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Analysis of the Clinical Efficacy of Glimepiride Combined with Insulin in the Treatment of Elderly Diabetes

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Abstract: *Objective:* To explore the clinical efficacy and incidence of hypoglycemia in the treatment of elderly diabetes with glimepiride combined with insulin. *Methods:* A total of 100 patients diagnosed with diabetes in Qinghai Red Cross Hospital from January 2018 to January 2019 were selected and divided into an observation group and a control group according to the order of their visits, with 50 patients in each group. The observation group was treated with glimepiride combined with insulin, while the control group was treated with insulin alone. The blood sugar indicators, including glycated hemoglobin (HbA1c), fasting blood glucose (FBG), and 2-hour postprandial blood glucose (2h PBG), were compared between the two groups. Additionally, the incidence of hypoglycemia was compared, and the causes of hypoglycemia were analyzed and summarized, proposing corresponding countermeasures. *Results:* The glycated hemoglobin value of the observation group was lower than that of the control group, and the statistical analysis showed a significant difference ($t = 3.54$, $P < 0.05$). The fasting blood glucose value in the observation group was lower than that in the control group, with statistically significant differences ($t = 4.08$, $P < 0.05$). The 2-hour postprandial blood glucose value in the observation group was also lower than that in the control group, with a significant difference ($t = 3.82$, $P < 0.05$). The incidence of hypoglycemia in the observation group was 10%, while it was 56% in the control group, with a statistically significant difference between the two groups ($\chi^2 = 5.813$, $P < 0.05$). *Conclusion:* The efficacy of glimepiride combined with insulin in the treatment of elderly diabetes is significantly higher than that of insulin alone, with a lower incidence of hypoglycemia.

Keywords: Diabetes; Glimepiride; Insulin; Hypoglycemia

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1. Introduction

Diabetes is a common chronic disease that can cause various complications and poses a serious threat to human health [1]. Nationally, the number of people with diabetes has been rising each year. According to statistics from

the International Diabetes Federation (IDF), the global number of people with diabetes reached 415 million in 2015 [2], an increase of nearly 7.2% from 387 million in 2014. It is estimated that by 2040, the global number of people with diabetes will reach 642 million [3]. In 2015, 5 million people globally died from diabetes [4].

In recent years, as China's economy has continuously developed and the living standards of its people have improved, the problem of population aging has become increasingly serious. The number of people with diabetes in China has been rising year by year. More concerning is that over half of the people with diabetes in China have not been diagnosed, and among those diagnosed, blood sugar control is not ideal. Therefore, this study explores the clinical efficacy of glimepiride combined with insulin in treating diabetes and the occurrence of hypoglycemia, aiming to provide a better treatment plan for diabetic patients and improve their quality of life.

2. Materials and methods

2.1. Clinical data

A total of 100 diabetic patients diagnosed in Qinghai Red Cross Hospital from January 2018 to January 2019 were selected. The inclusion criteria were: (1) Fasting blood glucose (FPG) ≥ 7.0 mmol/L or 2-hour postprandial blood glucose (2h PBG) ≥ 11.1 mmol/L [5]; (2) Normal adults capable of cooperating with treatment; (3) Voluntarily signed informed consent; (4) Blood glucose value between 3.0 and 3.9 mmol/L during hypoglycemia [6].

Exclusion criteria: (1) Patients with severe heart failure, renal failure, or other major organ failures; (2) Patients with cognitive impairments or mental disorders; (3) Patients bedridden or with mobility issues; (4) Patients without familial genetic predispositions.

A statistical analysis was conducted comparing the clinical data of gender, age, etc., between the two groups, with no statistically significant differences found ($P > 0.05$), making the groups comparable (**Table 1**).

Table 1. Comparison of general clinical data between the two groups

Indicators		Observation group	Control group	*P*
HbA1c (%)		7.27 ± 4.63	7.19 ± 4.98	> 0.05
2h PBG (mmol/L)		12.05 ± 5.01	11.93 ± 5.63	> 0.05
FBG (mmol/L)		9.28 ± 4.02	10.72 ± 3.57	> 0.05
Age (years)		62.0 ± 5.2	63.0 ± 4.8	> 0.05
Gender	Male	35	30	> 0.05
	Female	15	20	
Duration of disease (years)		5.52 ± 6.21	6.12 ± 5.08	> 0.05
BMI (kg/m^2)		18.5 ± 7.25	19.3 ± 6.28	> 0.05

2.2. Methods

A total of 100 diabetic patients diagnosed in our hospital from January 2018 to January 2019 were selected and divided into an observation group and a control group based on the order of their visits, with 50 patients in each group. The observation group was treated with glimepiride combined with insulin. Glimepiride

was administered starting at 1–2 mg per dose, with a maximum daily dose of no more than 4 mg, and was recommended to be taken before breakfast [7]. Insulin (produced by Gan & Lee Pharmaceuticals Co., Ltd.) was injected subcutaneously before bedtime at a dose of 0.5–1.0 U per kilogram of body weight per day [8]. The control group was treated with insulin (produced by Gan & Lee Pharmaceuticals Co., Ltd.) alone, using the same dosing method and bedtime subcutaneous injection as the observation group.

2.3. Observation indicators

After 3 months of treatment, the blood glucose indicators, including glycated hemoglobin (HbA1c), FBG, and 2h PBG, were compared between the two groups. The number of patients who experienced hypoglycemia during the treatment was also recorded. A questionnaire survey was conducted among patients who experienced hypoglycemia to investigate the causes of the condition. The incidence of hypoglycemia was compared between the two groups, and the causes of hypoglycemia were analyzed and summarized, with corresponding countermeasures proposed.

2.4. Statistical analysis

The data were processed using SPSS 20.0 software. Measurement data were expressed as mean ± standard deviation (SD) and analyzed using the *t*-test. Count data were expressed as frequency and rate and analyzed using the χ^2 test. $P < 0.05$ was considered statistically significant.

3. Results

Table 2 shows the comparison of blood glucose indicators between the two groups. The HbA1c levels in the observation group were lower than those in the control group. A statistical analysis of the data between the two groups showed a significant difference ($t = 3.54$, $P < 0.05$). The FBG levels in the observation group were also lower than those in the control group, with a statistically significant difference ($t = 4.08$, $P < 0.05$). Similarly, the 2h PBG levels in the observation group were lower than those in the control group, with a statistically significant difference ($t = 3.82$, $P < 0.05$).

Table 2. Comparison of blood glucose control between the two groups (mean ± SD)

Groups	*n*	HbA1c (%)	FBG (mmol/L)	2h PBG (mmol/L)
Observation group	50	7.12 ± 2.01	7.96 ± 1.34	8.96 ± 1.58
Control group	50	8.03 ± 1.98	9.08 ± 1.63	10.36 ± 1.35
t		3.54	4.08	3.82
P		< 0.05	< 0.05	< 0.05

In the observation group, 5 patients experienced hypoglycemia, with 2 cases caused by improper diet and 3 cases caused by improper exercise. The total incidence of hypoglycemia in the observation group was 10%. In the control group, 28 patients experienced hypoglycemia, with 10 cases caused by irregular medication use, 10 by improper diet, and 8 by improper exercise. The total incidence of hypoglycemia in the control group was 56%. A statistical analysis comparing the overall incidence of hypoglycemia between the two groups revealed a significant difference ($\chi^2 = 5.813$, $P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of hypoglycemia incidence between the two groups [*n* (%)]

Groups	*n*	Irregular medication	Improper diet	Improper exercise	Total hypoglycemia incidence
Observation group	50	0	2 (4%)	3 (6%)	5 (10%)
Control group	50	10 (20%)	10 (20%)	8 (16%)	28 (56%)
χ^2					5.813
P					< 0.05

4. Discussion

Diabetes is a chronic metabolic disease caused by various factors that result in insulin secretion and/or utilization defects [9,10], with hyperglycemia as its main clinical manifestation. Long-term hyperglycemia can lead to disruptions in fat metabolism, which in turn triggers damage to other body functions, such as impairments and failure in vital organs such as the eyes, kidneys, and heart [11,12]. In the later stages of diabetes or under stress, the body may experience severe endocrine system disorders, leading to conditions such as diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic syndrome [13].

This article focuses on the clinical efficacy of glimepiride combined with insulin in the treatment of elderly diabetic patients to control blood glucose levels. Additionally, the study analyzes cases of hypoglycemia during treatment, exploring the causes of hypoglycemia and providing corresponding strategies. Data from **Table 2** show that the glycated hemoglobin, fasting blood glucose, and 2-hour postprandial blood glucose values in the observation group were lower than those in the control group. Statistical analysis indicates that these results are significant ($P < 0.05$), suggesting that blood glucose control in the observation group was more stable than in the control group. This is attributed to the fact that glimepiride belongs to the sulfonylurea class of drugs, which are insulin secretagogues [14]. It primarily stimulates insulin secretion from pancreatic beta cells by promoting calcium ion influx, which increases intracellular calcium concentration and stimulates the exocytosis and release of insulin granules, leading to a decrease in blood glucose levels [15]. Glimepiride achieves blood glucose control by stimulating the secretion of insulin from beta cells, which fundamentally helps in treating diabetes [16]. Its effectiveness surpasses that of using exogenous insulin alone.

From the data in **Table 3**, the incidence of hypoglycemia in the observation group was 10%, compared to 56% in the control group, indicating that the combination of glimepiride and insulin not only controls blood glucose more effectively than insulin alone but also significantly reduces the incidence of hypoglycemia. A patient questionnaire revealed that none of the patients in the observation group experienced hypoglycemia due to irregular medication use, while 10 patients in the control group experienced hypoglycemia due to irregular medication. This indicates that the combined medication method in the observation group significantly reduced the incidence of hypoglycemia. The questionnaire also investigated the patients' medication use, diet, and exercise habits before experiencing hypoglycemia. In the observation group, two patients had an unreasonable diet, and three patients engaged in improper exercise. In the control group, 10 patients had irregular medication use, 10 had an unreasonable diet, and 8 engaged in improper exercise. The following strategies are provided for the three causes of hypoglycemia:

(1) Irregular medication use: Physicians should patiently explain the proper use and dosage of antidiabetic drugs and insulin to patients. Initially, insulin should be administered by the physician, but later, patients should be taught to self-administer insulin under medical supervision. Patients should be

instructed on the proper injection sites and advised not to change the injection sites randomly, rotating between specified sites as per schedule [17]. It is also important to change the needle with each insulin injection.

(2) Improper diet: Patients need to correct poor eating habits by drinking less sugary beverages, drinking more water, eating more fresh fruits and vegetables, and having smaller, more frequent meals. Attention should be paid to the relationship between meals and blood sugar [18]. Patients should avoid overeating, which can cause a sudden spike in blood glucose, and avoid under-eating, which can result in hypoglycemia. They should reasonably control meal timing and portion sizes, and ensure balanced nutrition to help maintain stable blood glucose levels.

(3) Improper exercise: To improve the physical fitness of diabetic patients, moderate exercise is recommended, such as jogging, swimming, or brisk walking, as these can enhance physical fitness in diabetic patients.

In conclusion, the combination of glimepiride and insulin is significantly more effective in treating diabetes than using insulin alone. The combined therapy not only better controls glycated hemoglobin, fasting blood glucose, and 2-hour postprandial blood glucose, but also reduces the incidence of hypoglycemia. The survey showed that hypoglycemia is related to irregular medication use, an unreasonable diet, and improper exercise. Therefore, physicians should patiently explain the correct medication methods and dietary and exercise precautions to patients. Patients should take their medication as prescribed, maintain a reasonable diet, and engage in appropriate exercise, working together with their physicians to keep blood glucose levels stable within a reasonable range and prevent further deterioration of their condition.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Sun B, He F, Gao Y, et al., 2019, Prognostic Impact of Visit-to-Visit Glycemic Variability on the Risks of Major Adverse Cardiovascular Outcomes and Hypoglycemia in Patients with Different Glycemic Control and Type 2 Diabetes. Endocrine, 64(3): 536–543. https://doi.org/10.1007/s12020-019-01893-1

[2] Tuháčková M, Urbanová J, Brunerová L, et al., 2019, Etanol a Riziko Hypoglykemie u Pacientů s Diabetes Mellitus 1. Typu: Stručný Přehled Pro Klinickou Praxi [Ethanol and Risk of Hypoglycemia in Patients with Type 1 Diabetes Mellitus: A Brief Overview for Clinical Practice]. Vnitr Lek, 65(4): 303.

[3] Brož J, Urbanová J, 2019, Rámcový Pohled na Epidemiologii Hypoglykemie u Diabetes Mellitus 1. a 2. Typu [A General View of Epidemiology of Hypoglycemia in Type 1 and Type 2 Diabetes Mellitus]. Vnitr Lek, 65(4): 289–294.

[4] Rossi MC, Nicolucci A, Ozzello A, et al., 2019, Impact of Severe and Symptomatic Hypoglycemia on Quality of Life and Fear of Hypoglycemia in Type 1 and Type 2 Diabetes. Results of the Hypos-1 Observational Study. Nutr Metab Cardiovasc Dis, 29(7): 736–743. https://doi.org/10.1016/j.numecd.2019.04.009

[5] Shah BR, Walji S, Kiss A, et al., 2019, Derivation and Validation of a Risk-Prediction Tool for Hypoglycemia in Hospitalized Adults With Diabetes: The Hypoglycemia During Hospitalization (HyDHo) Score. Can J Diabetes,

43(4): 278–282.e1. https://doi.org/10.1016/j.jcjd.2018.08.061

[6] Wolnik B, Orłowska-Kunikowska E, Błaszkowska M, et al., 2019, The Phenomenon of HbA1c Stability and the Risk of Hypoglycemia in Long-Standing Type 1 Diabetes. Diabetes Res Clin Pract, 152: 96–102. https://doi.org/10.1016/j.diabres.2019.05.010

[7] Meng F, Chang G, 2018, Analysis of the Causes of Hypoglycemia During the Treatment of Diabetic Patients. Electronic Journal of Clinical Medical Literature, 5(82): 39 + 42.

[8] Cao Y, 2018, Analysis of Hypoglycemia in Elderly Patients with Type 2 Diabetes. Practical Journal of Diabetes, 14(6): 47–48.

[9] Fan J, Yao C, 2018, Clinical Diagnosis and Treatment Analysis of 60 Cases of Elderly Diabetics with Hypoglycemia. World Latest Medicine Information Digest, 18(A1): 118.

[10] Wang Y, 2019, Clinical Analysis of 28 Cases of Elderly Diabetics with Hypoglycemia. China Modern Drug Application, 13(2): 72–73.

[11] Huang Y, Zhou Y, 2019, Exploration of the Causes of Hypoglycemia During Diabetes Treatment. Research on Women's Health in China and Abroad, 2019(1): 48 + 146.

[12] Tie M, 2018, Analysis of the Causes of Hypoglycemia in Diabetic Patients During Treatment. Electronic Journal of Clinical Medical Literature, 5(99): 25 + 28.

[13] Zhou Y, Zhang Y, Wang S, et al., 2018, Investigation of Risk Factors for Nocturnal Hypoglycemia in Type 2 Diabetic Patients with Intensive Insulin Therapy. Internal Medicine Theory and Practice, 13(6): 375–378.

[14] Du B, 2019, Health Management of Type 2 Diabetic Patients with Recurrent Hypoglycemia. New World of Diabetes, 22(1): 137–138.

[15] Ou Y, 2019, Observation of Emergency Treatment Methods and Outcomes for Diabetic Patients with Hypoglycemic Coma. World Latest Medicine Information Digest, 19(13): 88.

[16] Liu J, 2019, Clinical Analysis and Preventive Measures for Hypoglycemia in Elderly Diabetic Patients. World Latest Medicine Information Digest, 19(9): 71 + 73.

[17] Liang Y, Zhang H, 2019, Blood Glucose Fluctuations and Hypoglycemia Risks of Different Treatment Regimens for Type 2 Diabetes. Practical Journal of Diabetes, 15(1): 17–18.

[18] Xiao L, Chi J, Meng L, et al., 2019, Study on the Relationship Between Different Correction Methods of Hypoglycemia in Diabetic Patients and Blood Glucose Elevation. Nursing Research, 33(5): 843–846.