

# Effects of Kundalini Yoga on Diabetic Depression in China

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**Abstract:** Background: Yoga is good for both diabetes mellitus (DM) and depression, and Kundalini seems to be one of the most powerful types of yoga. So we tried to explore the effects of Kundalini Yoga on diabetic depression in China. Methods: 56 subjects were divided equally into two groups, a study group and a control group. The study group was trained with Kundalini Yoga, while the control group with walking. Both groups underwent a three-month follow-up. At the very beginning and the end of the follow-up we did Hamilton depression rating and the short form 36 (SF-36), as well as HbA1c. Results: After doing the Hamilton depression rating, we found that the effective rate in the study group was 34.62%, while that of the control group was 11.54%. The difference of HAM-D scores of post-intervention in the two groups was statistically significant ( $p = 0.040$ ). After intervention, six out of eight scales (SF-36) had an inter-group statistically significant difference ( $p < 0.05$ ). However, the inter-group difference of HbA1c wasn't statistically significant ( $p > 0.05$ ). Conclusion: Kundalini yoga is effective on diabetic depression. Its definite effects together with no obvious side effects make it a promising intervention in diabetic depression.

**Keywords:** Yoga, Diabetes Mellitus, Depression

## 1. Introduction

Diabetes mellitus (DM) is one of the most common chronic diseases among adults. About 11.2%, or 157 million, Chinese residents had diabetes in 2020 according to the guidelines for the prevention and control of type 2 diabetes in China (2020 Edition). Depressive disorders are serious chronic diseases that can severely lower the quality of life and increase mortality. Depressive symptoms account for up to 13% of the patients with type 1 diabetes mellitus (T1DM) and 24.7% of the patients with type 2 diabetes mellitus (T2DM) [1]. Depression and DM are interactive and mutually promoted [2]. However, patients with diabetic depression attach less importance to the disorder and even refuse treatment. Therefore, it's urgent for us to trigger the awareness of this disease and find a friendly way to alleviate symptoms rather than simply use antidepressants with many side effects.

Yoga is good and nothing bad for both DM [3, 4] and depression [5, 6]. Among the different types of yoga, Kundalini seems the most effective. The Yoga Sutras state that the effect of just one year of perfectly practiced Kundalini Yoga equals the effect of practicing 12 years of Hatha Yoga,

plus six years of Raja Yoga, plus three years of Mantra Yoga, plus one year of Laya Yoga. So in our research we selected Kundalini to treat diabetic depression.

There are lots of articles that have discussed the relationship between yoga and DM as well as the relationship between yoga and depression, but rare articles mention yoga is good for diabetic depression, let alone Kundalini yoga. In other words, there have been no similar studies on diabetic depression treated with Kundalini before except for one pilot study with another type of yoga [7]. Our study is just targeting the relationship between Kundalini and diabetic depression. If it is verified that Kundalini yoga is effective on diabetic depression, we can use an economical way to help patients like that. Practising yoga is an enjoyable thing compared to taking drugs, therefore we are expecting that yoga can be an optional treatment, even an substituent of medication.

## 2. Materials and Methods

### 2.1. Subjects

This study is a prospective, randomized controlled

interventional study. 56 patients with diabetic depression were recruited in urban areas of Beijing, China. All of them met the diagnoses of both diabetes mellitus and depression. Diabetes mellitus was diagnosed according to the 1999 world health organization (WHO) criteria, and depression was diagnosed according to the 17-item Hamilton depression rating scale (HAM-D) with the score over 7 ( $\geq 8$ ) [8]. Patients with severe depression or risk of suicide were excluded.

## 2.2. Study Intervention

56 subjects were divided equally into two groups, a study group and a control group, using a random number table generated by Excel. The study group was trained with Kundalini Yoga, while the control group with walking. Baseline characteristics of all the subjects are summarized in Table 1.

**Table 1.** Baseline characteristics.

Items (n=56)	Kundalini Yoga (n=28)	Walking control (n=28)	P value
Age (years)	54.1 $\pm$ 8.9	53.7 $\pm$ 8.7	>0.05
Gender (male/female)	14/14	14/14	
HAM-D Scores (points)	16.38 $\pm$ 4.15	16.35 $\pm$ 4.03	>0.05
HbA1c (%)	7.67 $\pm$ 0.58	7.53 $\pm$ 0.59	>0.05

Note: HbA1c=glycated hemoglobin A1c.

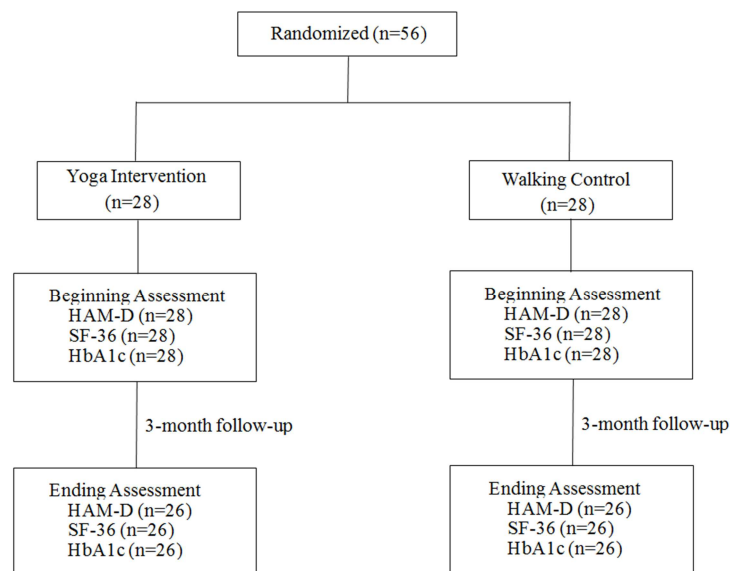
The method of kundalini Yoga: Kundalini is practised for one hour in the morning every day under the supervision of a licensed professional yoga coach. The process is divided into two parts: asana and pranayama. Asana is a collection of body postures, originally and still today a general term for meditation poses, later extended in yoga as an training method, including savasana, sarvangasana, matsyasana, paschimottanasana, halasana, bhujangasana, salabhasana, padmasana, etc [5]. In this study we used eight asanas as described above, each practised for three minutes. Pranayama is breath control in yoga, and is usually practised after asanas. In this study we did pranayama along with fixing our mind at seven chakras which are also known as wheel-like energy-enriched regions; each chakra was practised for five minutes.

The method of walking: Walking is practised for one hour in the morning every day at medium speed.

No antidepressants were administered, and routine anti-diabetic drugs were maintained.

## 2.3. Procedures and Assessment

Both groups underwent a three-month follow-up. At the very beginning and the end of the follow-up we did Hamilton depression rating and a HRQoL (Health-related quality of life) questionnaire-the short form 36 (SF-36) which is composed of 36 questions, as well as HbA1c. Unfortunately, there were two patients in both groups respectively lost to follow-up at the end of the third month. The flow of the study is summarized in Figure 1.



**Figure 1.** The flow of the study.

HAM-D was written in the late 1950s by Max Hamilton and is widely used in evaluating the effectiveness of anti-depressive treatment. According to the changes of HAM-D scores pre- and post-intervention, we graded the effectiveness into three levels: clinical cure (HAM-D score  $\leq 7$  or decreases by  $\geq 75\%$ ), effective (HAM-D score decreases by

25%-75%) and ineffective (HAM-D score decreases by  $<25\%$ ). Effective rate = (no. of clinical cure + no. of the effective) / total no. of ending assessment  $\times 100\%$ .

SF-36 was written in the early 1990s by the health institute in Boston and is widely used in evaluating the life quality of the patients with depression. There are eight scales in SF-36,

and the questionnaire sets different questions with different scores on every scale. Then we calculate the scores on eight scales respectively, which are physical functioning (PF), role limitations due to physical problems (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE) and mental health (MH) [9].

#### 2.4. Statistical Methods

Continuous variables were expressed as the mean value  $\pm$  standard deviation (SD) and compared using the paired t-test (within a group), independent t-test (between two groups) or rank sum test (non-normal distribution data). Categorical data

were expressed as counts (percentage) and compared using the chi-square test. The p-values were calculated using SPSS v23.0. A p-value of  $<0.05$  was considered to be statistically significant.

### 3. Results

#### 3.1. The Comparison of Clinical Effect Between Two Groups

After doing Hamilton depression rating, we found the effective rate in study group was 34.62%, while that in control group was 11.54%. The difference of effective rates between two groups showed statistical significance (Table 2).

Table 2. The comparison of clinical effect between two groups [n (%)].

Groups	Clinical cure	Effective	Ineffective	Effective rate
Yoga group (n=26)	2 (7.69)	7 (26.92)	17 (65.38)	9 (34.62)
Walking group (n=26)	0 (0)	3 (11.54)	23 (88.46)	3 (11.54)
$\chi^2$				3.900
P				0.048

#### 3.2. The Comparison of HAM-D, SF-36 Pre- and Post-Intervention Between Two Groups

After intervention, the symptoms of lacking interest, lacking pleasure and physical discomfort improved in both study and control groups. Meanwhile, the verbal amount and

social activities of the subjects also gradually increased, and some of them began to actively communicate with others. It seemed that the intervention in both groups was effective, but the effect in study group was more obvious. The difference of HAM-D scores of post-intervention in two groups was statistically significant (Table 3).

Table 3. The comparison of HAM-D between two groups ( $\bar{x} \pm s$ ).

Groups	Pre-intervention	Post-intervention	t	P
Yoga group (n=26)	16.38 $\pm$ 4.15	13.12 $\pm$ 3.71	6.566	0.000
Walking group (n=26)	16.35 $\pm$ 4.03	15.23 $\pm$ 3.52	2.364	0.026
t	0.034	-2.107		
P	0.973	0.040		

After intervention, six out of eight scales, including RP, BP, VT, SF, RE and MH had inter-group statistically significant difference (Table 4). In other words, yoga was more favorable for patients than walking control in improving their role limitations, bodily pain, vitality, social

functioning and mental health. The improvement of social functioning is especially essential for patients with depression, so we suppose that SF-36 has not only assessed the life quality but also further verified the result of HAM-D.

Table 4. The comparison of SF-36 between two groups ( $\bar{x} \pm s$ ).

Scales	Timings	Scores in yoga group	Scores in walking group
PF	Pre-intervention	82.31 $\pm$ 7.24	82.50 $\pm$ 6.96
	Post-intervention	83.65 $\pm$ 6.41	83.46 $\pm$ 5.25
RP	Pre-intervention	55.77 $\pm$ 19.12	54.81 $\pm$ 18.73
	Post-intervention	70.19 $\pm$ 15.84* <sup>#</sup>	59.62 $\pm$ 17.43*
BP	Pre-intervention	65.38 $\pm$ 13.63	65.00 $\pm$ 13.64
	Post-intervention	72.31 $\pm$ 10.70* <sup>#</sup>	65.38 $\pm$ 13.03
GH	Pre-intervention	49.62 $\pm$ 14.49	50.19 $\pm$ 14.03
	Post-intervention	54.04 $\pm$ 13.64*	51.15 $\pm$ 13.81
VT	Pre-intervention	45.19 $\pm$ 12.04	45.58 $\pm$ 11.60
	Post-intervention	55.00 $\pm$ 12.49* <sup>#</sup>	48.08 $\pm$ 10.59*
SF	Pre-intervention	60.58 $\pm$ 13.08	61.06 $\pm$ 12.91
	Post-intervention	71.15 $\pm$ 11.05* <sup>#</sup>	64.90 $\pm$ 10.01*
RE	Pre-intervention	35.88 $\pm$ 16.13	34.62 $\pm$ 14.86
	Post-intervention	50.00 $\pm$ 23.59* <sup>#</sup>	37.16 $\pm$ 17.21
MH	Pre-intervention	45.54 $\pm$ 7.84	45.38 $\pm$ 7.50
	Post-intervention	55.08 $\pm$ 7.00* <sup>#</sup>	50.62 $\pm$ 7.67*

Note: \* indicates a  $P<0.05$  compared to pre-intervention; # indicates a  $P<0.05$  compared to walking group.

### 3.3. The Comparison of HbA1c Pre- and Post- Intervention Between Two Groups

After intervention, HbA1c in the two groups apparently seemed not to decrease, and inter-group difference of HbA1c wasn't statistically significant either (Table 5).

*Table 5. The comparison of HbA1c between two groups ( $\bar{x} \pm s$ ).*

Groups	Pre-intervention	Post-intervention	<i>t</i>	<i>P</i>
Yoga group (n=26)	7.67±0.58	7.61±0.56	0.494	0.625
Walking group (n=26)	7.53±0.59	7.50±0.70	0.376	0.710
<i>t</i>	0.873	0.614		
<i>P</i>	0.387	0.542		

## 4. Discussion

Yoga originated in India, and is widely practised worldwide. It's used to treat a lot of diseases including DM and depression through the coordination of body and mind. For DM, yoga can lower blood sugar through the following mechanisms [10]: 1) to change eating habits and form mindful eating pattern; 2) to stimulate the pancreas to secrete insulin and promote intestinal peristalsis by different gestures of Asana; 3) to augment the cerebral blood flow and oxygenation to balance psycho-neuro-endocrine axis through pranayama; 4) to visualize and concentrate on the pancreas during meditation. For depression, yoga can alleviate the symptoms through the following mechanisms [11-14]: 1) to direct attention to present-moment thoughts, feelings, and body sensations in a non-judgmental way; 2) to modify underactivity of the parasympathetic nervous system and GABA systems through stimulation of the vagus nerves.

DM and depression are interactive and mutually promoted. Depression can cause hyperglycemia by a decrease in metabolic control, poor adherence to medication and diet regimens, a reduction in quality of life, and an increase in health care expenditures. DM can also cause depression in turn, and diminish the response to antidepressant regimens [2]. Thus, we assume that a relief of depression may facilitate the control of DM, but HbA1c seems not to decrease apparently after three-month yoga practice, which may be related to sample size, type and duration of yoga intervention and compliance to yoga practice.

This study used yoga as an interventional method. After a three-month intervention, patients' depressive symptoms were relieved, depression rating was decreased, and social functioning recovered to some extent, which shows that yoga is effective in combating diabetic depression. Antidepressants have a lot of side effects, even if selective serotonin reuptake inhibitor (SSRI) still has severe side effects, such as serotonin syndrome [15]. On the contrary, yoga was found to produce nothing bad in treating diabetic depression and was verified as a uniquely superior treatment method.

## 5. Conclusion

Since yoga is good for DM, depression and diabetic depression, we may further do more lab tests related to DM to confirm that DM can be treated during yoga practice and

explore what on earth the relationship between DM and depression is as well as what kind of a role Kundalini plays inside. If we can partly unveil the mysterious Kundalini by studying diabetic depression, it must be a very beneficial thing to the followers.

All in all, yoga can treat diabetic depression directly and indirectly, whose definite effects together with no obvious side effects make it a promising intervention in diabetic depression.

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