

# Research on the Effect of Comprehensive Intervention in the Clinical Treatment of Patients with Type 2 Diabetes Mellitus

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**Abstract:** *Objective:* This study aims to explore the value of comprehensive intervention in the clinical treatment of patients with type 2 diabetes mellitus complicated with hypertension. *Methods:* 90 patients with type 2 diabetes and hypertension were selected and divided into a control group and an intervention group according to the random number table method, with 45 cases in each group. The control group received conventional treatment, and the intervention group received comprehensive intervention on the basis of the control group, including a diet plan, an exercise program, scientific treatment, regular monitoring, and psychological counseling. The blood sugar, blood pressure, and other indicators of the two groups were compared. *Results:* After 5 months of intervention, the fasting blood glucose, postprandial 2 h blood glucose, glycosylated blood glucose protein, diastolic blood pressure, systolic blood pressure, mean arterial pressure, and other indicators of the intervention group were significantly lower than the control group ( $P < 0.05$ ), and the rate of decrease was significantly greater than that of the control group ( $P < 0.05$ ). *Conclusion:* Comprehensive intervention for patients with type 2 diabetes mellitus and hypertension helps in controlling blood sugar and lowering blood pressure, with clinical significance.

**Keywords:** Comprehensive intervention; Type 2 diabetes mellitus; Complications; Clinical treatment

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## 1. Introduction

Type 2 diabetes is a common chronic disease that can be hereditary, and among the types of diabetes, type 2 diabetes accounts for more than 70% <sup>[1]</sup>. The incidence of complications has also been increasing year by year. Among them, more than 40% of diabetic patients will develop high blood pressure, and high blood pressure is the main factor that complications like kidney disease and cardiovascular disease. Therefore, controlling blood sugar and blood pressure are extremely important for people with type 2 diabetes.

As type 2 diabetes is a chronic disease, hypoglycemic drugs and antihypertensive drugs alone are not enough to achieve long term effect, and comprehensive intervention methods are also required. Comprehensive intervention refers to a combined treatment with multiple aspects such as diet, exercise, and psychological counseling. It can effectively improve the treatment effect of patients with type 2 diabetes and hypertension and reduce the probability of other complications; besides, the patients' health can also be improved through leading a healthy lifestyle. A better immunity can help improve the patients' quality

of life; in addition, the comprehensive intervention method also reduces the need for drug treatment or surgical treatment to a certain extent, thus reducing the medical expenses of patients. In conclusion, comprehensive intervention is of great significance for the clinical treatment of patients with type 2 diabetes mellitus complicated with hypertension.

## **2. Materials and methods**

### **2.1. General information**

In this study, patients with type 2 diabetes who were treated in our hospital from December 2022 to April 2023 were selected. 90 hypertensive patients were used as research subjects, including 52 males and 38 females, in which the youngest was 45 years old and the oldest was 67 years old. The patients were divided into an intervention group and a control group according to the random number table method, with 45 cases in each group. The age, gender, fasting blood glucose (FBG), 2h postprandial blood glucose (2hPG), glycosylated hemoglobin (HbA1c), systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) of the two groups were compared, and the differences were not statistically significant ( $P > 0.05$ ).

Inclusion criteria: (i) Diagnosed with type 2 diabetes mellitus complicated with hypertension, whose blood glucose level complied with the World Health Organization's diagnostic criteria for type 2 diabetes; (ii) aged between 30 and 70 years old, regardless of gender; (ii) signed an informed consent and agreed to participate in this study.

Exclusion criteria: (i) diagnosed with type 1 diabetes, gestational diabetes, or other special types of diabetes; (ii) severe heart, liver, or kidney insufficiency; (iii) history of other endocrine diseases, autoimmune diseases, or malignant tumors; (iv) pregnant or lactating women; (v) suffering from mental illness or cognitive impairment prevents them from cooperating with the research.

### **2.2. Intervention methods**

The control group received conventional intervention methods, including drug treatment and monitoring of blood glucose and blood pressure.

The intervention group underwent a comprehensive treatment that included five aspects: diet, exercise, monitoring, treatment, and psychological counseling.

#### **2.2.1. Diet intervention**

A diet plan was given to the patients to control blood sugar, blood lipids, body weight, and other indicators. The daily energy requirements of the patients in the intervention group were calculated according to the height, weight, age, gender and other factors of the patients, and a diet plan was formulated for each patient based on their energy requirements. Specifically, (i) Carbohydrates accounted for 45%–60% of the total energy, and the diet was mainly low-sugar and consisted of high-fiber vegetables and fruits; (ii) protein accounted for 15%–20 % of total energy, and the protein consumed was high-quality protein, such as fish, meat, eggs, milk, etc.; (iii) fat accounted for 25%– 35% of the total energy, mainly consisting of unsaturated fatty acids, such as olive oil, fish oil, etc.; (iv) the intake of dietary fiber was increased by eating foods like oats, brown rice, beans, etc. Lastly, the patients were instructed to eat regular and quantitative meals, avoid overeating, and reduce the intake of high-sugar, high-fat, and high-salt foods <sup>[2]</sup>.

#### **2.2.2. Exercise intervention**

Exercise intervention is a treatment modality that uses exercise to control blood sugar, improve cardiovascular health, and enhance physical fitness. For patients with type 2 diabetes mellitus, exercise intervention can help control blood sugar and lower blood pressure <sup>[3]</sup>. The patients in the intervention group

were instructed to perform the following exercises: (i) At least 150 minutes of moderate-intensity aerobic exercise every week, such as jogging, walking, swimming, etc.; (ii) stretching exercises like Pilates or yoga at least twice a week, 20–30 minutes each time; (iii) the exercises were done at 1–2 hours after meals; (iv) during exercise, patients wore tools such as heart rate monitors or exercise bracelets, and the exercise were done in a moderate intensity to avoid excessive fatigue or injury [4].

### **2.2.3. Medical intervention**

In the comprehensive intervention method, the blood sugar and blood pressure were also controlled through drug therapy, surgical treatment, and other intervention methods. The patients in the intervention group received corresponding drug treatment or surgical treatment according to their conditions and the doctor's prescription. (i) Drug therapy is one of the important ways to control blood sugar and blood pressure. At present, the most commonly used drug therapy is the combination of angiotensin receptor antagonist (ARB) + calcium channel blocker (CCB), which includes drugs such as losartan and nifedipine. In addition to oral medications, injectable medications are often used, most commonly insulin injections [5]. (ii) If the patient had severe coronary artery stenosis, percutaneous coronary artery bypass grafting was performed. Through interventional therapy, the blood flow of the coronary arteries was restored to improve the patient's myocardial blood supply; if there was a heart valve disease, a heart valve replacement was performed to improve the heart function of the patient.

### **2.2.4. Patient monitoring**

The blood sugar, blood pressure and other indicators of patients in the intervention group were measured using blood glucose meters, sphygmomanometers, or blood pressure and blood sugar monitors, so as to keep abreast of changes in their conditions and adjust treatment accordingly [6].

### **2.2.5. Psychological counseling**

Psychological counseling helps patients improve their mental state, confidence and cooperation through cognitive behavioral therapy, emotional therapy, hypnotherapy, and other means. The patients in the intervention group received psychological counseling, and through cognitive behavioral therapy, the patients got to understand the causes, symptoms, and treatment of type 2 diabetes complications. Psychological counseling was provided for patients who experienced depression and anxiety [7]. By allowing the patients to express themselves and by listening to them and encouraging them, the confidence of the patients toward the treatment can be enhanced. Hypnotherapy was carried out for some patients with severe anxiety. At the same time, a healthy lifestyle with proper diet, moderate exercise, and good monitoring can relieve patients' anxiety and depression, and help patient better cope with the psychological pressure brought about by the disease [8].

## **2.3. Observation indicators**

FBG, 2hPG, HbA1c, SBP, DBP and MAP of the patients were observed before and after the intervention.

## **2.4. Statistical analysis**

Statistical software SPSS 20.0 was used for data analysis, the measurement data was expressed as mean  $\pm$  standard deviation, and *t*-test was used to compare the data of both groups.

# **3. Results**

## **3.1. Biochemical indices**

The results of the study showed that after the comprehensive intervention, the levels of biochemical

indicators such as FBG, 2hPG, and HbA1c of both groups of patients were significantly improved after intervention ( $P < 0.05$ ), and the biochemical indices of the intervention group were significantly better than those of the control ( $P < 0.05$ ), as shown in **Table 1**.

**Table 1.** Comparison of blood glucose indicators before and after comprehensive intervention

Group	FBG (mmol/L)		2hPG (mmol/L)		HbA1c (%)	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group ( $n = 45$ )	6.80 ± 1.69	6.43 ± 0.56	8.68 ± 2.42	8.23 ± 1.06	6.87 ± 1.22	6.78 ± 1.02
Intervention group ( $n = 45$ )	7.64 ± 2.28	6.19 ± 0.51	9.67 ± 2.60	7.47 ± 0.77	7.34 ± 1.10	6.39 ± 0.70
<i>t</i>	1.986	2.134	1.650	3.891	1.919	2.115
<i>P</i>	$P > 0.05$	$P < 0.05$	$P > 0.05$	$P < 0.05$	$P > 0.05$	$P < 0.05$

### 3.2. Blood pressure

The results of the study showed that the blood pressure of the two groups of patients was significantly lower after intervention ( $P < 0.05$ ), and the blood pressure of intervention group was better than that of the control group ( $P < 0.05$ ), as shown in **Table 2**.

**Table 2.** Comparison of blood pressure indicators before and after comprehensive intervention

Group	SBP (mm/Hg)		DBP (mm/Hg)		MAP (mm/Hg)	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group ( $n = 45$ )	165.28 ± 12.12	155.38 ± 11.25	103.56 ± 12.28	95.28 ± 9.26	122.56 ± 9.58	111.25 ± 10.25
Intervention group ( $n = 45$ )	166.55 ± 10.45	132.58 ± 9.45	105.25 ± 9.11	80.26 ± 5.28	125.22 ± 12.35	103.15 ± 9.27
<i>t</i>	0.532	10.410	0.741	9.4523	1.142	3.932
<i>P</i>	$P > 0.05$	$P < 0.05$	$P > 0.05$	$P < 0.05$	$P > 0.05$	$P < 0.05$

### 4. Discussion

Type 2 diabetes is a lifelong chronic disease, and the development of its comorbidities cannot be ignored. With the improvement of living standards, the average life expectancy has increased, and the problem of aging is becoming increasingly concerning. Besides, the proportion of type 2 diabetes complications is also increasing year by year [9]. It is estimated that millions of people worldwide develop type 2 diabetes each year, and most of them will develop comorbidities. These complications include hypoglycemia, kidney disease, foot lesions, vascular disease, etc. Studies have shown that among these comorbidities, the probability of patients suffering from high blood pressure is more than 20%. Compared with patients with simple diabetes, patients with type 2 diabetes and hypertension are more likely to develop cardiovascular and other complications [10], which significantly impacts their physical and mental health. Many studies have shown that comprehensive intervention for patients with type 2 diabetes and hypertension can effectively reduce blood sugar and blood pressure levels and improve their quality of life. A study by Luo

*et al.* showed that blood sugar, blood pressure, and body weight were significantly improved by including aspects diet, psychology, and medication in the treatment of patients with type 2 diabetes and hypertension [11]. The research of Feidan *et al.* also shows that comprehensive nursing intervention can effectively promote the treatment of type 2 diabetes mellitus with hypertension and improve the quality of patients. The results of these studies were all consistent with this present study [12].

The results of this study showed that after 5 months of comprehensive intervention for patients with type 2 diabetes mellitus, the fasting blood glucose, 2h postprandial blood glucose, postprandial blood glucose, the glycosylated blood sugar, and protein indicators all decreased after intervention; moreover, the blood pressure of the patients after the intervention also significantly decreased after intervention.

## 5. Conclusion

In conclusion, comprehensive intervention has great clinical value in the treatment of patients with type 2 diabetes and hypertension. As further research is being done on type 2 diabetes mellitus combined with hypertension, the means of comprehensive intervention will become more diversified in the future. For example, in addition to the conventional intervention mentioned in this article, new treatments such as cell therapy and gene therapy can provide more alternatives for clinical treatment. Comprehensive intervention will also become more and more personalized, which can further improve of treatment effect [13]. At the same time, in the future, the goal of comprehensive intervention will shift from treatment to prevention. Through early intervention, the occurrence of complications can be delayed or reduced, and the quality of life of patients can be improved.

## Disclosure statement

The author declares no conflict of interest.

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