Review Article
Application value of routine management and chronic disease management in patients with hypertension and diabetes

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Abstract: Objective: This study aimed to explore and compare the application value of routine management and chronic disease management (CDM) on the treatment effects of hypertension patients with diabetes. Methods: Altogether 173 patients with hypertension and diabetes who visited our hospital from August 2018 to December 2019 were selected as the research subjects. Among them, 84 in the routine group (RG) received routine management measures and 89 in the observation group (OG) received CDM. Six months after intervention, the treatment compliance, self-efficacy, self-care ability and quality of life of patients in the two groups were compared. Meanwhile, the changes of blood pressure, blood glucose, cardiovascular and cerebrovascular events and occurrence of renal damage were recorded. Results: Diastolic blood pressure, systolic blood pressure, fasting plasma glucose, 2 h postprandial blood glucose and glycosylated hemoglobin levels in the OG were lower than those in the RG, and the total incidence of complications in the OG was lower than that in the RG. After intervention, the treatment compliance of the OG was higher than that of the RG, and the self-efficacy, self-care ability and quality of life of the OG were also higher than those of the RG. Conclusion: CDM can improve treatment compliance, self-management ability, self-efficacy and quality of life of patients with hypertension and diabetes, and it can also help control blood pressure and blood glucose more effectively and reduce the incidence of complications.

Keywords: CDM, hypertension complicated with diabetes, treatment compliance

Introduction

Chronic disease is a type of disease that lasts for a long time, it usually progresses slowly and does not spread from person to person [1]. With the modern changes in people's lifestyles and the aggravation of population aging, the morbidity of chronic diseases is increasing rapidly; as such it has a very negative impact on the quality of life and physical and mental health of patients [2, 3]. It is reported that chronic diseases are the main cause of death in the world, accounting for more than 60% of all deaths [4]. Hypertension and diabetes are the most common chronic diseases, they are also risk factors for various cardiovascular diseases [5]. Hypertension and diabetes often both occur in one person at the same time, and 60% of hypertension patients also suffer from diabetes [6].

At present, the clinical management of diseases is mainly concentrated on hospital management, which lacks for patients' daily life, self-management, psychological emotion and treatment compliance. Consequently, patients' self-management is not always strict and therefore it cannot effectively control diseases. With the concept of a healthy life deeply rooted in the hearts of the people, patients with chronic diseases need more and more health scientific management methods. CDM is a type of continuous and active management for patients with chronic diseases. It mainly consists of six elements, proposed by Wagner et al. in 1996. After decades of development, CDM has become the standard management method for some diseases [7, 8]. Some research results show that CDM can reduce the readmission rate of patients with chronic obstructive pulmonary disease and improve their treatment com-

pliance compared with the routine treatment management modes [9]. There are also findings that show it can improve the quality of life of adult asthma patients, reduce the severity of asthma and improve the lung function examination rate compared with routine management [10]. CDM has been applied for the management of various chronic diseases and has achieved positive results. However, as far as we know, there is currently a lack of randomized trials for CMD intervention in hypertension patients with diabetes.

In this study, we compared the application value of routine management and CDM management in the treatment of hypertension patients complicated with diabetes, aiming at finding a scientific and effective management scheme.

Data and methods

General data

Altogether 173 patients with hypertension and diabetes who visited our hospital from August 2018 to December 2019 were selected as the research subjects. Among them, 84 patients in the routine group (RG) were given routine management measures, and 89 patients in the observation group (OG) were given CDM. Inclusion criteria: All patients were diagnosed with hypertension and diabetes [11, 12]; systolic blood pressure (SBP) ≥140 mmhg and/or diastolic blood pressure (DBP) ≥90 mmhg, fasting plasma glucose (FPG) >6.5 mmol/L, 2 h postprandial blood glucose (2hPG) >7.8 mmol/L, glycosylated hemoglobin (HbA1c) >6.5%; and clinical data were complete. Exclusion criteria: patients were complicated with severe heart, liver, kidney and other important organ dysfunction; those who lost self-care ability; those who could not complete the evaluation involved in this research; those who were complicated with severe diabetic complications such as diabetic foot; those who were pregnant or lactating. This study was approved by the Medical Ethics Committee of our hospital and the research met the requirements of medical ethics. Patients and their families agreed to take part in this study.

Intervention methods

Patients in the RG were treated with routine drugs. According to their age, blood glucose level, blood pressure level and organ damage of the research subjects, they were instructed to use hypoglycemic and antihypertensive drugs correctly and reasonably so that their blood glucose and blood pressure levels reached the predetermined target.

The OG had CDM in addition to the treatment of the RG, and care was mainly divided into the following points. (1) Diet management: To calculate the daily energy needed by each subject according to their body mass and basic metabolic level, and formulated a reasonable diet plan. Subjects were informed of other matters needing attention in dietary management, such as quitting smoking and drinking, and monitoring their body mass index. A nutrition plan was formulated with a table of common foods, urging patients to check the nutrition composition table of foods before meals, so as to avoid eating foods that are unfavorable for controlling blood glucose and blood pressure. (2) Exercise management: A targeted exercise program was formulated for patients, and informed them of relevant preparations, exercise essentials and exercise intensity before exercise. (3) Health education: Regular special lectures were held on diabetes and hypertension, to distribute health education materials and assist patients and their families by watching special videos on diabetes and hypertension, so that the research subjects have a more in-depth understanding of the hazards of these two chronic non-communicable diseases, and then urge them to correct their bad eating habits and lifestyles. (4) Psychological counseling: During the management period, attention is paid to guiding the attitudes of patients, encouraging them and helping them to build their confidence, including not only the confidence in treating diseases, but also the confidence in adhering to regular treatment. Meanwhile, active communication is made with the patients' families to help improve their attitude level and actively help them to formulate measures. (5) Medication guidance: Explain the drug use plan and matters needing attention to each patient, and inform them of possible adverse reactions, as well as urge them to adhere to the medication guidance according to the doctors' advice, thus avoiding the influencing of medication effects due to factors such as dose increase or decrease. (6) Management hotline: Open an online management hotline to solve problems and emergencies encountered by patients in a timely manner.

Outcome measures

The levels of SBP, DBP, FPG, 2hPG and HbA1c were detected and compared between the two groups, before and 6 months after intervention. The occurrence of central cerebrovascular events and renal damage 6 months after intervention was recorded.

Before and 6 months after intervention, the self-efficacy scale (GSES) [13] and the self-care ability measurement scale (ESCA) [14] were used to evaluate the self-efficacy and self-care ability of patients in the two groups. The former had a full score of 40 and the latter had a full score of 172. The lower the score, the worse the self-efficacy and self-care ability.

The anxiety and depression of the patients were evaluated by the self-rating anxiety scale (SAS) [15] and self-rating depression scale (SDS) [16] before and 6 months after intervention. The total score was 100 points, and the higher the score, the more serious the anxiety status.

Six months after intervention, treatment compliance of patients in the two groups was evaluated by the self-rated "treatment compliance questionnaire" made by the hospital. The survey content included a reasonable diet, regular exercise, standardized medication, regular outpatient reexamination, regular monitoring of blood pressure and blood glucose, as well as smoking and drinking cessation. The total score was 0-100 points, divided into non-compliance (<70 points), basic compliance (70-85 points), and compliance (>85 points). The total compliance rate = (basic compliance + compliance)/ total cases × 100%.

Patients' quality of life six months after intervention was evaluated by Quality of Life Questionnaire [17], including general health (GH), role physical (RP), physical function (PF), social function (SF), emotional role (RE) and mental health (MH). The full score of each item was 100 points, and the higher the score, the better the quality of life.

Statistical analysis

SPSS 19.0 was employed for statistical analysis, and pictures were illustrated by GraphPad Prism 7. The counting data were compared by Chi-square test or Fisher exact test. The comparison of measurement data between the two groups was analyzed by independent-samples t test, comparison within the group before and after treatment was assessed through paired t-test, and that between the two groups was analyzed through one-way analysis of variance (ANOVA). The correctness of statistical values was verified by back testing (Tukey's HSD method), with statistical differences at P<0.05.

Results

General data of patients

There was no statistical difference between the two groups in the general data such as gender, age, weight, course of disease, smoking history, alcoholism, educational level and working status (P>0.05) (**Table 1**).

SBP and DBP levels

Detection of SBP and DBP levels showed that there was no statistical difference between the two groups before intervention (P>0.05). After intervention, the levels in both groups were reduced dramatically, and the levels in the OG were lower than those in the RG (P<0.05) (**Figure 1**).

Blood glucose indexes

Detection of FPG, 2hPG and HbA1c levels showed that there was no marked difference between the two groups before intervention (P>0.05). After intervention, the levels in both groups were reduced dramatically, and the levels in the OG were lower than those in the RG (P<0.05) (**Figure 2**).

Occurrence of cardiovascular and cerebrovascular events and renal damage

The occurrence of central cerebrovascular events and renal damage 6 months after intervention of the patients in both groups was recorded. It was found that although both groups had patients with cardiovascular and cerebrovascular events and or renal damage, the total number of those affected in the OG was obviously lower than that in the RG (P<0.05) (**Table 2**).

Psychological emotions

Assessment of patients' adverse psychological emotions showed that there was no statistical

Table 1. Comparison of general data of patients in both groups

| Group	RG (n=84)	OG (n=96)	χ^2/t	P
Gender			0.326	0.568
Female	35 (41.67)	36 (37.50)		
Male	49 (58.33)	60 (62.50)		
Average age (years)	63.98±7.98	64.38±8.11	0.333	0.740
Average body weight (KG)	71.21±6.33	69.66±7.18	1.526	0.129
Average course of disease (years)	9.89±4.15	10.21±4.68	0.482	0.630
Smoking history			0.536	0.464
Yes	48 (57.14)	60 (62.50)		
No	36 (42.86)	36 (37.50)		
Alcoholism			1.031	0.310
Yes	21 (25.00)	18 (18.75)		
No	63 (75.00)	78 (81.25)		
Educational level			1.528	0.216
< high school	36 (42.86)	50 (52.08)		
High school or higher	48 (57.14)	46 (47.92)		
Working			0.879	0.348
Yes	30 (35.71)	28 (29.17)		
No	54 (64.29)	68 (70.83)		
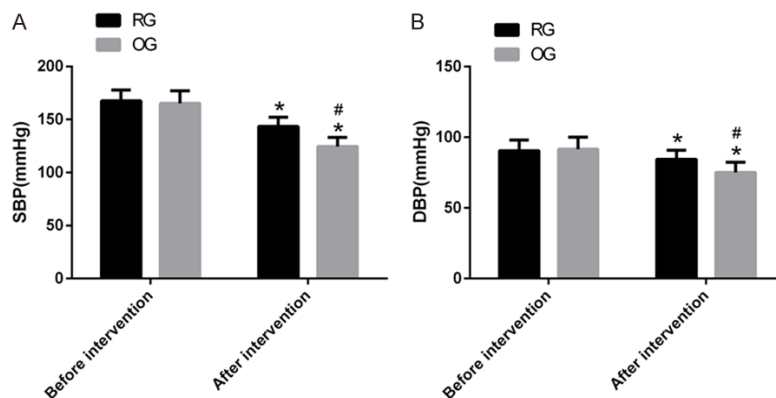
Figure 1. SBP and DBP levels of patients before and after intervention in both groups (A) SBP level of patients before and after intervention in both groups; (B) DBP level of patients before and after intervention in both groups. Note: compared with the group before intervention, * represents P<0.05; compared with the RG after intervention, # represents P<0.05.

difference in SAS and SDS scores between both groups before intervention (P>0.05). After intervention, the scores in both groups were reduced remarkably, and the results of the scores in the OG were lower than that of the RG (P<0.05) (**Figure 3**).

Treatment compliance

Evaluation of patients' treatment compliance showed that there were 30 cases of compliance, 36 of basic compliance and 18 of non-

compliance in the RG, with a total compliance rate of 78.57%. There were 56 cases of compliance, 32 of basic compliance and 8 of non-compliance in the OG, with a total compliance rate of 791.67%. The total compliance rate of patients in the OG was higher than that in the RG (P<0.05) (**Table 3**).

Comparison of GSES and ESCA scores

Comparing the GSES and ESCA scales completed by patients in the two groups, we found that there was no statistical difference between their scores (P> 0.05). After intervention, the GSES and ESCA scores in the two groups increased dramatically, and the results of the scores of the OG were higher than that of the RG (P<0.05) (**Figure 4**).

Assessment of quality of life

After intervention, the scores of GH, RP, PF, SF, RE and MH in QLQ items in the OG were higher than those in RG (P<0.05) (**Table 4**).

Discussion

The morbidity rate of chronic disease has increased and as such it has become an important public health problem that endangers people's health [2, 3]. Hypertension and diabetes are common chronic diseases. After being discharged from the hospital, patients generally relax self-monitoring of blood glucose, take medicine irregularly, and reduce compliance, which makes it difficult to effectively control disease. At present, the traditional medical model only requires doctors to diagnose and treat patients in the hospital, and thus care rarely involves the management of patients outside the hospital, which is not conducive to helping those with chronic diseas-
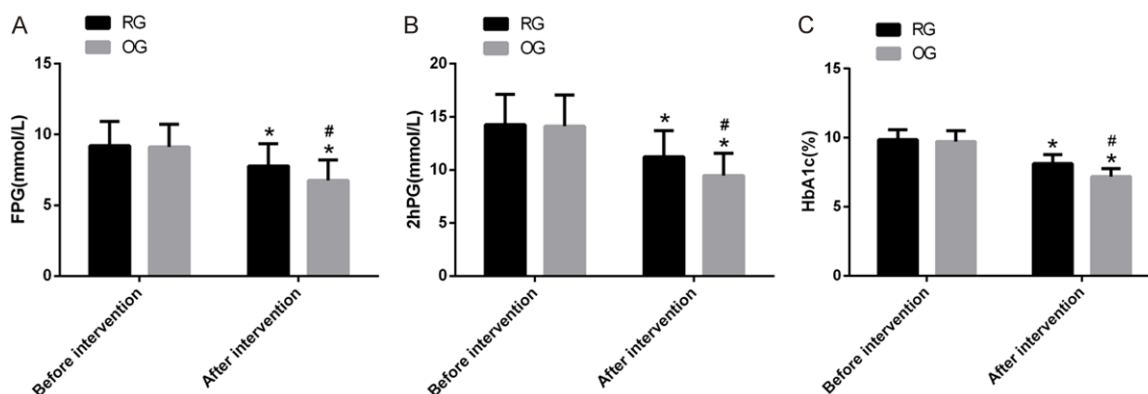
Figure 2. Comparison of blood glucose indexes between the two groups. A: Comparison of FPG levels between the two groups before and after intervention; B: Comparison of 2hPG levels before and after intervention between the two groups; C: Comparison of HbA1c levels between the two groups before and after intervention. Note: compared with the group before intervention, * represents P<0.05; compared with the RG after intervention, $^\#$ represents P<0.05.

Table 2. Occurrence of cardiovascular and cerebrovascular events and renal damage

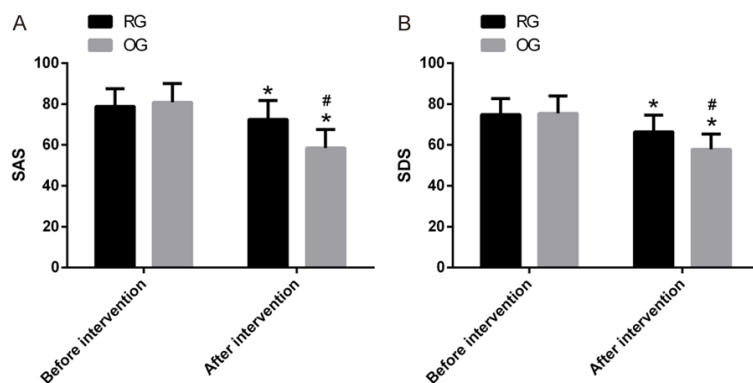| Group	RG (n=84)	OG (n=96)	χ^2	P
Myocardial infarction	1 (1.19)	1 (1.04)	1.320	0.924
Peripheral macroangiopathy	5 (5.95)	2 (2.08)	1.794	0.180
Impaired renal function	9 (10.71)	4 (4.17)	2.866	0.090
Stroke	6 (7.14)	3 (3.13)	1.523	0.217
Total number of people affected	17 (20.24)	8 (8.33)	5.309	0.021

Figure 3. Comparison of SAS and SDS scores before and after intervention between the two groups (A) SAS scores before and after intervention of patients in the two groups; (B) SDS score before and after intervention of patients in the two groups. Note: compared with the group before intervention, * represents P<0.05; compared with the RG after intervention, $^\#$ represents P<0.05.

of various diseases [9, 10]. In this study, we compared the application value of routine management and CDM in the management of hypertension patients with diabetes. Our results showed that CDM could improve the treatment compliance, self-management ability, self-efficacy and quality of life of hypertension patients complicated with diabetes, and it could also help them control blood pressure and blood glucose more effectively, and reduce the incidence of complications.

Diabetes and hypertension are both lifestyle diseases, which are mainly caused by unhealthy lifestyles and eating habits [18]. Thus, it is necessary to strengthen the self-management of patients so as to correct their bad habits [19]. However, patients will encounter many obstacles in performing optimal self-management behaviors, such as weight control, regular exercise, regulation of bad moods, lack of family support and poor communication with doctors [20]. Self-efficacy is believed to be a necessary goal. However, lack of self-efficacy is common in patients with chronic diseases,

es to control their diseases. Therefore, strengthening CDM is one of the urgent problems to be solved at present. CDM is a continuous and active management mode for patients, which has shown positive effects in the management

Table 3. Treatment compliance of patients

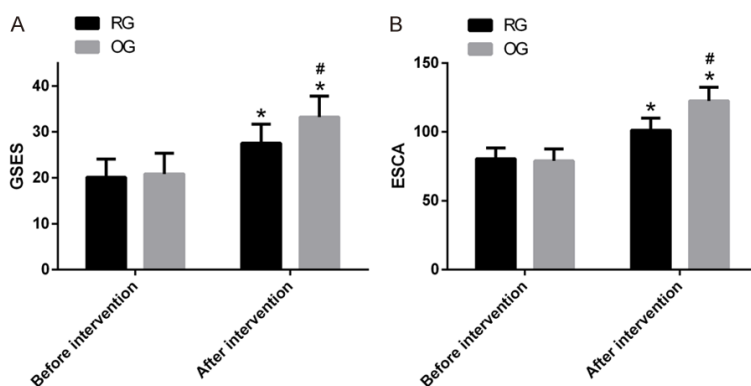| Group	Compliance	Basic compliance	Non-compliance	Total compliance rate
RG (n=84)	30 (35.71)	36 (42.86)	18 (21.43)	78.57%
OG (n=96)	56 (58.33)	32 (33.33)	8 (8.33)	91.67%
χ^2	--	--	--	6.217
P	--	--	--	0.013

Figure 4. Comparison of GSES and ESCA scores. A: GSES scores before and after intervention of patients in the two groups; B: ESCA score before and after intervention of patients in the two groups. Note: compared with the group before intervention, * represents P<0.05; compared with the RG after intervention, # represents P<0.05.

Table 4. Comparison of quality of life score between both groups after nursing

Group	RG (n=84)	OG (n=96)	t	P
GH	75.64±6.15	81.34±5.53	6.547	<0.001
RP	76.23±5.45	81.33±5.15	6.450	<0.001
PF	72.61±5.13	76.42±4.82	5.134	<0.001
SF	72.12±4.87	78.67±5.77	8.165	<0.001
RE	73.42±5.22	79.88±6.31	7.420	<0.001
MH	73.76±5.68	80.24±6.12	7.328	<0.001

which has adverse effects on disease management and control [21, 22]. Hence, it is necessary to reduce patients' bad moods and help to establish their confidence so as to enhance their self-efficacy and further strengthen their self-management ability. Previous studies have shown that health education can help hypertensive patients control SBP, improve exercise self-efficacy and health-related quality of life [23]. There are also research results which show that psychological health nursing for diabetic patients can reduce their long-term negative emotions, promote self-management ability and obtain stronger willpower, so as to improve their quality of life [24]. In this study, we carried out targeted psychological counsel-

ing and health education for patients, aiming to help them have a certain understanding of the disease itself and treatment methods, dispel any fear in them of the disease, and simultaneously build their confidence. The evaluation of patients' adverse emotions, treatment compliance, self-efficacy and self-management ability showed that compared with the RG, the SAS and SDS scores of patients in the OG decreased, while the GSES and ESCA scores increased. In addition, the total compliance rate of patients in the OG was higher than that in the RG. This showed that CDM could improve treatment compliance, self-management ability and self-efficacy of hypertension patients with diabetes.

Controlling blood pressure and blood glucose of patients plays a positive role in reducing the occurrence of cardiovascular adverse events and other adverse reactions [25-27]. Thus, we not only paid attention to the psychological state of patients in the OG and improve their self-management ability, but also guided and managed their diet, exercise and medication, so as to help them better control blood glucose and blood pressure from many aspects. The results showed that the levels of SBP, DBP, FPG, 2hPG and HbA1c in the OG were dramatically lower than those in the RG. Complications of diabetes and hypertension were the main causes of poor prognosis. The occurrence of central cerebrovascular events and renal damage 6 months after intervention of patients in the two groups was recorded. It was found that the total number of patients affected in the OG was dramatically lower than that in the RG. This manifested as CDM helping patients to control blood pressure and blood glucose more effectively and reduce the incidence of complications. At the end of this study, the quality of life of patients was evaluated: and the result was that the quality of life of patients in the OG was not higher than that in the RG.

Still, there are some limitations to this study. For example, we only evaluated the effect of

CDM on patients with blood pressure and diabetes, but did not analyze the application value in other chronic diseases. Currently, with the modern development of society and the change of living habits, diabetes and hypertension tend to affect people of younger ages. Most of the subjects in this study are over 60 years old. Hence, it is impossible to know the application effect of CDM in younger patients.

To sum up, compared with a routine management scheme, CDM can improve the treatment compliance, self-management ability, self-efficacy and quality of life of patients with hypertension and diabetes. Also, it can help them control blood pressure and blood glucose, and reduce the incidence of complications more effectively.

Disclosure of conflict of interest

None.

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