Int J Clin Exp Med 2021;14(2):813-821
www.ijcem.com /ISSN:1940-5901/IJCEM0122169

Original Article

The application of group cognitive behavioral intervention to T2DM treatment

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Received September 11, 2020; Accepted November 11, 2020; Epub February 15, 2021; Published February 28, 2021

Abstract: Objective: To investigate the application of group cognitive behavioral intervention in the treatment of type 2 diabetes mellitus (T2DM). Methods: A total of 120 T2DM patients admitted to our hospital were recruited as the study cohort and randomly divided into an observation group (n=62) and a control group (n=58). The control group underwent conventional nursing, while the observation group underwent conventional nursing and group cognitive behavioral intervention. Before and after the intervention, the changes in the SAS, SDS, blood glucose, and hemoglobin A1c (HbA1c) levels were compared between the two groups. Results: Meticulous examinations were carried out on the patients. The inspection direction involved starting with the degree of inhibition, and the changes in each patient's blood glucose and glycosylated hemoglobin levels were monitored in real time, input into a mathematical data model and then compared with the control group's results before the intervention, but the differences were not statistically significant ($P > 0.05$). After the intervention, the SAS and SDS levels of the patients in the observation group were compared in real time with the control group, and the different levels were recorded. There were no significant differences in the patients' anxiety and depression levels in the control group before and after the intervention ($P > 0.05$), but the patients' fasting blood glucose and HbA1c levels in the control group were statistically significant ($P < 0.05$). The comparisons of the SAS and SDS levels before and after the intervention, and the conversion of the blood glucose and other substances had independent sample data for the overall inspection. In the process of carrying out this study, the obtained numerical results showed that there was a significant difference between the SDS levels in the observation group and the levels in the control group, showing a practical statistical significance. In addition, there were significant differences in the blood glucose and HbA1c levels, which had a certain statistical significance. And the different values between the two kinds of data obtained by the independent sample tests were statistically significant. Conclusions: Proper nursing interventions effectively improve the therapeutic effects on patients' diseases, reduce their blood glucose and hemoglobin levels, help to regulate their glucose metabolism, mitigate their negative emotions (e.g., anxiety and depression), and elevate T2DM patients' quality of life.

Keywords: Group cognitive-behaviors, T2DM, nursing psychology, cognitive behavioral intervention

Introduction

Diabetes mellitus (DM) is a chronic disease caused by both genetic and environmental factors [1]. Generally, DM is an abnormal metabolism syndrome. The functions of multiple tissues in the human body may cause islet cells to be unable to promptly supply a sufficient amount of insulin necessary to the body, resulting in a metabolic disorder of the proteins and sugars in the body and ultimately leading to DM [1]. Patients are concerned about the cardiac, cerebral, and renal diseases caused by DM, and DM patients are plagued by polyuria, drinking plenty of water and eating too much while losing weight. Due to the aging of the population and lifestyle changes, a growing number of people are suffering from DM, and their lives are negatively affected by it [2, 3].

DM has long been plaguing people's lives. DM, a chronic non-hereditary disease, affects patients' physical and mental health [4]. Patients who learn that they are diagnosed with DM are often unwilling to accept the fact and exhibit negative emotions. If DM patients can control

their emotions such that their adrenocortical hormone secretions increase, their symptoms and signs will be relieved to a certain extent. Meanwhile, the excitability of their nervous systems will be elevated, leading to the expedited decomposition of fat in the body and the secretion of massive ketone bodies [5]. If patients' nervous emotions can be alleviated at this time, their urine glucose, insulin demand, and islet B cell levels will fall, thereby facilitating the secretion of sufficient insulin necessary to achieve the proper balance [6]. In this study, we found that the proper psychological interventions effectively improved patients' negative emotions and raised their self-perception to a higher level, and the effective measures alleviated their symptoms and signs, enhanced their bodies' immunity, prolonged their overall survival (OS) to a certain extent, and helped to improve their quality of life. Data show that T2DM has a higher incidence among the two forms of diabetes. Therefore, medical staff and DM patients pay increasingly significant attention to the influences of the psychological and social factors on T2DM [7]. With the changes in the modern clinical medical models and the continuously improved medical methods, the traditional medical model has been gradually transformed into a new model integrating biology, social medicine, and psychology. Regarding this new model, some scholars have provided some reliable theoretical foundations. The theoretical models suggest that patients' psychological states and physical conditions inevitably are affected by multiple social factors, resulting in a series of changes. Both the factors and changes play a synergetic role in the patients' conditions. Through a series of clinical experiments, we found that patients undergoing treatment who received psychological and behavioral interventions were cured earlier, and their self-care abilities and quality of life were improved. Meanwhile, certain psychological interventions helped to improve their understanding of DM and reduce their depression, so as to inhibit the secretion of glucagon and adrenaline, thus helping the patients identify a method to control their own blood glucose [8]. Meanwhile, the incidence of some complications caused by DM was reduced and DM patients' quality of life was effectively improved. Based on numerous clinical experiments, we found that a marked improvement in the somatization symptoms led to a remarkable decrease in patient anxiety and markedly improved indexes and blood glucose metabolism. In recent years, it has been shown that psychotherapy can help DM patients improve their blood glucose, and a proper explanation of the disease can help patients understand the therapy and rehabilitation services they receive, thereby reducing the incidence of depression and boosting their confidence in overcoming DM [2].

At present, many domestic scholars take measures to improve the cognitive behavior of patients with T2DM basically through mental health education, or they implement cognitive behavior intervention on a one-to-one basis. However, the applicability of this method is relatively low, and it is difficult to popularize the one-to-one intervention, so it is not suitable for wide use. In this study, T2DM patients' potential psychological and physical states were observed and measured, and on this basis, the analysis was conducted accordingly, some psychological conditions that may occur in T2DM patients were summarized to help them control their emotions, and the biofeedback therapy was adopted to effectively regulate and stabilize their blood glucose and hemoglobin A1c levels. This effectively helps patients to reduce their psychological burdens and boost their confidence in overcoming T2DM. Meanwhile, we scientifically assessed and tested the T2DM patients' psychological nursing care and treatment methods through careful observations. This study will not only help innovate the psychological nursing of T2DM patients and improve the applicability of psychological nursing, but it will also recommend more scientific and effective treatment regimens for T2DM patients, which is an innovation of the treatment measures.

Materials and methods

General materials

From March 2019 to December 2019, 120 T2DM patients admitted to the hospital were observed and randomly divided into the observation group (62 patients) and the control group (58 patients). This study was approved by the Ethics Committee of Hainan General Hospital. All study participants provided written informed consent before participating in the study.

Inclusion criteria: ① T2DM patients who meet the diagnostic criteria for type 2 diabetes mellitus proposed by WHO in 1999. ② Patients with a primary school education or higher. ③ Patients without serious cardiac or pulmonary diseases and with normal hepatic and renal functions. ④ Patients who need to be treated with insulin. ⑤ Patients without cognitive disorders and the like. ⑥ Patients whose participation was voluntary. The patients' right to stay informed of this study is ensured.

Exclusion criteria: (1) Cachexia patients who could not complete the investigation. (2) Patients with a history of mental illness. (3) Patients who withdrew voluntarily.

Intervention methods

The control group underwent conventional nursing, and the observation group underwent conventional nursing and group cognitive behavioral interventions. Information on healthy diets and the formulation of relevant recipes were explained to the patients. First, the patients were informed that the recipes were formulated in accordance with the distribution ratio of the necessary daily calories and the three major nutrients. The three meals were assigned every day following the 1:2:2 ratio. According to the actual conditions of the patients, they were instructed to exercise properly, and they received *fixed* amounts of the assigned *foods* and conventional DM treatment if they had no serious diabetes complications or had not suffered damage to their cardiac and pulmonary functions. Walking is a simple type of exercise. There are three types of walking, namely, 120 steps per minute, 140 steps per minute, and 160 steps per minute. Before their exercises, assistance was provided to the patients to help them prepare. After the exercises started, the medical staff assisted the patients in relaxing for 3-5 minutes. Based on the condition that the patients' daily diets and nutrition met the consumption requirements, they were required to additionally consume 1737.5 kilojoules. When the patients maintained the corresponding exercise intensity, the muscles and cells of each patient's whole body were certainly maintained at a suitable stimulation intensity. The patients' blood pressure and physical conditions were observed during the exercise. Each exercise training started at 90 min after a meal and lasted for 0.5-1 hour. The medical staff assisted the patients in exercising properly twice a week, and the duration for each exercise was 30 minutes. During the feedback training exercise, the patients were placed in a supine position, wore headphones, and were instructed to relax in accordance with the rhythm of the music. The relevant information was fed back following the instrument's instructions.

Observation indexes and assessment standards

The Self-Rating Anxiety Scale (SAS) was designed by Zung in 1971. The methods used in the SAS are similar to those in the Self-Rating Depression Scale (SDS). The SAS, a Likert scale, consists of 20 small items and is divided into four grades. Such items can accurately and scientifically assess patients' subjective feelings of anxiety.

The Self-Rating Depression Scale (SDS) was designed by William W.K. Zung in 1965. Using SDS, medical staff can clearly understand a patient's depression, so the patient can receive timely adjuvant treatment.

Fasting blood glucose (FBG): On the day before measuring the FBG, the patients were required to fast for over 8 hours, and their blood was taken to measure their blood glucose index at 6-8 o'clock the next morning. The normal index value is 3.33-5.55 mmol/L (60-100 mg/dl). In 1999, the World Health Organization established the diagnostic criteria for DM patients, and those with a fasting blood glucose ≥7.0 mmol/L (126 mg/dL) are diagnosed with DM.

HbA1c affects all aspects of the body. Increased HbA1c results in a reduced affinity of the red blood cells and oxygen molecules, causing hypoxia in the body's cells and tissues. In this case, DM patients have a higher incidence of cardiovascular and cerebrovascular complications and diabetic nephropathy. Therefore, it is crucial to measure patients' HbA1c and to monitor and diagnose DM patients' multiple basic indexes.

Statistical methods

We systematically sorted out and analyzed the data using SPSS 20.0, and then we analyzed the data in accordance with the relevant statistical formulas, selected the appropriate values, performed the analysis using Student's t test, reduced errors, conducted the measurements using standard working hours in [*n* (%)], and

Table 1. Comparison of the differences in the general clinical indexes between the two groups

General clinical data		Observation group (*n*=62)	Control group (*n*=58)	*t*	*p*
Gender	M	32	22	0.374	0.541
	F	30	36		
Mean age (years)		57.04±8.48	57.55±7.42	0.350	0.000
Marital status	Not Married	3	1	0.902	0.342
	Married	59	57		
Basic diseases	Y	37	40	0.308	0.579
	N	25	22		
Source of income	NCMS	40	37	0.608	0.738
	Medical insurance	17	14		
	self-paying	5	7		

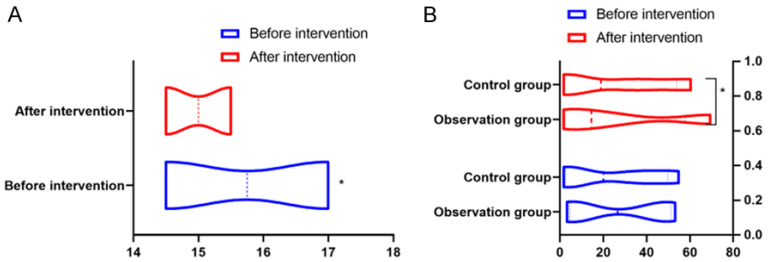

Figure 1. Comparison of the anxiety levels in the two groups before and after the intervention. The comparison of the anxiety levels in the two groups before and after the intervention shows that the patients in the observation group were depressed before the intervention, but their depression was remarkably reduced after the intervention. The patients in the control group were depressed before and after the intervention. Compared with the control group, *$P < 0.05$.

inspected the internal variances of the two groups using the variance data. The experimental results were analyzed using Student's t test, and the differences in the data between the two groups were determined using F. $P < 0.05$ indicated a statistically significant difference.

Results

Comparison of the differences in the general clinical indexes between the two groups

Our comparison of the measured data showed that there were no statistically significant differences among the values corresponding to the general clinical indexes between the two groups ($P > 0.05$), but the differences were comparable (**Table 1**).

Comparison of the anxiety levels in the observation and control groups before and after the intervention

The depression and anxiety levels in the observation and control groups were compared before and after the nursing interventions. The anxiety levels of the patients in the observation group were markedly higher before the intervention, but they were significantly reduced after the intervention. The patients in the control group exhibited anxiety before the intervention, but their anxiety decreased significantly after the intervention (**Figure 1**).

Comparison of the degrees of depression in the observation and control groups before and after the intervention

The degrees of depression in the observation and control groups were compared before the nursing interventions. Before the nursing interventions, the patients in the observation group were significant, and they were highly depressed, but the depression decreased significantly after the nursing intervention. The patients in the control group were depressed before the nursing intervention, but the depression decreased significantly (**Figure 2**).

Comparison of the anxiety and depression levels and the glucose metabolism control in the observation and control groups before the intervention

We compared the negative emotions and the FBG and HbA1c values in the two groups before the nursing interventions, but the differences were not statistically significant (**Figure 3**).

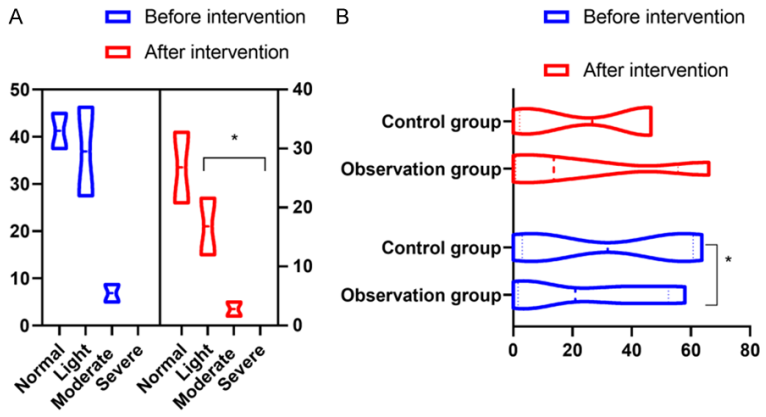

Figure 2. Comparison of the degrees of depression in the two groups before and after the intervention. The comparison of the degrees of depression in the observation and control groups before and after the intervention showed that before the intervention, 50% of the patients in the observation group were depressed, but the depression decreased after the intervention. The patients in the control group were depressed before and after the intervention. Compared with the control group, *$P < 0.05$.

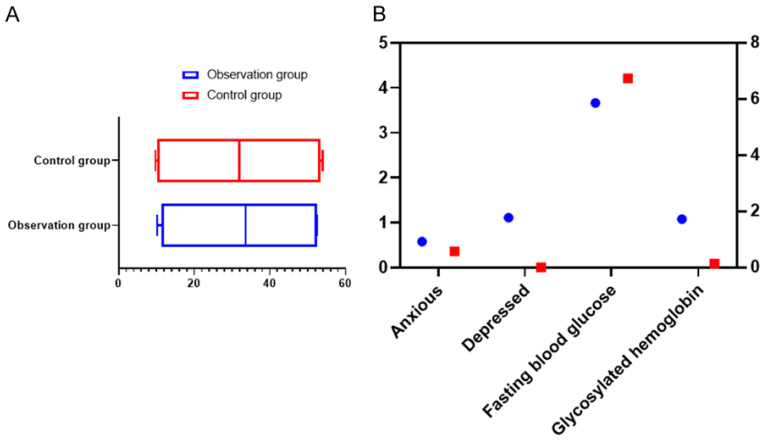

Figure 3. Comparison of the anxiety, depression, and glucose metabolism control levels in the two groups before the intervention. There were no significant differences in the anxiety, depression, FBG, or HbA1c levels between the observation and control groups before the intervention ($P > 0.05$).

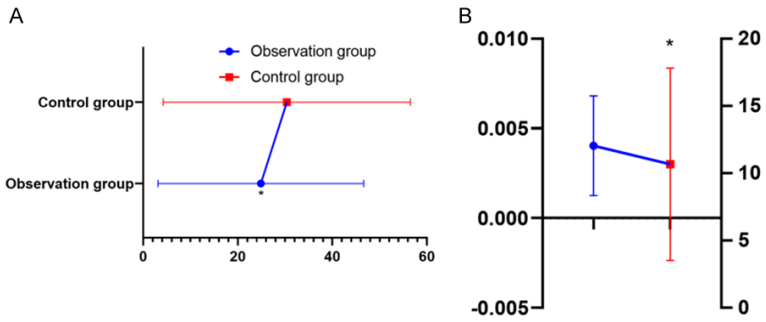

Figure 4. Comparison of the anxiety, depression, and glucose metabolism control levels in the two groups after the intervention. After the intervention, there were marked differences in the anxiety, depression, blood glucose, and HbA1c levels in the observation and control groups (*$P < 0.05$).

Comparison of anxiety and depression levels and the glucose metabolism control in the observation and control groups after the intervention

After the patients underwent group cognitive behavioral intervention, there were significant differences in the negative emotions and the HbA1c index levels in the control and observation groups, and the differences were statistically significant ($P < 0.05$) (**Figure 4**).

Comparison of the anxiety and depression levels and the glucose metabolism in the observation group before and after the intervention

After the intervention, the differences in the blood glucose, HbA1c, anxiety, and depression levels in the observation group were statistically significant ($P < 0.05$) (**Figure 5**).

Comparison of the anxiety and depression levels in the control group before and after the intervention

There were no significant differences in the physical conditions or depression levels in the control group before and after the intervention ($P > 0.05$), but the FBG and HbA1c levels in the control group were significantly different ($P < 0.05$) (**Figure 6**).

Comparison of the glucose metabolism differences between the observation and control groups before and after the intervention

Our comparison of the cognition, the related data, and the data differences between the two groups before and after the nursing interventions

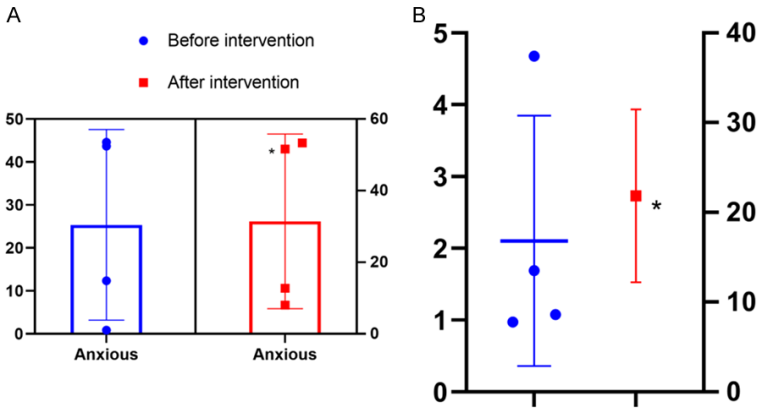

Figure 5. Comparison of the anxiety, depression, and glucose metabolism levels in the observation group before and after the intervention. There were significance differences in the anxiety, depression, and FBG and HbA1c levels in the observation group before and after intervention (*$P < 0.05$).

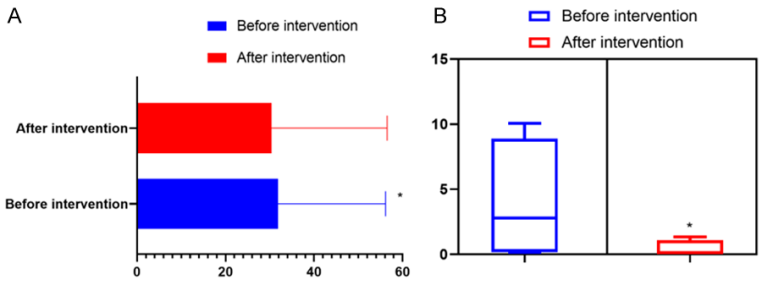

Figure 6. Comparison of the anxiety and depression levels in the control group before and after the intervention. There were no significant differences in the anxiety and depression levels in the control group before and after the intervention ($P > 0.05$), but there was a significant difference in the FBG and HbA1c levels (*$P < 0.05$).

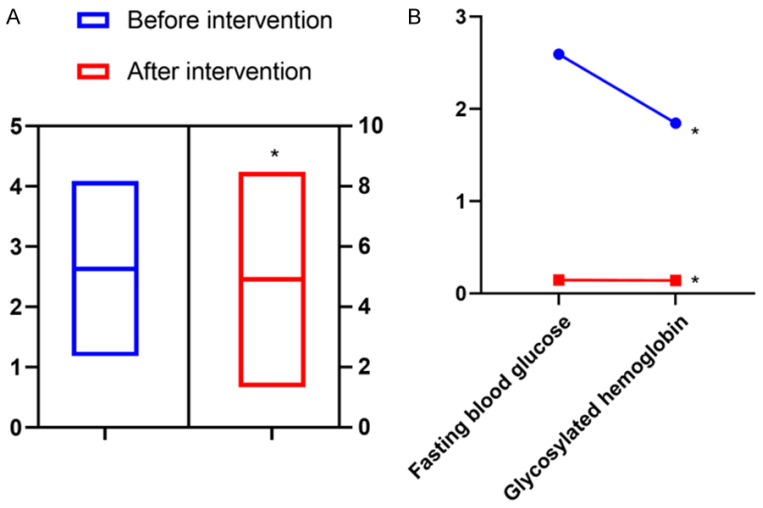

Figure 7. Comparison of the glucose metabolism levels in the two groups before and after the intervention. Our comparison of the glucose metabolism levels in the two groups before and after the intervention shows that the levels in the observation group were significantly better than they were in the control group, and the differences were statistically significant (*$P < 0.05$).

showed that the observation group was superior to the control group in terms of the physical conditions, and the data differences within the groups were statistically significant ($P < 0.05$) (**Figure 7**).

Discussion

Currently in China, most healthcare providers implement one-on-one cognitive behavioral and psychological interventions for DM patients. However, such interventions merely provide mental health counseling for DM patients. The medical staff can hardly achieve any changes in the patients' cognitive behavior using one-on-one psychological intervention, so the promotion and implementation of such nursing interventions remain a challenge [9]. Therefore, we conducted an analysis using an assessment of the psychological values and an understanding of the conditions of T2DM patients. On this basis, the psychological issues (e.g., the patients' denial of their having diabetes and depression) that may exist or occur throughout the treatment were sorted out using the obtained data, and we found that these patients are very sensitive to the word "insulin". Therefore, we should formulate the proper emotional therapy and biofeedback therapy to effectively control and stabilize their blood glucose and HbA1c levels [10]. This can alleviate the patients' anxiety and depression to a certain extent, and it impacts DM patients' blood pressure, blood glucose, and body mass indexes, so the medical staff should closely observe the patients' conditions. Therefore, comprehensive observa-

tion and proper psychological intervention provide a satisfactory scientific basis for the treatment of DM patients and systematic and scientific guidance for DM patients [11].

Group cognitive behavioral intervention effectively improves patients' anxiety and depression

DM is closely related to a patient's lifestyle and psychological states, and it may cause the patients to experience a certain degree of depression [12]. Moreover, other tissues in DM patients are influenced by their neuroendocrine systems, and this contributes to their negative emotions and increases their incidences of depression or anxiety. In the medical field, many medical scholars believe that DM patients have certain psychological barriers characterized by depression and anxiety. Price et al. found that nearly 40% of T2DM patients suffer from anxiety, and the incidence of depression is 36%, and the incidence of depression in DM patients is twice that in non-diabetic patients [13]. In addition, Price et al. performed psychological intervention and routine nursing measures on 46 patients with DM for 8 weeks, and finally achieved a good effect and significantly improved the patients' blood glucose metabolism indexes [13]. In this study, patients with DM were treated using psychological intervention in two groups. After the intervention, the depression and anxiety levels were significantly different between the control and observation groups, and the glucose metabolism index in the observation group was significantly improved, a finding consistent with previous research results [14]. Multiple empirical studies in China have proved that the emotional stress response can give real-time feedback through the physiological mechanism in the body and can stimulate the nervous system to send out signals, thus causing T2DM [15, 16]. The proper psychological interventions can improve DM patients' psychological states and expedite the improvement of their conditions. DM, a lifelong chronic disease, cannot be completely cured using existing medical options, causing most DM patients to undergo severe psychological stress that leads to psychological states (e.g., anxieties and depression). Depression is undoubtedly a psychological trauma for DM patients. The proper psychological interventions enable DM patients to fully express their feelings and enhance their confidence in the treatment of DM.

Group cognitive behavioral intervention helps patients to further control their glucose metabolism levels

The specific methods for changing patients' cognitive behaviors have been extensively adopted in the United States since the mid-1970s. Regarding the classic behavioral therapies [17], psychotherapy is undoubtedly a new treatment method. Cognitive education is used to encourage more patients to participate in the plan. The plan should be education-oriented. Throughout the process, the patients' understanding of DM can be effectively enhanced, and their cognitive levels can be improved. In addition, it should be ensured that they independently adopt healthy behaviors and ways of thinking. Cognitive therapy can completely eliminate their negative thoughts by changing their mindsets, thereby achieving psychological treatment [18]. This method involves multiple aspects. First, DM patients should be motivated to seek help, and they should be willing to improve their negative thinking. Second, they should take the initiative to raise the issues encountered in daily life. Finally, they should change their outlook and accept the advice of doctors or physicians. Anxiety occurs frequently in T2DM patients. Early cognitive behavioral intervention can increase patients' understanding of DM and change their mentalities and behaviors, thereby reducing their psychological burdens, facilitating the control of blood glucose, and enhancing their quality of life [19]. Fall et al. selected 32 T2DM patients as a research cohort and grouped them for study, among which the observation group was given cognitive behavioral intervention measures; the anxiety and depression data were collected before and after the intervention, the blood glucose changes in the patients were monitored, and the results showed that all the indicators of the patients in the observation group were significantly better than they were in the control group, which is consistent with this study [15]. Regarding the psychological intervention in China, the biological conditions are not fed back simply using one-on-one cognitive intervention, so the DM patients cannot accurately understand their conditions. The relaxation therapy requires an effectively reduced work-

load of the medical staff using group psychotherapy for hospitalized DM patients based on an increase in the number of existing DM patients, so as to help more patients [20]. In summary, group cognitive behavioral intervention is conducive to controlling DM patients' blood glucose and anxiety levels. In addition to the clinical treatment, appropriate psychological interventions for the patients will have a very long-term impact, and with the passage of time, patients' psychological states can be further studied and investigated. However, in this study, the patient cohort was small, so research using larger cohorts needs to be carried out to further validate our findings.

Disclosure of conflict of interest

None.

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