparative efficacy remains unclear. The present study aimed to evaluate the efficacies of 6 NPTTCM (acupuncture, acupoint catgut embedding (ACE), Baduanjin, electroacupuncture, massage and Taiji) in prediabetes intervention.
Methods	Eight databases were searched for randomized controlled trials (RCTs). The network meta-analyses were performed to estimate mean differences and 95% confidence intervals and surface under the cumulative ranking curve (SUCRA) was used to rank NPTTCM.
Results	Fifty-one RCTs (4,129 participants) were included. Massage, **electroacupuncture**, Baduanjin and **acupuncture** significantly reduced fasting plasma glucose (FPG) compared with lifestyle interventions. Massage (SUCRA: 99.3%) was the most effective in FPG reduction, followed by electroacupuncture, Baduanjin, acupuncture. All therapies significantly improved 2-hour postprandial plasma glucose (2hPG), among them, massage (SUCRA: 94.1%) was the best, followed by electroacupuncture, Taiji, acupuncture, Baduanjin and ACE. **Acupuncture** (SUCRA: 81.8%) was the only intervention that significantly reduced HbA1c. Furthermore, electroacupuncture, massage and acupuncture significantly reduced body mass index (BMI), with electroacupuncture (SUCRA: 98.8%) the best, followed by massage and acupuncture. Electroacupuncture and Baduanjin significantly reduced total cholesterol, with electroacupuncture (SUCRA: 79.7%) the best, Baduanjin the second. ACE and Baduanjin significantly reduced triglycerides, with ACE (SUCRA: 74.9%) the best, Baduanjin the second.
Conclusion	NPTTCM may provide potential benefits for improving metabolic outcomes in prediabetes. Massage showed a favorable ranking for reducing FPG and 2hPG, while acupuncture showed a favorable ranking for HbA1c reduction. Electroacupuncture and ACE showed potential benefits for BMI and lipid management. However, given the limitations, these results should be interpreted with caution. Future head-to-head and rigorously designed studies are needed to provide further evidence.

1.2.1.2. Zhu 2026

Zhu Z, Yu H, Chen S, Wan R, Sun L, Zeng X, Zhang Y, Lai P, Zheng Q, Zhang W, Li Y. Acupuncture Therapy for Type 2 Diabetes Mellitus: A Systematic Review and Network Meta-Analysis. Res Nurs Health. 2026;49(2):180-192. https://doi.org/10.1002/nur.70054

Background	Type 2 diabetes mellitus (T2DM) affects the patient's quality of life. Currently, hypoglycemic drugs are mainly used for the standard care for T2DM, but they appear to cause many adverse reactions. As a traditional therapy, acupuncture has been gradually applied to the treatment of T2DM. However, the best acupuncture regimen is still uncertain.
Objective	Therefore, we evaluated the clinical efficacy of various acupuncture therapies in the treatment of T2DM.
Methods	Up to December 2nd, 2024, eight databases were searched. The data were analyzed using Stata 15.1 and R 4.2.1 software. The included studies were assessed for bias using the Cochrane risk of bias tool (RoB2.0). A total of **139 randomized controlled trials** were included, involving **12,231 patients** with T2DM.
Results	The results showed that compared with conventional treatment (CT), body acupuncture + CT had the best effect on improving fasting blood glucose (FBG) (MD = -0.84, 95% CI: -1.01, -0.67; SUCRA = 84.44%) and HbA1c (MD = -1.08, 95% CI: -1.42, -0.76; SUCRA = 87.44%); auricular acupuncture + CT had the best effect on improving 2 h postprandial blood glucose (2hBG) (MD = -1.56, 95% CI: -2.05, -1.06: SUCRA = 82.10%), and laser acupuncture + CT had the best effect on improving homeostasis model assessment for insulin resistance (HOMA-IR) (MD = -2.46, 95% CI: -5.85, 0.96; SUCRA = 83.95%), fasting insulin (FINS) (MD = -7.21, 95% CI: -19, 4.54; SUCRA = 82.00%) and overall response rate (RR = 1.45, 95% CI: 0.97, 2.31; SUCRA = 84.00%) Acupuncture can effectively improve diabetes related indicators.
Conclusion	Body acupuncture, auricular acupuncture, and laser acupuncture appear to be the most advantageous options for managing T2DM. However, due to the low quality of the included studies, more evidence may be needed to verify the conclusions.

1.2.2. Catgut Embedding

1.2.2.1. Yu 2023

Yu Y, Xu X, Tan D, Yin Y, Yang X, Yu R. A study on the use of acupoint catgut embedding in the treatment of pre-diabetes: a meta-analysis and data mining approach. Front Public Health. 2023 Dec 7;11:1282720. https://doi.org/10.3389/fpubh.2023.1282720

Objective	The efficacy of acupoint catgut embedding (ACE) for the treatment of pre-diabetes remains controversial. Therefore, this study investigated the clinical efficacy and acupoint selection in ACE for the treatment of pre-diabetes.
Methods	Eight common databases were searched for relevant literature on ACE for pre-diabetes. Meta-analysis was used to evaluate its efficacy and safety, and data mining was used to explore the protocol for acupoint selection.
Results	The meta-analysis revealed that compared with conventional treatment alone, conventional treatment combined with ACE reduced the levels of glycated hemoglobin A1c [mean difference (MD) -0.45, 95% confidence interval (CI) -0.67 to -0.24%, $p < 0.001$], fasting blood glucose (MD -0.61 mmol/L, 95% CI -0.87 to -0.36 mmol/L, $p < 0.001$), 2-h postprandial glucose (MD -0.77 mmol/L, 95% CI -0.98 to -0.55 mmol/L, $p < 0.001$), total cholesterol (MD -0.37 mmol/L, 95% CI -0.74 to 0.00 mmol/L, $p = 0.049$), triglyceride (MD -0.49 mmol/L, 95% CI -0.77 to -0.20 mmol/L, $p < 0.001$) and low-density lipoprotein cholesterol (MD -0.23 mmol/L, 95% CI -0.33 to -0.12 mmol/L, $p < 0.001$), and increased high-density lipoprotein cholesterol levels (MD 0.16 mmol/L, 95% CI 0.05 to 0.27 mmol/L, $p = 0.004$), whereas changes in the body mass index and the adverse event rates were comparable between groups. Data mining revealed that Pishu (BL20), Weiwanxiashu (EX-B3), Zusanli (ST36), Shenshu (BL23), Sanyinjiao (SP6), Weishu (BL21), and Taixi (KI3) were the core acupoints used in ACE for pre-diabetes.

Conclusion	ACE can effectively improve blood glucose and lipid levels in pre-diabetes patients and has a good safety profile. ACE consisting of Pishu (BL20), Weiwanxiashu (EX-B3), Zusanli (ST36), Shenshu (BL23), Sanyinjiao (SP6), Weishu (BL21), and Taixi (KI3), is a promising complementary strategy for the treatment of pre-diabetes.

1.2.3. Pharmaco-acupuncture ☆

1.2.3.1. Lee 2017

Lee SW, Nam MH, Lee BC. Herbal acupuncture for type 2 diabetes: A meta-analysis. Exp Ther Med. 2017;13 (6):3249-325. [195251].

Objective	Herbal acupuncture (HA) is a modern adjunctive technique in which natural herbs or biologic substances are injected into acupuncture points. The objective of this systematic review was to evaluate evidence of the effectiveness of HA for type 2 diabetes mellitus (T2DM).
Methods	Three databases were searched. The included randomized controlled trials (RCTs) evaluated HA in controls and patients with T2DM and reported at least one of the following: Fasting blood glucose (FBG), postprandial (PP2hr) glucose and glycated hemoglobin (HbA1c).
Results	In a meta-analysis of **seven RCTs (n=598 patients),** HA significantly reduced levels of FBG, PP2hr glucose and HbA1c ($P<0.0001$, $P=0.0005$ and $P=0.004$, respectively). There was no significant effect of HA on total cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, or triglyceride level. High degrees of heterogeneity were present for all analyses except HDL-cholesterol and LDL-cholesterol.
Conclusions	**HA might have a beneficial effect** on FBG, PP2hr glucose and HbA1c levels in patients with T2DM; however, because of several limitations, **the results are inconclusive**. Therefore, additional rigorous RCTs are warranted to overcome the limitations of previous studies.

1.2.4. Moxibustion

1.2.4.1. Kim 2011

Kim TH, Choi TY, Shin BC, Lee MS. Moxibustion for Managing Type 2 Diabetes Mellitus: A Systematic Review. Chinese Journal of Integrated Medicine. 2011;17(8):575-9. [158539].

Objectives	Moxibustion is currently used for treating diabetes mellitus (DM) as a non-drug intervention in East Asian countries. This systematic review aims to evaluate the effectiveness of moxibustion for managing the symptoms of type 2 DM patients.
Methods	We searched MEDLINE, AMED, EMBASE, CINAHL, The Cochrane Library, six Korean databases, and four Chinese databases. Risk of bias was used for evaluating the quality of the included studies.

Results	A total of **5 studies met the inclusion criteria** for this review. All of the included studies had high risks of bias. One randomized clinical trial (RCT) compared the effectiveness of one-time moxibustion use with oral administration of glibenclimide and showed the significant effects of moxibustion on glycemic control. Another RCT tested the effectiveness of moxibustion plus conventional treatment, and the moxibustion group reported significant improvement in fasting and postprandial blood glucose levels compared with the conventional treatment group. Two RCTs compared the effectiveness of moxibustion versus acupuncture or moxibustion plus acupuncture, and the combined treatment showed the most favorable effects on the control of blood glucose, urine glucose, and glycocylated hemoglobin A(1c) (HbA(1c)). One uncontrolled observational study showed favorable effects of moxibustion on the response rate.
Conclusions	It is difficult to conclude that moxibustion is an effective intervention for the control of type 2 DM due to the scarcity of trials and the low methodological quality of included studies. Further rigorous RCTs may be necessary to evaluate the effectiveness of moxibustion for type 2 DM.

1.2.5. Auricular Acupuncture

1.2.5.1. Yu 2024

Yu Y, Xiang Q, Liu X, Yin Y, Bai S, Yu R. Auricular pressure as an adjuvant treatment for type 2 diabetes: data mining and meta-analysis. Front Endocrinol (Lausanne). 2024 Sep 5;15:1424304. https://doi.org/10.3389/fendo.2024.1424304

Objective	This study aimed to explore the clinical efficacy and acupoint combinations of auricular pressure for treating type 2 diabetes.
Methods	Eight common databases were searched for publications related to auricular pressure in type 2 diabetes as of November 2023. A meta-analysis was performed to assess the efficacy and safety of auricular pressure therapy. Data mining was used to analyze the core acupoints for auricular pressure.
Results	Meta-analysis demonstrated that compared with the conventional treatment group, the combined auricular pressure and conventional treatment group had significantly reduced fasting blood glucose (mean difference [MD]: -0.93; 95% confidence interval [CI]: -1.17 to -0.68; $p < 0.00001$), 2-hour postprandial blood glucose (MD: -1.58; 95% CI: -2.04 to -1.12; $p < 0.00001$), glycated hemoglobin A1c (MD: -0.83; 95% CI: -1.19 to -0.48; $p < 0.00001$), total cholesterol (MD: -0.43; 95% CI: -0.72 to -0.14; $p = 0.004$), triglycerides (MD: -0.33; 95% CI: -0.64 to -0.03; $p < 0.00001$), systolic blood pressure (MD: -14.75; 95% CI: -24.46 to -5.05; $p = 0.003$), diastolic blood pressure (MD: -10.32; 95% CI: -20.14 to -0.50; $p = 0.04$), and body mass index (MD: -1.74; 95% CI: -2.61 to -0.87; $p < 0.0001$), while adverse events were comparable (RR: 0.84; 95% CI: 0.43 to 1.66; $p = 0.61$). Egger's test revealed no publication bias ($p = 0.715$). Data mining identified AH6a, TF4, AT4, CO18, and CO10 as core acupoints for treating type 2 diabetes with auricular pressure.
Conclusion	Auricular pressure safely improves blood glucose and lipid levels, blood pressure, and body mass index in patients with type 2 diabetes. A regimen consisting of AH6a, TF4, AT4, CO18, and CO10 is expected to serve as a complementary treatment for type 2 diabetes.

1.3. Complications of diabetes

1.3.1. Diabetic Peripheral Neuropathy

see corresponding item

1.3.2. Diabetic Foot

see corresponding item

1.3.3. Diabetic gastroparesis

see corresponding item

1.3.4. Diabetic retinopathy

corresponding item

1.3.5. Diabetes and depression

1.3.5.1. Liu 2016 ☆

Liu Meijun, Liu Zhicheng, Xu Bin, Cai Jianwei. [Meta-analysis of acupuncture treatment of type 2 diabetes mellitus and depression clinical research]. Journal of Zhejiang University of Traditional Chinese Medicine. 2016;1:54-59. [187031].

Objectives	To evaluate the clinical curative effect of acupuncture and moxibustion treatment of type 2 diabetes mellitus and depression, and safety.
Methods	Computer retrieves Pubmed, Cochrane, Web of Science, CBM, CNKI, VIP and WanFang database, to find all about acupuncture and moxibustion treatment of type 2 diabetes mellitus and depression randomized controlled trial (RCT), before May 9, 2014, at the same time search by hand into literature references. According to inclusion and exclusion criteria, independently by two researchers after RCT extraction and filtering, data quality evaluation, adopting Revman5. 2 Meta-analysis software.
Results	**Three studies involving 256 patients** were included. Meta-analysis showed: (1) the FPG: the results between the two groups were statistically significant (MD=1. 41, 95% CI= (1. 77, 1. 05)], showing that acupuncture and moxibustion treatment of type 2 diabetes mellitus and depression fasting blood glucose level was superior to the drugs. (2)2 HPBG: the results between the two groups statistically significant (MD=0. 67, 95% CI= (1. 07, 0. 27)], showing that acupuncture and moxibustion treatment of type 2 diabetes mellitus and depression postprandial 2 hours' blood glucose level was superior to the drugs. (3) HbA1c: the results between the two groups was statistically significant (MD=2. 38, 95% CI= (2. 61, 2. 16)], showing that acupuncture and moxibustion treatment of type 2 diabetes mellitus and depression level of glycated hemoglobin level is superior to the drugs. (4) HAMD: the results showed that the statistical significance was found between the two groups [MD=11. 76, 95% CI= (12. 20, 11. 33)], that acupuncture and moxibustion treatment of type 2 diabetes mellitus and Hamilton depression rating scale was superior to the drugs. (5) SDS: the results between the two groups had statistical significance [MD=11. 17, 95%CI= (11. 53, 10. 81)], showing that acupuncture and moxibustion treatment of type 2 diabetes mellitus and depression self rating scale score better than drugs.

Conclusions	The curative effect of acupuncture and moxibustion treatment of type 2 diabetes mellitus and depression is superior to conventional drug treatment, due to the limitation of the evaluation into the research quality, it needs more high quality, large sample of RCT further argument.

1.4. Mechanistic systematic reviews

1.4.1. Jiang 2026 (glucose metabolism)

Jiang X, Dong H, Yu L, Yang X, Tang Y. Acupuncture for glucose metabolism: An updated Meta-Analysis of Randomized Controlled Trials. Complement Ther Med. 2026 Feb 27:103335. https://doi.org/10.1016/j.ctim.2026.103335

Background	Metabolic disorders such as insulin resistance and type 2 diabetes remain major global health challenges. Acupuncture has been proposed as a complementary approach to improve glucose metabolism, but recent evidence required updating.
Methods	Databases (PubMed, Web of Science, Embase, CNKI, Wanfang, others) were searched from January 2017 to October 2025 for randomized controlled trials comparing acupuncture with control interventions. Random-effects meta-analyses were conducted. **Fourteen RCTs involving 1179 participants** were included.
Results	Acupuncture was associated with significant improvements versus controls in HOMA-IR (MD -0.79, 95% CI -1.30 to -0.28, I^2=91%), HbA1c (MD -0.68%, 95% CI -1.02 to -0.34, I^2=88%), fasting plasma glucose (MD -0.61 mmol/L, 95% CI -0.82 to -0.41, I^2=95%), 2-hour postprandial plasma glucose (MD -0.94 mmol/L, 95% CI -1.49 to -0.39, I^2=92%) and fasting insulin (MD -3.27 mU/L, 95% CI -5.59 to -0.95). Subgroup analyses suggested manual acupuncture might be more effective. Adverse events were infrequent and mild. Overall certainty of evidence was rated moderate, limited by substantial heterogeneity and risks of selection and detection bias.
Conclusion	Acupuncture may improve glycemic parameters, but high heterogeneity and methodological limitations preclude definitive conclusions. Larger, rigorously designed RCTs with standardized protocols and homogeneous comparators are needed.

1.4.2. Jiao 2025

Jiao X, Hu Y, Tian G. Systematic Review and Meta-Analysis of Acupuncture Treatment for Diabetic Cognitive Impairment: Focus on Animal Models. Brain Behav. 2025 Sep;15(9):e70783. https://doi.org/10.1002/brb3.70783

Background	Cognitive impairment is a frequent complication of diabetes, yet effective treatments remain elusive. In animal models, acupuncture has shown potential in improving cognitive deficits related to diabetes, but a comprehensive evaluation of its efficacy is lacking.
Methods	Materials and methods: We systematically searched seven databases (PubMed, Web of Science, Embase, OVID, SinoMed, CNKI, and Wanfang) from their inception through January 1, 2025. Studies meeting inclusion criteria underwent quality assessment using the SYRCLE Risk of Bias tool. Data analysis was conducted with Stata 14.0.
Results	Thirteen studies comprising 294 animals were included. Acupuncture significantly reduced blood glucose in diabetic models [SMD = -2.44, 95% CI (-3.33, -1.55); I2 = 88.9%, $p < 0.000$], shortened water maze escape latency [SMD = -2.35, 95% CI (-2.86, -1.84); I2 = 60.0%, $p = 0.003$], and increased target platform crossings [SMD = 1.49, 95% CI (1.10, 1.88); I2 = 51.9%, $p < 0.001$].

Conclusion	Acupuncture can improve cognitive impairment in diabetic animal models and lower their blood glucose levels.

1.4.3. Lin 2025

Lin L, Li S, Guo Z, Fang P, Feng Y, Qi C, Wang M, Xiao L, Chen M, Wang T. The efficacy and potential mechanism of the acupuncture treatment for type 2 diabetes mellitus: A systematic review and meta-analysis of data from animal models. Front Endocrinol (Lausanne). 2025 Oct 6;16:1627061. https://doi.org/10.3389/fendo.2025.1627061

Background	Type 2 diabetes mellitus (T2DM) is a prevalent metabolic disorder with limited treatment options. Manual acupuncture and electroacupuncture have been investigated in numerous animal studies for their potential to improve glycemic and lipid profiles, but no comprehensive synthesis exists. This review aims to evaluate the effects of manual acupuncture and electroacupuncture on blood glucose and lipid levels in animal models of T2DM, and to explore potential mechanisms.
Methods	A systematic search was conducted in PubMed, Embase, Cochrane, Web of Science, and major Chinese databases from inception to December 2024. Only animal studies employing manual acupuncture or electroacupuncture for T2DM models were included. The methodological quality was assessed using a 10-item CAMARADES checklist. Meta-analyses were performed using STATA 17.0, and subgroup analyses explored the influence of modeling methods, intervention timing, and treatment duration.
Results	A total of **14 studies with 274 animals** with T2DM were included. The overall quality of the included reports was rated as moderate or higher. Meta-analysis showed that acupuncture significantly reduced blood glucose [Standardized Mean Difference (SMD)= -3.15, 95% Confidence Interval (CI) (-4.18, -2.12), I^2= 85.1%, (P< 0.05)], body weight [SMD = -3.36, 95%CI (-4.77, -1.95), I^2= 84.2%, (P<0.05)], triglycerides [SMD=-2.50, 95% CI (-3.00, -2.01), I^2= 0.0%, (P< 0.05)], total cholesterol [SMD = -2.60, 95% CI (-3.55, -1.65), I^2= 74.9%, (P< 0.05)], and low-density lipoprotein [SMD = -3.36, 95%CI (-5.42,-1.95), I^2= 86.2% (P< 0.05)], and no statistically significant difference was observed in high-density lipoprotein [SMD = 0.61, 95% CI (-0.98, 2.19), I^2 = 92.1%, (P> 0.05)] compared to the control group. These results suggest that acupuncture can effectively improve blood glucose and lipid levels in animal models of T2DM.
Conclusion	While this study is limited by the number of included studies, the results indicate that acupuncture can effectively improve blood glucose and lipid levels in animal models of T2DM.

1.4.4. Luo 2025

Luo F, Ma Z, Chen H, Li Z, Feng J, Su C, Zhu J. Effects of acupuncture on the insulin signaling pathway and mitochondrial AMPK pathway in an animal model of type 2 diabetes mellitus: systematic evaluation and meta-analysis. Diabetol Metab Syndr. 2025 May 2;17(1):146. https://doi.org/10.1186/s13098-025-01634-7

Background	Previous studies of acupuncture for type 2 diabetes mellitus (T2DM) have focused on lowering blood glucose and improving symptoms; however, the mechanisms underlying these effects have not been systematically reviewed. Acupuncture can improve impaired glucose-lipid metabolism and correct insulin resistance (IR) by modulating relevant pathway cytokines, which are both key process in T2DM pathogenesis.
Objectives	The aim of this study was to quantitatively assess the efficacy of acupuncture in an animal model of T2DM.

Methods	Three researchers identified animal studies of acupuncture intervention in T2DM by searching nine databases, including PubMed, Scopus, Embase, the Cochrane Library, Web of Science, Ovide Medline, BIOSIS Previews, Wan Fang, CNKI, and VIP. Literature that met the inclusion criteria was screened, required data were extracted, and meta-analysis was performed using RevMan 5.4 and Stata 17.0.
Results	A total of **31 studies with 619 animals** were included—309 in the acupuncture group and 310 in the model group—all of which were male rodents. The mean quality score of the studies was 3.7, which indicated low quality. Meta-analysis showed that first acupuncture led to a significant reduction in body weight gain and hematological factors, and reduced food intake and water intake in T2DM animals. Second acupuncture significantly reduced blood glucose and serum insulin, increased insulin sensitivity, and decreased IR index in T2DM animals. Finally acupuncture had the following beneficial effects on the insulin signaling pathway and mitochondrial AMPK pathway: (1) insulin signaling pathway: Acupuncture can balance the phosphorylation levels of IRS-1 tyrosine 895 and IRS-1 serine/threonine 307 and promote the expression of all factors of the insulin signaling pathway, namely, IRS-1 mRNA, p-IRS-1, PI3K p85, PI3K mRNA, AKT, p-AKT, GLUT 4, and GLUT 4 mRNA—promoting glucose uptake, alleviating IR, and ameliorating impaired glucose metabolism. (2) Mitochondrial AMPK pathway: acupuncture significantly promoted AMPK, AMPK mRNA, p-AMPK, SIRT1, SIRT1 mRNA, PGC-1α, PGC-1α mRNA and NRF1, improved mitochondrial dysfunction, enhanced glucose metabolism, and alleviated T2DM symptoms.
Conclusion	Acupuncture can improve glucose-lipid metabolism, enhance insulin sensitivity, and correct IR, likely by promoting the expression of signaling factors in the insulin and mitochondrial AMPK pathways. These findings offer potential explanations for the mechanism of action and clinical effects of acupuncture in the treatment of T2DM.

2. Clinical Practice Guidelines

⊕ positive recommendation (regardless of the level of evidence reported)
Ø negative recommendation (or lack of evidence)

2.1. Department of Veterans Affairs Department of Defense (VA/DoD, USA) 2023 Ø

VA/DoD Clinical Practice Guideline. Management of Type 2 Diabetes Mellitus. Washington, DC: U.S. Government Printing Office. 2023. 165P.
https://www.healthquality.va.gov/guidelines/CD/diabetes/VADoD-Diabetes-CPG_Final_508.pdf

For adults with type 2 diabetes mellitus and diabetes distress, there is insufficient evidence to recommend for or against the use of **acupuncture**, biofeedback, hypnosis, guided imagery, massage therapy, yoga, or tai chi to improve outcomes. Strength : Neither for nor against

2.2. Canadian Diabetes Association (CDA, Canada) 2018 Ø

Diabetes Canada Clinical Practice Guidelines Expert Committee, Grossman LD, Robert Roscoe R, Shack AR. 2018 Clinical Practice Guidelines. Complementary and Alternative Medicine for Diabetes. Canadian Journal of Diabetes. 2018;42:S154-S161. [181265].

There is insufficient evidence to make a recommendation regarding efficacy and safety of complementary or alternative medicine [acupuncture] for individuals with diabetes [Grade D, Consensus].

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