

# EFFECTS OF TWENTY-FOUR MOVE SHADOW BOXING COMBINED WITH PSYCHOSOMATIC RELAXATION ON DEPRESSION AND ANXIETY IN PATIENTS WITH TYPE-2 DIABETES

Yingying Zheng, Yiyi Zhou & Qiujia Lai

Institute of Physical Education, Wenzhou University, Wenzhou City, China

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## SUMMARY

**Background:** The aim of the current study was to observe the effects of Twenty-four Move Shadow Boxing combined with psychosomatic relaxation on depression and anxiety in patients with Type-2 Diabetes.

**Subjects and methods:** One hundred and twenty (120) patients with Type-2 Diabetes and depressive/anxious symptoms were divided into intervention group (60 cases) and control group (60 cases) according to the minimum distribution principle of unbalanced indicators. Twenty-four Move Shadow Boxing group used this intervention combined with psychosomatic relaxation. Control group underwent conventional treatment. All the patients in the two groups completed the Self-rating Depression Scale (SDS) and Self-Rating Anxiety Scale (SAS) before and after treatment.

**Results:** Among the 52 people included in the statistical analysis, the recovery rate was 13.3%. The differences between depression and anxiety scores in the intervention group before and after treatment were statistically significant ( $P < 0.001$ ), whereas these differences were non-significant in the control group ( $P = 0.123$ ). After the treatment, the glycated hemoglobin reduction in the intervention group was greater than that of the control group ( $t = 2.438$ ,  $P = 0.016$ ).

**Conclusion:** The combination of Twenty-four Move Shadow Boxing and psychosomatic relaxation has a beneficial auxiliary therapeutic effect on depression and anxiety accompanying Type-2 Diabetes.

**Key words:** shadow boxing - psychosomatic relaxation – diabetes – depression - anxiety

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## INTRODUCTION

Diabetes has been considered the fourth leading cause of death after cardiovascular diseases, cerebrovascular diseases and cancer, while becoming an epidemic in the world today. At present, China has become the world's second largest diabetes country after India (Feng et al. 2010). Most diabetic patients need medication, strict diet, regular monitoring of blood glucose and even physical examinations for a long term during treatment (Lin et al. 2013). Therefore, this kind of treatment may bring great mental and psychological pressure to patients. They tend to suffer from despair, depression, anxiety and other negative emotions (Lin et al. 2013). Besides, the personality, bad genetic qualities, diabetes mellitus (DM)-induced endocrine and metabolic disorders, change of blood glucose, visceral damages and other complications caused by DM in these patients may become the root of all kinds of psychological problems. Among them, depression is a major psychological barrier for DM patients (Feng et al. 2010). Researches indicate that the incidence of depression in DM patients is about 2~3 times higher than in non-DM patients. Nearly 40% of DM patients have suffered from depressive symptoms (Weinger & Lee 2006). Additional studies reported that Type-2 Diabetes patients with depressive symptoms may have their physiological functions impaired (Ciechanowski et al. 2000, Wander & Tovi 2000). Their first-aid and

hospitalization rates were higher. Meanwhile, depression prevented patients from following strict dietary requirements, dealing with interpersonal relationship and caring for themselves, resulting in the decrease of their life quality and deteriorated diseases. However, hospitals in China, which remains a developing country, often emphasize the control of blood glucose in the care and treatment of patients with Type-2 Diabetes and tend to ignore the life quality of patients and the improvement of their psychological state (Lin et al. 2013).

Twenty-four Move Shadow Boxing is one of the most outstanding traditional boxing techniques in Chinese martial arts (Qin et al. 2004). This boxing technique emphasizes a close association between consciousness, breath and action. It is a typical soft and slow exercise with a moderate tempo. It requires a "calm mind, relaxed body and harmony between action and mind", to achieve an ideal union of "nature and humanity". The characteristic of this exercise is that it helps practitioners relax nervous activities of their sympathetic system. This is of great significance to inhibiting the excessive excitement of sympathetic nerves (Qin et al. 2004). Steptoe & Bolton (1988) showed that "Exercises involving large muscle groups in the whole body, with rich natural rhythms are effective to the alleviation of depression. Low intensity exercise can lead to a sense of vigor, youth and other positive emotional changes." The content of Twenty-four Move Shadow Boxing is, to a certain degree, identical with the requirements of this

model. Psychosomatic relaxation is a type of Chinese qigong and belongs to static techniques. Practitioners relax all parts of their bodies from top to bottom, from head to toe gradually consciously and murmur the word "relax". Meanwhile, by eliminating distractions, they adjust their bodies to a static, natural and comfortable state and achieve a middle stage between particular wakefulness and quietness (Liu et al. 2012). Psychosomatic relaxation training is a technique for the patients' relaxation through simple actions. Originally, this technique was not used to relieve anxiety. However, as depression and anxiety often accompany each other and break out simultaneously, this technique can serve as an auxiliary therapy for depression, anxiety and other neuroses. Murphy et al. (1995) confirmed that compared with tricyclic antidepressant drugs and CBT, the curative effect of psychosomatic relaxation alone was not very significant. Kahn's research showed that the combination of psychosomatic relaxation and antidepressant drugs was better than antidepressant drugs alone (Kahn et al. 1990).

At present, in the process of diabetes diagnosis and treatment in China, when medical staffs are helping patients to control blood glucose, it is still a significant challenge to adjust and improve patients' psychological states. Some researchers proposed traditional regimen, which integrated "entertainment with bodybuilding" as an auxiliary therapy to control Type-2 Diabetes (Liu et al. 2012). However, no research about the combination of Shadow Boxing and psychosomatic relaxation to improve depression and anxiety in patients with Type-2 Diabetes has been reported thus far.

## SUBJECTS AND METHODS

### Subjects

In March 2013, self-rating depression scale (SDS) (Zhang 2001) and self-rating anxiety scale (SAS) (Zhang 2001) were used as evaluation tools to investigate 436 patients with Type-2 DM in communities of four general hospitals in Wenzhou City of Zhejiang Province in China, with the approval of the medical ethics committees. One hundred and twenty-four (124) patients with depression and anxiety were screened out. Among the 124 patients, 4 cases did not meet the inclusion criteria and were thus eliminated. 120 patients conforming to the inclusion criteria were divided into intervention group (60 cases) and control group (60 cases), according to the minimum distribution principle of unbalanced indicators. The control factors included gender, DM duration and age. All patients signed informed consents. After 24 weeks, 5 cases in intervention group and 3 cases in control group recovered respectively. The final sample sizes in the two groups included in the statistical analysis were 55 and 57, respectively. The research process required patients to continue the original therapy, i.e., drugs, diet and exercise were the same as they initially entered the

group. The glycosylated hemoglobin of research objects was measured before and after intervention.

Inclusion criteria: (1) Conforming to the new T2 DM patients diagnosis standards developed by WHO and the American Diabetes Association in 1999; (2) Without a family history of mental illness; (3) Willing to participate in the present study and able to express psychological state truthfully (Liu et al. 2012).

Exclusion criteria: (1) Acute complications of diabetes; (2) Severe complications, such as infection and lower limb gangrene; (3) Incomplete functions in heart, lung, kidney and other serious diseases; (4) Substance abuse or alcohol addiction; (5) Contraindications for exercise therapy; (6) Practiced traditional Chinese medicine regimen qigong and shadow boxing within one month (Liu et al. 2012).

### Measuring tools

Self-rating depression scale (SDS) (Zhang 2001) and self-rating anxiety scale (SAS) (Zhang 2001) were developed by Zung in 1965 and 1971, respectively. The Chinese versions of these instruments exhibited good reliability and psychometric validity (Zhang 2001). The two scales contain 20 items and use a 4-point scoring method. The total score is 20-80 points. The original total score was converted into standard SDS scores (standard SDS score = original score × 1.25). SDS reflects depressive symptoms and changes. Higher SDS and SAS scores suggest more serious levels of depressive and anxiety symptoms.

### Control group

Subjects received community diabetes health instructions once every 2 weeks, a total of 6 times, 30 min each time. The contents included basic knowledge about diabetes, diets, exercise, drugs and mental health guidance.

### Intervention group

On the basis of community health instruction, subjects practiced Twenty-four Move Shadow Boxing and psychosomatic relaxation for 24 weeks continuously. The content and method of community health instructions were the same as community nursing group. Before intervention, they were given action guidance by professional trainers for 3 consecutive days. The effects of Twenty-four Move Shadow Boxing and psychosomatic relaxation were explained. Meanwhile, Twenty-four Move Shadow Boxing and psychosomatic relaxation discs and teaching materials were handed out to patients to master their techniques. During intervention, patients practiced Twenty-four Move Shadow Boxing and psychosomatic relaxation for 3-5 days every week, twice a day (in the morning and evening), along with warm-up and cool-down activities. They practiced about 40 min every time for 12 weeks a cycle, a total of 2 cycles (24 weeks). Subjects started the exercises 1 hour after their meals, to avoid motile hypoglycemia.

## Statistical Analysis

The data were analyzed with the SPSS 15.0 software package. All quantitative data were represented with mean  $\pm$  standard deviation ( $\pm$ s). Two groups of quantitative data were compared with t-test. Intra-group comparison before and after intervention was conducted with t-test. Qualitative data was represented with number of cases and constituent ratio. Inter-group comparison between two groups of qualitative data was conducted with chi-square test or rank-sum test.  $P < 0.05$  was considered as statistically significant.

## RESULTS

### General information

From Table 1, we can see that before intervention, the differences in gender, age, DM duration, marital status, average monthly income, complication and therapy between intervention group and control group

had no statistical significance ( $P > 0.05$ ), suggesting that the two groups were comparable with regard to baseline data.

### Depression changes in patients before and after intervention

Before intervention, there was no statistically significant difference between intervention group and control group in depression scores ( $t = 0.657$ ,  $P = 0.513$ ). After the treatment, the depression score of intervention group was significantly lower than before. The difference was statistically significant ( $P < 0.001$ ). Although the depression score of control group declined slightly, too, compared with pre-intervention, the difference was not statistically significant ( $P = 0.123$ ). Besides, the difference value in depression scores of two groups before and after intervention was statistically significant ( $t = 3.596$ ,  $P < 0.001$ ). For more details, see Table 2.

**Table 1.** Comparison of the control and intervention groups with regard to the baseline data

| Item                   | Intervention Group (n=55)                    | Control Group (n=57) | t/z/ <sup>2</sup> | P     |
|------------------------|----------------------------------------------|----------------------|-------------------|-------|
| Gender                 | Male                                         | 27(49.1)             | 0.033             | 0.855 |
|                        | Female                                       | 28(50.9)             |                   |       |
| Age (Years)            | 62 $\pm$ 6                                   | 61 $\pm$ 7           | 0.810             | 0.419 |
| DM Duration (Years)    | 8.2 $\pm$ 3.8                                | 8.1 $\pm$ 4.5        | 0.127             | 0.899 |
| Marital Status         | Married                                      | 48(87.3)             | 0.132             | 0.716 |
|                        | Divorced/Widowed                             | 7(12.7)              |                   |       |
| Education Level        | Primary school and below                     | 15(27.3)             | 0.416             | 0.677 |
|                        | Junior high school                           | 23(41.8)             |                   |       |
|                        | Senior high school/technical school          | 10(18.2)             |                   |       |
|                        | Junior college                               | 4(7.3)               |                   |       |
|                        | Undergraduate and above                      | 3(5.5)               |                   |       |
| Average Monthly Income | <1000 yuan                                   | 9(16.4)              | 0.104             | 0.917 |
|                        | 1000-2999 yuan                               | 30(54.5)             |                   |       |
|                        | 3000-4999 yuan                               | 11(20.0)             |                   |       |
|                        | $\geq$ 5000 yuan                             | 5(9.1)               |                   |       |
| Complication           | Yes                                          | 19(34.5)             | 1.018             | 0.313 |
|                        | No                                           | 36(65.5)             |                   |       |
| Therapy                | Untreated                                    | 14(25.5)             | 1.167*            | 0.838 |
|                        | Oral hypoglycemic drugs                      | 34(61.8)             |                   |       |
|                        | Insulin injection                            | 4(7.3)               |                   |       |
|                        | Oral hypoglycemic drugs + insulin injections | 3(5.5)               |                   |       |
|                        |                                              | 1(1.8)               |                   |       |

\* stands for using Fisher's exact probability method

**Table 2.** Depression changes in patients before and after intervention

| Group              | Before Intervention | After Intervention | Difference    | Intra-Group Comparison | Inter-Group Difference Value Comparison |
|--------------------|---------------------|--------------------|---------------|------------------------|-----------------------------------------|
| Intervention Group | 53.2 $\pm$ 8.5      | 47.1 $\pm$ 8.1     | 6.1 $\pm$ 4.9 | $P < 0.001$            | $t = 3.596$                             |
| Control Group      | 54.3 $\pm$ 9.2      | 52.2 $\pm$ 8.5     | 2.1 $\pm$ 6.7 | $P = 0.123$            | $P < 0.001$                             |

**Table 3.** Anxiety changes in patients before and after intervention (standard score)

| Group              | Before Intervention | After Intervention | Difference | Intra-Group Comparison | Inter-Group Difference Value Comparison |
|--------------------|---------------------|--------------------|------------|------------------------|-----------------------------------------|
| Intervention Group | 58.5±6.5            | 47.3±7.1           | 11.2±4.5   | P<0.001                | t=10.443                                |
| Control Group      | 56.9±6.2            | 54.7±7.5           | 2.2±4.7    | P=0.101                | P<0.001                                 |

**Table 4.** Blood glucose changes in patients before and after intervention

| Group              | Before Intervention | After Intervention | Difference | Intra-Group Comparison | Inter-Group Difference Value Comparison |
|--------------------|---------------------|--------------------|------------|------------------------|-----------------------------------------|
| Intervention Group | 7.54±1.53           | 6.31±1.11          | 1.23±0.75  | P<0.001                | t=2.438                                 |
| Control Group      | 7.39±1.62           | 6.52±1.35          | 0.87±0.81  | P<0.001                | P=0.016                                 |

### Anxiety changes in patients before and after intervention

Before intervention, there was no statistically significant difference between intervention group and control group in anxiety scores ( $t=1.333$ ,  $P=0.185$ ). After the treatment, the anxiety score of intervention group was significantly lower than before. The difference was statistically significant ( $P<0.001$ ). Although the anxiety score of control group declined slightly, too, compared with pre-intervention, the difference was not statistically significant ( $P=0.101$ ). Besides, the difference value in anxiety scores of two groups before and after intervention was statistically significant ( $t=10.443$ ,  $P<0.001$ ). For more details, see Table 3.

### Blood glucose changes in patients before and after intervention

Before intervention, there was no statistically significant difference between intervention group and control group in glycosylated hemoglobin level ( $t=0.503$ ,  $P=0.615$ ). After the treatment, the glycosylated hemoglobin levels of both groups were significantly lower than before. The differences of both groups were statistically significant ( $P<0.001$ ). The blood glucose reduction in the intervention group was greater than that of the control group. Their comparative difference was statistically significant ( $t=2.438$ ,  $P=0.016$ ). For more details, see Table 4.

## DISCUSSION

The findings of this study suggest that the combination of Twenty-four Move Shadow Boxing and psychosomatic relaxation has a beneficiary effect on depression, anxiety and blood glucose levels in patients with Type-2 Diabetes. Previously, Luo et al. (2008) found that Twenty-four Move Shadow Boxing can improve mental health and life quality of elderly females, yet the improvement effect was not significant unless they persisted in exercise for a longer time. Huang (2008) found that all kinds of sports and exercise can significantly improve the depressive symptoms of female college students, but the effect of Shadow Boxing was superior to other exercise programs. A follow-up study spanning 20 years showed that

depression was related to non-engagement in physical activities. After the depression group increased physical exercise, their self-esteem, cognitive ability, memory and judgment was improved (Huang 2008). For diabetic patients specifically, Hu (2014) demonstrated that physical activities had a positive effect on depression and other mental health indicators among elderly DM patients.

Li Yang's investigation (Li 2011) discovered that Twenty-four Move Shadow Boxing can improve female prison guards' anxiety. The conclusion that various relaxation trainings could mitigate anxiety has been confirmed by various research (Xu 2011). Methods of relaxation in these studies include progressive muscle relaxation, music relaxation, biofeedback relaxation training, three line relaxation and imagination relaxation, and the subjects therein include students, all sorts of clinical patients, pregnant and maternal women as well as military personnel.

The combination of Twenty-four Move Shadow Boxing and psychosomatic relaxation seems to improve diabetic patients' depression symptoms (Cui & Lv 2007). When the practitioners perform shadow boxing, spiral winding movements of limbs and rotation of the waist will stretch and press 300-plus acupuncture points in the whole body, which is a good massage for practitioners' body (Cui & Lv 2007). Through many tests and much research, Martial Arts Association of Chinese Academy of Sciences came to the conclusion that shadow boxing has a very significant medical effect. First of all, the long-term practice of shadow boxing makes practitioners' alpha wave dominant among the brain waves, whose main mountain is prominent and whose synchronization is orderly. The brain is in a good awakening state (we name it "tai chi state") (Zhang et al. 2005). The modern medicine holds that this state can enhance functions of internal organs and immune functions. The fact that the forehead brain waves' slow rhythm changes obviously increase alpha wave's frequency band energy shows that the systematic training of shadow boxing could improve the balance and coordinate the left and right brain hemispheres (Zhang et al. 2005). It is a typical aerobic exercise, the most effective way to tone up one's body; therefore, shadow boxing can have a positive impact on various physiological systems in people who practice regular aerobic exercise.

For example, some researches (Yang & Liang 2011) point out that physical exercise can promote the nervous, circulatory and respiratory system as well as bones, and prevent some diseases. Shadow boxing can promote the psychophysiology effect of central nervous system and peripheral proprioception (Wang et al. 2006). Psychosomatic relaxation's influence on depression and anxiety in patients with diabetes mainly works through the nervous system and the related physiological indicators. Relaxation training can lower the activity function of the sympathetic nervous system in patients, adjust the patient's breathing rate, blood pressure and muscle tension, and thus achieve the goal of relieving anxiety and depression. For example, biofeedback relaxation training can improve glucose metabolism of patients with Type-2 Diabetes, and effectively control the fluctuation of blood glucose (Zhu et al. 2001, Hosseinzadeh et al. 2013).

Glycated hemoglobin is an important reference standard for the assessment of blood glucose control of Type-2 Diabetes. Hypoglycemic effect of the exercise therapy has been widely recognized by scholars at home and abroad, especially for patients with Type-2 Diabetes. The main aerobic exercises which are suitable for people with diabetes are walking, jogging, mountain climbing, swimming, etc., but the implementation of these sports is difficult for the diabetic patients with complications. To achieve the maximum hypoglycemic effect, the diabetic patients must persevere in those physical activities. The intensity of Twenty-four Move Shadow Boxing can be classified into small to medium intensity among the aerobic exercise, and it is suitable for middle-aged people, the elderly people, and the diabetic patients with complications to perform as a long-term regular exercise. Mainly through patients' entering "relaxed and serene" state, psychosomatic relaxation can adjust neuroendocrine function, thus improve the practitioners' glucose metabolism. Moreover, the combination of Twenty-four Move Shadow Boxing and psychosomatic relaxation can achieve visceral autonomic massage through "gentle breathing, abdominal breathing" required by movement, and directly affect the pancreas function and promote the B cell's secretion function (Wang et al. 2002). Through this practice, moods and the activity function of the cerebral cortex can be regulated and then the plant nerve function could be adjusted and the function of adrenal medulla be affected; at the same time, through the affection of the hypothalamus-pituitary-gland system, B cell's secretion function can be strengthened; or by affecting the secretion of hormone resistance of insulin, the blood glucose can be reduced (Zhu et al. 2001).

## CONCLUSION

The combination of Twenty-four Move Shadow Boxing and psychosomatic relaxation has a significant beneficial effect on depression, anxiety and blood glucose control in patients with Type-2 Diabetes.

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**Conflict of interest:** None to declare.

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Correspondence:

Yingying Zheng  
Institute of Physical Education, Wenzhou University  
Wenzhou City, Zhejiang Province, China  
E-mail: zjzyy881@163.com