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Clinical Effects of Insulin Glargine and Acarbose Tablets in the Treatment of Diabetes Mellitus in the Elderly and Analysis of Glycosylated Hemoglobin

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Abstract: *Objective:* To analyze the clinical effects of insulin glargine and acarbose tablets in the treatment of diabetes mellitus in the elderly and the analysis of glycosylated hemoglobin. *Methods:* Patients (80 cases) from Taizhou City Hospital of Traditional Chinese and Western Medicine (January 2021–December 2022) were randomly divided into two groups (40 cases/group). Patients in the control group were treated with acarbose tablets, whereas those in the observation group were treated with insulin glargine and acarbose tablets. The clinical effects were compared. *Results:* The difference in blood glucose level and quality of life score between the two groups before treatment was insignificant ($P > 0.05$). The total effective rate (97.5%) of the observation group was significantly higher than that of the control group (85.0%); the blood sugar indices of the observation group were significantly lower than those of the control group; and the observation group scored higher in the quality-of-life scale than the control group ($P < 0.05$). *Conclusion:* Diabetes in elderly is characterized by repeated attacks. The elderly often suffers from chronic diseases, such as cardiovascular disease and respiratory system disease, making it is challenging to achieve the desired effect in treatment. Therefore, it is necessary to explore new treatment methods for the management of diabetes in the elderly. Insulin glargine is a new type of insulin analog, which can last for 24 hours, effectively controlling patients' blood sugar level. According to research, insulin glargine can effectively regulate the blood sugar level of diabetic patients for an extended period of time, significantly lower the fasting blood sugar, and reduce the complications caused by hypoglycemia. Acarbose tablet, on the other hand, is an alpha-glucosidase inhibitor, which prevents the breakdown of starch into sugar, thereby reducing postprandial blood sugar levels. For diabetic patients, especially those whose staple food is starch, acarbose is a suitable drug.

Keywords: Insulin glargine; Acarbose tablets; Elderly diabetes mellitus; Clinical effect; Glycosylated hemoglobin

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1. Introduction

As society ages, the prevalence of diabetes is on the rise. At the same time, most elderly patients have concomitant coronary heart disease, hypertension, and other diseases. Without early intervention or treatment, long-term complications involving multiple organs including the nerves and kidneys may occur [1]. In addition, due to the prolonged disease duration and low treatment compliance, drug selection in elderly diabetic patients often leads to relatively insufficient levels of insulin secretion or decreased insulin sensitivity [2]. For the elderly, controlling blood sugar, preventing complications, and restoring normal

insulin secretion are crucial in the course of treatment. However, treatment with a single drug may not achieve satisfactory outcomes, while long-term insulin injections may easily lead to abnormal blood sugar and even threaten their lives [3,4]. According to experts, the combined use of insulin glargine and acarbose can significantly improve the therapeutic effect of diabetes in the elderly. Therefore, 80 elderly diabetic patients (admission time from January 2021 to December 2022) were selected and randomly divided into two groups: an observation group and a control group. Patients in the control group were managed with acarbose tablets, whereas those in the observation group were managed with insulin glargine and acarbose tablets.

2. Materials and methods

2.1. General information

The study subjects were 80 elderly patients with diabetes admitted from January 2021 to December 2022. The patients were divided into two equal groups according to the treatment used. Patients in the control group were treated with acarbose tablets, whereas those in the observation group were treated with insulin glargine and acarbose tablets. The gender ratio (male/female) of the control group and the observation group were 29/11 and 30/10, respectively, and their mean age was 69.54 ± 4.18 (61–78 years old). The difference between the two groups was insignificant ($P > 0.05$).

2.2. Treatment methods

All patients received diet guidance and exercise guidance. On this basis, acarbose tablets were prescribed TDS with meals at 50 mg/day. Given that the patients did not develop any adverse reaction, the dose of drug was increased, not exceeding 300 mg/day, and their blood glucose levels were controlled at 7–8 mmol/L 2-hour postprandial. Patients in the observation group were treated with insulin glargine on the basis of acarbose tablets. The daily dose was determined based on fasting blood glucose (FBG), with a target value of 5.6 mmol/L; 2 U of insulin glargine was required for every excess of 1 mmol/L, the dosage was adjusted once every 3 days, and the 2-hour postprandial blood glucose was maintained at the standard value. All patients continued treatment for 3 months.

2.3. Outcome indicators

(i) Curative effect: markedly effective, FBG < 7 mmol/L; effective, 7 mmol/L ≤ FBG ≤ 8 mmol/L; ineffective, does not meet the above criteria. Total effective rate = markedly effective + effective.
(ii) Blood glucose indices: FBG, 2-hour postprandial glucose (2-hour PG), and glycosylated hemoglobin (HbA1c).
(iii) Quality of life: a scale consisting of eight items, each with 100 points; the higher the score, the higher the quality of life.

2.4. Statistical analysis

Data were processed using SPSS 22.0. Measurement data were represented by mean ± standard deviation, and t-test was used. Enumeration data were expressed in percentage (%), and χ^2 test was used. $P < 0.05$ indicates statistically significant difference.

3. Results

3.1. Curative effect

As shown in **Table 1**, the total effective rate of the observation group (97.5%) was significantly higher than that (85.0%) of the control group ($P < 0.05$).

Table 1. Comparison of curative effects

Group	Number of cases	Markedly effective	Effective	Ineffective	Total effective rate
Observation group	40	29 (72.5)	10 (25.0)	1 (2.5)	39 (97.5)
Control group	40	20 (50.0)	14 (35.0)	6 (15.0)	34 (85.0)
χ^2		1.03 0	0.514	3.295	3.295
P		0.016	0.473	0.0 01	0.0 01

Data are presented in n (%).

3.2. Blood sugar indices

As shown in **Table 2**, there was little difference in the blood glucose indices of the two groups before treatment ($P > 0.05$). However, after treatment, the blood glucose indices of the observation group were lower compared those of the control group ($P < 0.05$).

Table 2. Comparison of blood glucose indices

Group	Number of cases	FBG (mmol/L)		2-hour PG (mmol/L)		HbAlc (%)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation group	40	8.12 ± 2.24	5.12 ± 1.03	11.60 ± 1.42	8.03 ± 0.34	9.13 ± 3.46	5.12 ± 0.43
Control group	40	8.91 ± 3.42	5.35 ± 1.47	11.45 ± 1.07	9.35 ± 0.27	8.47 ± 2.35	6.28 ± 0.57
t		1.195	7.813	0.962	34.665	1.799	18.524
P		0.233	0.000	0.337	0.000	0.073	0.000

Data are presented in mean ± standard deviation. Abbreviations: 2-hour PG, 2-hour postprandial glucose; FBG, fasting blood glucose; HbA1c, glycosylated hemoglobin.

3.3. Quality of life

As shown in **Table 3**, there was no significant difference in quality-of-life scores between the two groups before treatment ($P > 0.05$); however, after treatment, the quality-of-life scores of the observation group were lower than those of the control group ($P < 0.05$).

Table 3. Comparison of quality-of-life scores

Group	Number of cases	Mobility		Body pain		Emotion		Mental health	
		Before	After	Before	After	Before	After	Before	After
Observation group	40	65.87 ± 8.22	95.35 ± 13.48	66.12 ± 8.46	97.34 ± 1.28	66.33 ± 2.40	96.82 ± 1.24	71.42 ± 2.56	95.42 ± 3.20
Control group	40	65.74 ± 6.28	84.44 ± 10.47	66.33 ± 8.58	80.64 ± 2.20	66.42 ± 2.41	80.54 ± 2.30	71.77 ± 2.65	79.58 ± 2.60
t		0.078	4.043	0.110	41.497	0.167	39.405	0.601	24.298
P		0.937	0.000	0.913	0.000	0.868	0.000	0.550	0.000
Group	**Number of cases**	**Vitality**		**Role limitation**		**Social skills**		**General health**	
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
Observation group	40	66.22 ± 9.15	96.44 ± 13.67	67.44 ± 1.92	95.15 ± 10.88	63.28 ± 6.87	95.87 ± 2.23	70.64 ± 1.82	96.44 ± 13.67

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Group	Number of cases	Vitality		Role limitation		Social skills		General health	
		Before	After	Before	After	Before	After	Before	After
Control group	40	66.57 ± 9.22	85.45 ± 11.84	67.50 ± 1.43	82.14 ± 8.64	63.66 ± 6.99	79.85 ± 2.24	70.25 ± 1.65	85.45 ± 11.84
t		0.170	3.843	0.159	5.923	0.245	32.055	1.004	3.843
P		0.865	0.000	0.875	0.000	0.807	0.000	0.319	0.000

Data are presented in mean ± standard deviation. Before and After refer to before and after treatment, respectively.

4. Discussion

With the development of society and the improvement of people's living standards, the number of diabetic patients is increasing. Diabetes and its complications have become one of the significant challenges that the medical field needs to face [5,6]. Especially since the 19th century, it is important to accurately assess and determine the blood glucose level of patients. In elderly diabetic patients, blood sugar rises over a longer period of time, increasing the risk of cardiovascular and cerebrovascular diseases and thus negatively affecting their life and quality of life. Therefore, it is imperative to improve the prevention and treatment of diabetes. The occurrence of diabetes in elderly is related to genetic and environmental factors, and its symptoms include weight loss, thirst, hunger, *etc*. The disease favors people over the age of 60 and is often associated with hypertension and cardiovascular disease. For treatment, oral drugs and insulin can generally be used. However, the course of treatment for elderly patients is often complicated and lengthy, and this group of patients cannot completely rely on the basic treatment used for diabetes. These treatments may cause side effects on the brain, which would worsen the condition.

Acarbose is a commonly used drug and widely used as an oral treatment. Acarbose is a glucosidase inhibitor, which can effectively inhibit the activity of glucosidase, strengthen the function of carbohydrate degrading enzymes, promote the absorption of glucose, and help stabilize blood sugar levels. Especially for those who prefer starchy food, the use of acarbose has a significant and rapid effect. However, it should be noted that the drug has a short half-life and its long-term use will damage the function of islet cells, resulting in the weakening of its effect in lowering blood sugar levels [7,8]. Insulin glargine has a longer duration of action but rapidly metabolizes in as short as 10 minutes, lasting for a few hours. After subcutaneous injection, the drug is quickly absorbed through fat, muscle, and liver tissues, effectively reducing blood sugar levels. Elderly diabetic patients can use the aforementioned two drugs together to improve cell function, make up for the deficiency of single acarbose treatment, and achieve blood sugar control goals at a faster rate [9,10]. The hexameric structure of insulin breaks down into yellow dimers that inhibit the release of primary glycogen. Like the substances released by islet cells, insulin functions the same and can enhance the secretion of insulin [11,12]. Compared with insulin-resistant preparations, its peak value is lower, thereby reducing the occurrence of adverse reactions, improving insulin resistance, and effectively controlling blood sugar levels in patients. Insulin glargine belongs to the group of medications called long-acting insulins, which when injected, redistribute tiny medicine particles and release small amounts of insulin, maintaining the drug at a relatively constant concentration within a mild expected range. The effect of the drug varies depending on the rate of absorption. It regulates blood sugar levels by absorbing glucose from small amounts of tissues such as bone and fat to control blood sugar levels.

HbA1c is a marker that reflects average blood sugar levels. The UK Prospective Diabetes Study (UKPDS) has found that controlling HbA1c levels in different types of diabetes could reduce related heart attacks by 14%, risk of diabetes complications by 21%, related deaths by 21%, and microvascular complications by 37% [13,14]. Therefore, the key is to control HBA1c to 6.5% to combat the long-term complications of diabetes. The results of the present study showed that after treatment, all blood sugar

indexes of the observation group significantly reduced ($P < 0.05$). In addition, the most common complication of diabetes in the elderly is hypoglycemia. After the onset of hypoglycemia, symptoms such as confusion, headache, and dizziness will appear, and some patients may be in a critical state. Hypoglycemia can damage their brain tissue, cause stroke, and even threaten the life of patients [15]. According to research, the combined treatment can stabilize patients' blood sugar indices, with the biological effect lasting for more than one day. This prevents large fluctuations in blood sugar, thus maintaining the stability of blood glucose levels. Compared with the sole application of a drug, the combined treatment has less hypoglycemic effect and can improve patients' treatment compliance. In addition, it does not impose an additional burden on the gastrointestinal function of patients and is relatively safe and reliable.

In conclusion, for elderly patients with diabetes, the intervention of adding insulin glargine to conventional acarbose in the treatment of diabetes can ensure the long-term maintenance of blood glucose levels and optimize HbA1c. This method provides a scientific, reasonable, and effective reference for future clinical treatment of diabetic patients. Therefore, the application and popularization of this method are of great significance.

Disclosure statement

The author declares no conflict of interest.

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