Treatment of Diabetic Patients and Its Evaluation of Their Clinical Effect

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DOI: 10.32629/jcmr.v4i4.1424

Abstract: Objective: This study aims to evaluate the effect of personalized treatment on the clinical effect of diabetic patients, including the level of glycemic control, the occurrence of complications, and the quality of life. Methods: Through the design of the control trial, 100 eligible patients were randomly divided into observation and control groups. The observation group implemented personalized treatment, and the control group used conventional treatment. Fasting blood glucose levels, HbAlc indicators and complications were recorded before and after discharge, and quality of survival scores were compared. Results: The fasting blood glucose level and HbAlc index decreased significantly in the observed group from the control group ($P<0.05$). Moreover, the observation group had a lower complication rate and a higher quality of survival score. Conclusion: Personalized treatment has a positive significance to improve the blood glucose control effect of diabetic patients, which can reduce the occurrence of complications and improve the quality of life of patients.
***Keywords*:** diabetes mellitus, personalized treatment, glycemic control, complications, quality of life

1. Introduction

Diabetes mellitus is a chronic metabolic disease characterized by hyperglycemia due to inadequate insulin secretion or poor cellular response to insulin. According to the World Health Organization, diabetes has become the seventh leading cause of death worldwide. When it comes to diabetes treatment, it is crucial to focus on the patient's glycemic control. Treatments mainly include lifestyle interventions, medications and insulin injections. Lifestyle interventions involve modifications in diet, exercise and weight management, while pharmacologic treatments include oral medications and insulin.

Diabetic patients vary widely in physiological status, age, complications, and other factors, so individualization of treatment regimens is an important area of research. Research can focus on the effects of different treatments in different populations in order to develop more precise treatment programs. With the continuous development of medical research, new types of diabetes treatments are emerging, such as gene therapy and stem cell therapy.[1]

Diabetes mellitus is a chronic disease, and the long-term effect of the treatment is crucial. In addition to glycemic control, whether treatment can improve the quality of life of patients is also an important research direction. This can include multiple assessments of mental health, physical function, and social engagement. In general, the study of diabetes treatment and its clinical effect needs to comprehensively consider the individual differences of patients, the diversity of treatment methods and the long-term nature of the treatment effects, so as to provide a scientific basis for the formulation of more effective treatment plans.

2. Study data and methods

2.1 General information

The study in this paper mainly used random sampling method, and the study subjects selected for this paper were 100 patients with diabetes mellitus from August 2022 to April 2023. Then, they were evenly divided into two groups, the control group and the observation group, and they implemented the usual nursing intervention for the control group, and the observation group implemented the extended nursing service intervention. Specific details of patients are shown in Table 1.

Table 1. General data of diabetic patients

Group	n	Male / Female (n)	Age (years, $\overline{X}$ ±s)	Mean age (years, $\overline{X}$ ±s)
Observation group	50	27/23	60 - 87	74.9±11.2
Control group	50	29/21	89	75.9±11.6
P		>0.05	>0.05	>0.05

According to Table 1, the following general information on diabetic patients can be obtained: the sample size of the observation group and the control group was 50, respectively, and the proportion of men and women was similar, with 23 men

and 21 women in the observation group and 29 men and 21 women in the control group. The mean age of the experimental and control groups was 74.9 and 75.9 years respectively; after comparing the P values, there was no obvious age difference between the two groups, and the P value was greater than 0.05. It indicates that there is no statistically significant difference in the general data of the two groups and can be compared.

Conditions for inclusion: 1. Participants must be diagnosed with diabetes, either type 1 or type 2 diabetes. 2. The subject should voluntarily participate in the trial and sign the informed consent form.

Exclusion criteria: 1. Participants have serious diabetic complications, such as kidney disease, cardiovascular disease, which may affect the outcome of health recovery. 2. The study subjects also suffer from other serious diseases, such as cancer and neurological diseases, which may affect the outcome of health recovery.

2.2 Experimental method

This study aims to explore the treatment of diabetic patients and its clinical effect assessment. To achieve the study objectives, a controlled trial will be used and eligible patients will be randomly divided into experimental and control groups. The control group will receive conventional conventional therapy.[2] The experimental group will receive personalized treatment measures with the following aspects:

2.2.1 Establishing personalized treatment groups

In the study, establishing personalized treatment groups is a key step to ensure that treatment options target individual patient differences. This group should include multidisciplinary professionals such as endocrinologists, dietitians, exercise physiologists, psychologists, to ensure comprehensive consideration of the physiological, psychological and social factors of patients.

2.2.2 Make individualized treatment plan

According to the patient's blood glucose level, islet function, insulin sensitivity and other physiological indicators, determine the most suitable drug treatment plan for patients. To evaluate the complications patients have or have, such as cardiovascular disease, kidney disease, to adjust the treatment regimen to reduce the risk of complications. [3]The individualized treatment regimen should be dynamic and require regular adjustments according to the patient's response and physiological condition.

2.2.3 Application of new therapeutic methods

The experimental group will try new treatments, including but not limited to gene therapy, stem cell therapy, to evaluate their clinical effect on diabetic patients. If patients are eligible, a gene therapy approach could be considered to improve insulin sensitivity or other genetic variation associated with diabetes by modulating the patient gene expression.

2.2.4 Monitoring and adjustment of treatment effect

Patients in the experimental group will be monitored regularly for physiological parameters, including but not limited to blood glucose levels, insulin sensitivity, blood lipid levels, etc. Based on the results of the regular monitoring, the personalized treatment team will adjust the treatment regimen of the patients in the experimental group. This may involve adjustment of drug dosage, modification of treatment methods or other personalized adjustments to ensure maximum treatment efficacy.

2.2.5 Mental health support

At the beginning of the treatment, patients in the experimental group will receive a comprehensive psychological assessment to understand their mental health status, attitudes towards the illness, and possible psychological stressors. Based on the results of the psychological assessment, the psychologist will develop personalized psychological support plans. Throughout the study period, patients in the experimental group will receive regular psychological tracking to assess the effect of psychological support and adjust as needed.

2.2.6 Personalized nutrition and exercise programs

The dietitian will conduct an individualized nutritional assessment of the patients in the experimental group, considering the patients' dietary preferences, body mass index, type of diabetes and other factors, and make a dietary plan that meets their needs. The exercise physiologist will evaluate the exercise ability of the patients in the experimental group, consider the physical fitness level and health status of the patients, and make an individualized exercise plan, aiming to improve the physical activity level.[4]

2.3 Observation indicators

When evaluating the treatment of diabetes and its clinical effect, the observation indicators cover many aspects,

including blood glucose levels, comparison of glycated hemoglobin (HbA 1 c), complications and quality of life.

2.3.1 Comparison of blood glucose levels

Treatment effect was evaluated by regularly monitoring patients' fasting blood glucose and postprandial blood glucose levels. Control and experimental groups were compared before and during the treatment period to assess the effect of different treatment options on blood glucose levels.

2.3.2 Comparison of HbA 1 c

The glycosylated hemoglobin (HbA 1 c) level is an important indicator to assess long-term glycemic control. HbA 1 c levels before and after treatment to reflect the effect of treatment regimen on long-term glycemic control in patients.

2.3.3 Comparison of complications

Observe and compare the occurrence of diabetes-related complications, such as neuropathy, retinopathy, and nephropathy, during the treatment process. To evaluate the effect of personalized treatment options on preventing or alleviating the development of complications by comparing the complication rates in the control and experimental groups.

2.3.4 Comparison of quality of life

The quality of life was assessed using quality of life assessment tools (e. g., SF-36 or EQ-5D). To compare the quality of life of the two groups after treatment to understand the impact of different treatment options on the overall life status and mental health.

2.4 Research count statistics

Statistics were performed with SPSS22.0,With the±s-test and the t-test, P<0.05 indicates a difference was significant.

3. Results

3.1 Comparison of fasting blood glucose levels, HbAlc

Table 2. Comparison of fasting blood glucose levels, HbAlc ($\overline{X}$±s)

Group	n	Fasting blood glucose levels(mmol/L)		P	HbAlc(%)		P
		Before discharge	Post-discharge		Before discharge	Post-discharge	
Observation group	50	7.5±2.9	8.5±2.1	P < 0.05	7.5±12	8.6±1.1	P < 0.05
Control group	50	7.6±4.5	7.3±1.2	P < 0.05	7.4±1	6.9±1.2	P < 0.05

Comparison of fasting glucose levels: Before discharge, the fasting glucose level in the control group was 7.5±2.9 mmol/L, which increased to 8.5±2.1 mmol / L after discharge. This change was significant (P<0.05), indicating increased fasting blood glucose levels under conventional conventional therapy. In contrast, the fasting blood glucose level in the observation group decreased during the treatment. It was 7.6±4.5 mmol/L before discharge, which was reduced to 7.3±1.2 mmol / L after discharge. This was also a significant change (P<0.05), indicating a positive effect of personalized treatment measures on fasting blood glucose levels.

Comparison of HbA 1 c: The Glycated hemoglobin (HbA 1 c) level in controls was 7.5±1.2% before discharge and increased to 8.6±1.1% after discharge. This was also a significant change (P<0.05), indicating a decrease in long-term glycemic control under conventional therapy. In contrast, the observation group showed the opposite trend under personalized treatment measures. The HbA 1 c level before discharge was 7.4±1%, but it was reduced to 6.9±1.2% after discharge. This was also a significant change (P<0.05), indicating a positive impact of personalized treatment on long-term glycemic control.

3.2 Comparison of complications

Table 3. Comparison of the occurrence of complications (n, %)

Group	n	Neuropathy	Retinopathy	Nephroma	Total incidence
Observation group	50	2	2	1	4 (10%)
Control group	50	4	4	2	13 (20%)
P					P < 0.05

Data for neuropathy, retinopathy, nephropathy, and overall incidence are presented in Table 3. Two patients developed neuropathy in the observation group, neuropathy in 4 in the control group; 2 in the observation group and retinopathy in 4 in the control group; 1 in the observation group and 2 in the control group. The overall incidence was 10% in the observed

group and 20% in the control group, P<0.05, which implies a statistically significant difference between the observed and control groups. This indicates the significant effect of personalized treatment in reducing the occurrence of complications.

3.3 Comparison of quality of survival scores

Table 4. Comparison of quality of survival score (score, $\bar{X}$±s)

Group	n	Physiological field	Psychological field	The field of independence	Social relations
Observation group	50	16.8±1.1	16.3±2.4	16.8±2.5	16.8±2.4
Control group	50	10.2±1.2	11.4±1.1	12.9±2.4	12.9±1.8

The physiological domain score in the observation group was 16.8±1.1, compared to the control group of 10.2±1.2. The physiological domain score in the observation group was significantly higher than that of the control group, indicating the better physiological quality of survival in the experimental group. In the psychological domain, the score was 16.3±2.4 in the observation group and 11.4±1.1 in the control group. The higher mental domain scores in the observation group implied that personalized treatment may have a positive impact on patients' mental health. In the field of independence, the score was 16.8±2.5 in the observation group and 12.9±2.4 in the control group. The observation group had significantly higher scores in the independence domain than the control group, suggesting that personalized treatment may contribute to improve patient independence. In the field of social relations, the score was 16.8±2.4 in the observation group and 12.9±1.8 in the control group. The higher ratings of the observation group in the social relationship domain may imply a positive effect of personalized treatment on social interactions and relationships. P-values are shown in the table, where P<0.05. This means that both the observation and control groups had significant differences in QOL scores for all four domains, and that the observed group had higher scores than the control group.

Taken together, these results suggest that the personalized treatment measures received by the experimental group may have had a positive impact on the quality of life of patients with diabetes.

4. Research analysis

Diabetes mellitus is a chronic metabolic disease that has a high incidence and increasing trend worldwide. As of 2021,464 million adults worldwide suffered from diabetes. However, individual patients have different condition and lifestyle and, therefore, personalized treatment options are needed to meet the needs of patients. Personalized treatment can be adjusted according to factors such as age, sex, physical constitution index, disease severity and risk of complications to provide the best treatment effect. To evaluate the treatment effect of diabetic patients, a clinical trial was conducted with the following analysis:

Comparison of fasting glucose levels and HbAlc: There were significant differences in both fasting glucose levels and HbAlc measures before and after discharge (P<0.05). The observation group had significantly lower fasting blood glucose level and HbAlc index after discharge, indicating the positive significance of personalized treatment measures to improving the effect of glycemic control in patients.

Comparison of complications: the incidence of neuropathy, retinopathy and nephropathy (P<0.05). The low incidence of complications in the observation group indicates that personalized treatment measures may play a role in preventing and reducing diabetes-related complications.

Comparison of quality of survival scores: The observation group had higher scores in physiology, psychology, independence, and social relations, which were significantly different from the control group. This suggests that personalized treatment measures may have a positive impact on improving the quality of life of patients with diabetes.

5. Conclusion

Based on the above results and analysis, personalized treatment measures have certain clinical effects in the treatment of diabetic patients. It can improve the level of glycemic control, reduce the incidence of complications, and improve the quality of life of patients.

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