



RESEARCH ARTICLE

Immediate Effect of Needling at CV-12 (Zhongwan) Acupuncture Point on Blood Glucose Level in Patients with Type 2 Diabetes Mellitus: A Pilot Randomized Placebo-Controlled Trial

Ranjan Kumar¹, A. Mooventhan^{2,*},
Nandi Krishnamurthy Manjunath²

¹ Department of Yoga and Naturopathy, S-VYASA University, Bengaluru, Karnataka, India

² Department of Research and Development, S-VYASA University, Bengaluru, Karnataka, India

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Abstract

Introduction: Diabetes mellitus is a major global health problem. Needling at CV-12 has reduced blood glucose level in diabetic rats. The aim of this study was to evaluate the effect of needling at CV-12 (Zhongwan) on blood glucose level in patients with type 2 diabetes mellitus (T2DM).

Materials and Methods: Forty T2DM patients were recruited and randomized into either the acupuncture group or placebo control group. The participants in the acupuncture group were needled at CV-12 (4 cun above the center of the umbilicus), and those in the placebo control group were needled at a placebo point on the right side of the abdomen (1 cun beside the CV-12). For both groups, the needle was retained for 30 minutes. Assessments were performed prior to and after the intervention. Statistical analysis was performed using SPSS version 16.

Results: There was a significant reduction in random blood glucose level in the acupuncture group compared to baseline. No such significant change was observed in the placebo control group.

Conclusion: The result of this study suggests that 30 minutes of needling at CV-12 might be useful in reducing blood glucose level in patients with T2DM.

* Corresponding author. Department of Research and Development, S-VYASA University, #19, Eknath Bhavan, Kavipuram Circle, Kempegowda Nagar, Bengaluru 560019, Karnataka, India.
E-mail: dr.mooventhan@gmail.com (A. Mooventhan).

1. Introduction

Diabetes mellitus is a group of metabolic disorders characterized by chronic hyperglycemia due to relative insulin deficiency or resistance or both. Type 2 diabetes mellitus (T2DM) is a major global health problem with a prevalence of 366 million in 2011 and that is projected to increase by 51%, reaching 552 million by 2030. India follows this global trend with a prevalence of 31 million diabetics in 2000, 60 million in 2011, and that is projected to increase by 63%, reaching 98 million by 2030. Use of drugs has its own drawbacks, such as drug dependency, drug resistance, and adverse effects, if used for a long time. Hence, in recent years there has been an intense search for nonmedical measures not only to manage T2DM, but also to prevent its complications [1].

Traditional Chinese medicine (TCM) offers a complete medical system that has been used to diagnose, treat, and prevent illnesses for more than 2000 years. One of the most commonly used therapies of TCM is acupuncture, which consists in stimulating specific points on the body (acupoints), by inserting thin metal needles into superficial structures such as skin, subcutaneous tissue, or muscles, in order to remove blockages in the flow of vital energy or life force called "qi" that circulates throughout the body through a system of pathways called channels [2]. Acupuncture has been used for thousands of years for the treatment of diabetes and its associated medical conditions [3]. Needling at CV-12 (Zhongwan) has been widely used to relieve symptoms of diabetes [4]. In a previous study, CV-12 in combination with other acupuncture points such as CV-4 (Guanguan), CV-6 (Qihai), CV-10 (Xiawan), ST-24 (Huaroumen), ST-25 (Tianshu), TE-5 (Wailing), SP-15 (Daheng), and KI-13 (Qixue) decreased blood glucose level and improve insulin resistance with no adverse effects in obese T2DM [5].

Even though needling at CV-12 alone has shown to produce a significant reduction in blood glucose level in diabetic rats [4], it did not produce a significant reduction in blood glucose level of healthy individuals [6]. There are various studies reporting the hypoglycemic effect of single acupuncture point therapy including electroacupuncture at CV-12 [4], ST-36 (Zusanli) [7], and GB 26 (Daimai) [8]; and laser acupuncture at only BL20 (Pishu) in diabetic rats [9]. To the best of our knowledge, there is no known study reporting the effect of single needling at CV-12 in patients with diabetes. Hence, the aim of this study was to evaluate the effect of needling CV-12 on blood glucose level in patients with T2DM.

2. Materials and methods

2.1. Patients

A total of 40 patients who were diagnosed with T2DM at a mean \pm standard deviation age of 56.20 ± 11.0 years were recruited from a holistic healthcare center, South India. Male patients with a history of T2DM, under stable medication for the past 3 months and willing to participate in the study, were included, and patients with a history of T2DM complications, needle phobia, or mental illness were

excluded. The study protocol was approved by the Institutional Ethics Committee and written informed consent was obtained from each patient.

2.2. Study design

A randomized placebo-controlled trial was adopted for this pilot study. All the patients were randomly assigned to either the acupuncture group or the placebo control group. The acupuncture group received needling at CV-12 and the placebo control group received needling at a non-acupuncture point for 30 minutes. Data assessment was performed prior to and after the intervention (Fig. 1).

2.3. Randomization

All the patients were randomly assigned to either the acupuncture group or the placebo control group using computerized randomization. Randomization was performed by one of the authors who was not involved in any part of the assessment.

2.4. Blinding/masking

All participants were blind to the acupuncture (CV-12) and the placebo control points. The investigator who assessed the blood glucose was blind to the acupuncture and placebo control groups.

2.5. Random blood glucose monitoring

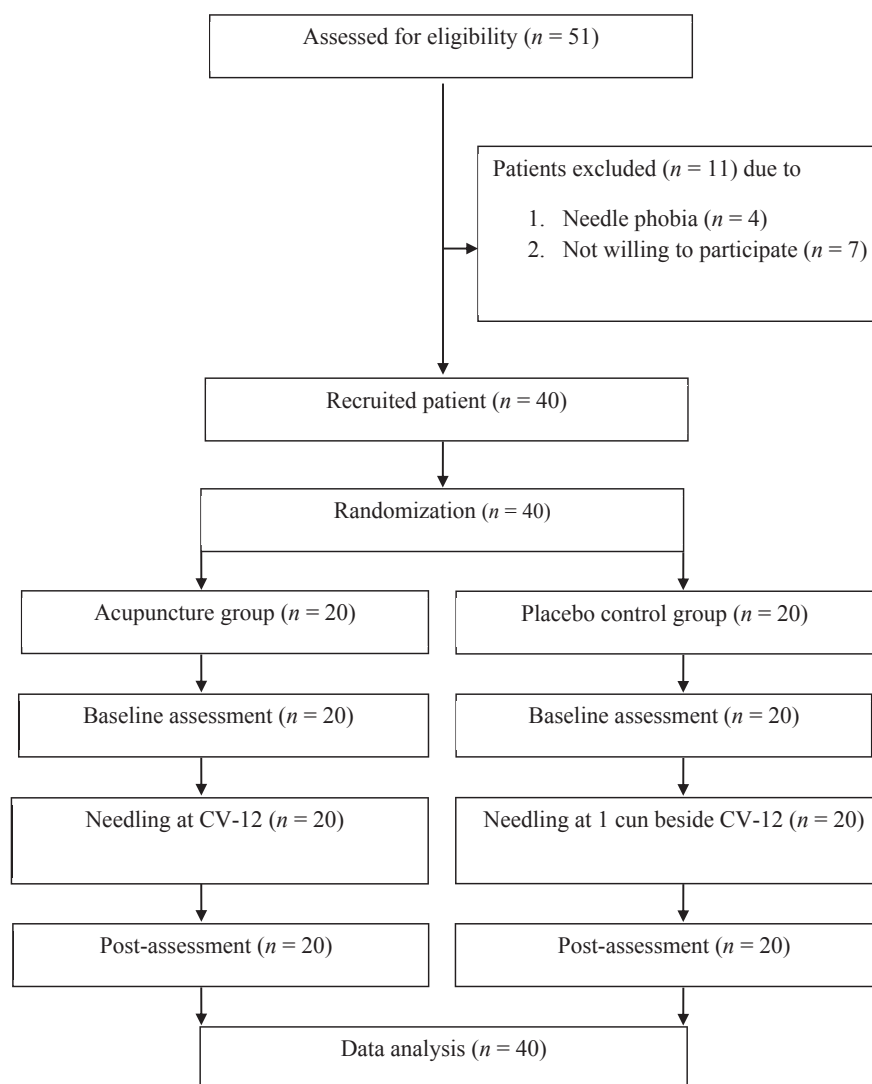
Random blood glucose (RBG) was assessed using a portable ACCU-CHEK Active, Performa Nano machine (Roche Diagnostics India Pvt. Ltd, Mumbai, India). Assessments were performed prior to and after the intervention for both groups.

2.6. Acupuncture group

The participants received TCM style of acupuncture. Needling was performed at CV-12 (4 *cun* above the center of the umbilicus) at a depth of 0.5 *cun*. The participants were informed about the procedure, sensations of needle insertion, and response sought [6]. Manual stimulation was given by lifting the needle up and down for 5 minutes. We used 0.5 *cun* filiform locally manufactured copper needle with 0.38 mm diameter and 13 mm length. The participants received only one session of acupuncture for a duration of 30 minutes. The participants did not receive any treatments other than acupuncture. Needling was administered by one of the authors who was institutionally qualified with 2-years' experience in clinical acupuncture.

2.7. Placebo control group

The participants in this group received needling in the right side of the abdomen 1 *cun* lateral to CV-12, where there is no known acupuncture point, with manual stimulation similar to the acupuncture group.



CV = Conception Vessel

Figure 1 Trial profile.

2.8. Data analysis

Data were checked for normality using the Kolmogorov–Smirnov test. Statistical analysis of within groups was performed using paired samples *t* test, and between groups analysis was performed using independent samples *t* test (data that were normally distributed) and Mann–Whitney *U* test (data that were not normally distributed) with the use of SPSS for Windows, version 16.0 (Chicago, IL, USA).

3. Results

Eleven of 51 patients did not fulfill the criteria and thus were not included in the study. Forty patients were divided into the acupuncture group or placebo control group. Demographic variables and baseline values of both groups were comparable and there were no significant differences between the groups (Table 1). There was a significant

reduction in RBG in the acupuncture group compared to baseline. No such significant change was observed in the placebo control group. However, there was no significant difference between the groups (Fig. 2).

4. Discussion

In the last decade, there has been an increasing interest in alternative medicine, including acupuncture (one of the common parts of TCM) [2]. In Korean medicine, CV-12 is known as the stomach control point and is located on the abdominal wall associated with the pancreas. Although it is located on the Conception Vessel Meridian, it is considered a therapeutic point for diseases of the digestive organs such as the stomach, pancreas, and spleen [6,10].

Even though the result of this study showed no significant difference between the groups, a significant reduction in RBG level was observed 30 minutes after the needling at CV-12 (acupuncture group), while no such significant

Table 1 Demographic variables of acupuncture ($n = 20$) and placebo control group ($n = 20$).

Variables	Acupuncture group	Placebo control group	t/z	p
Age (y)*	53.55 ± 10.50	58.85 ± 11.12	-1.504	0.133
Sex	20 men	20 men	—	—
Height (m) [†]	1.68 ± 0.07	1.64 ± 0.07	-0.996	0.326
Weight (kg) [†]	74.18 ± 10.53	72.30 ± 17.0	0.419	0.677
Body mass index (kg/m ²) [†]	26.54 ± 4.52	26.86 ± 6.20	-0.183	0.857

All values are in mean ± standard deviation except values of sex.

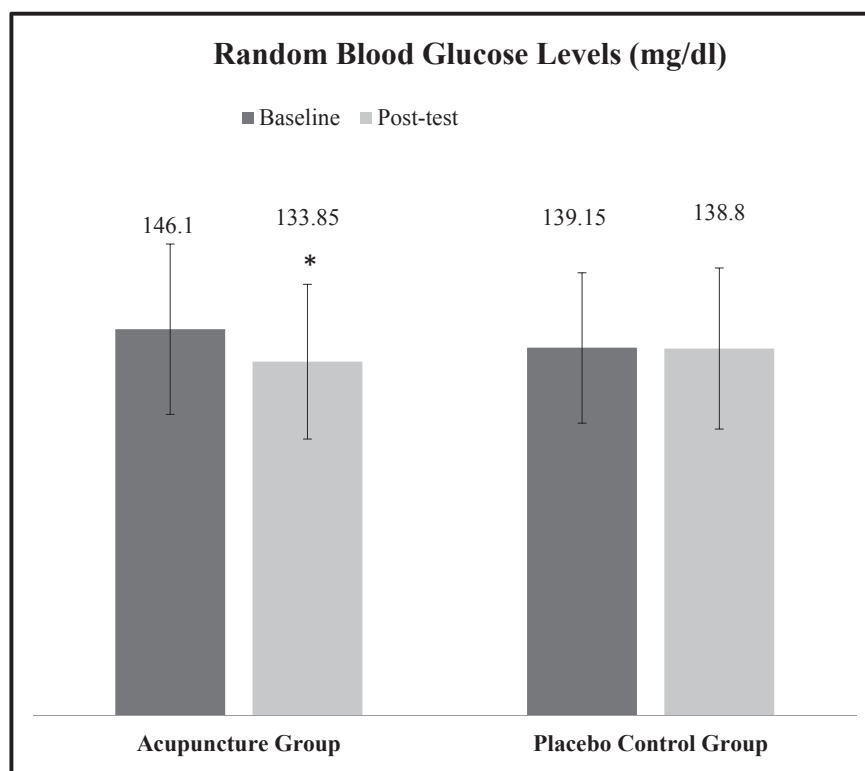
*Independent samples *t* test; [†]Mann–Whitney *U* test.

change was observed 30 minutes after the needling at the placebo point (placebo control group) compared to their respective baselines. It suggests that needling at CV-12 with manual stimulation might be effective in reducing blood glucose level in patients with T2DM.

This result supports the hypoglycemic effect of CV-12 that was reported in the previous studies on needling at CV-12 alone in diabetic rats [4], as well as in combination with other points in diabetic patients [5]. The present study confirms the statement of a previous study that needling at CV-12 might be more effective in patients with high blood glucose levels (i.e., diabetes) than in healthy individuals [6]. The reduction in the blood glucose level in patients with T2DM might be mediated through an increase in plasma insulin-like immunoreactivity or secretion of endogenous β -endorphin due to needling at CV-12, as reported in a previous study on electroacupuncture in

diabetic rats [4]. Further studies are required to confirm this mechanism.

This is believed to be the first randomized placebo-controlled study to evaluate the effect of single needling at CV-12 on RBG levels in T2DM. Both the participants and the investigator were blind to the acupuncture and placebo control groups. This study had some limitations. The study evaluated only the immediate effect with manual stimulation and did not evaluate its short-term or long-term effect with or without stimulation. The study had a small sample size and it was not calculated based on the previous study. Only male patients were included, hence generalization of the finding of this study to female patients is limited. Assessment of variables such as fasting blood glucose, postprandial blood glucose, glycosylated hemoglobin, and insulin levels was not performed. Hence, long-term studies with various other methods of stimulation



* $p < 0.001$

Figure 2 Baseline and post-test assessments of acupuncture group ($n = 20$) and placebo control group ($n = 20$).

using electrical, moxa, laser, and embedding are required in a larger sample, including both male and female patients, and more variables as mentioned above for better understanding.

In conclusion, the present study suggests that 30 minutes of needling at CV-12 with manual stimulation might be an effective method for reducing blood glucose level in patients with T2DM.

Disclosure Statement

The authors declare that they have no conflicts of interest and no financial interests related to the material in this manuscript.

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