

## Original Article

# The effect of individual nursing on improving the living ability and blood sugar control of Alzheimer disease patients with diabetes mellitus

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**Abstract:** Objective: To explore the effect of individual nursing on Alzheimer disease (AD) patients with diabetes mellitus. Methods: A total of 119 patients with AD complicated with diabetes admitted to our hospital from January 2017 to January 2019 were selected for prospective analysis, and 64 patients received individual nursing mode, which were regarded as the personality group (PG). Another 55 patients received routine nursing mode and were regarded as the regular group (RG). The curative effect of AD, blood glucose, living ability, cognitive function, self-care ability and nursing satisfaction of the two groups were investigated. Results: There was no difference between the two groups in AD curative effect and cognitive function ( $P > 0.05$ ), and the blood sugar control, living ability, self-care ability and nursing satisfaction of the PG were higher than those of the RG ( $P < 0.05$ ). Conclusion: Individual nursing can effectively improve the ability of blood sugar control and daily life of AD patients with diabetes mellitus, and greatly enhance the patients' trust, dependence, and satisfaction with medical staff, which is worth popularizing in clinical practice.

**Keywords:** Individual nursing, AD, diabetes, blood sugar, living ability

## Introduction

Alzheimer disease (AD) is a progressive neurodegenerative disease with hidden onset, which has a very high incidence among the elderly [1]. According to the survey data, there are 5.05% AD patients in the world at present, and this number is rising with the global aging [2, 3]. At present, the pathogenesis of AD is not completely clear, and it may be related to heredity, organ diseases and head trauma [4]. Patients with AD have obvious memory loss and unresponsiveness, and even worse, they may lose their ability to take care of themselves, which not only affects their lives, but also causes a great burden on their families [5, 6]. Moreover, most AD patients have serious chronic diseases, among which diabetes is the most common one [7, 8]. Diabetes mellitus, as a chronic disease with the highest incidence in the world, causes more serious harm to AD patients [9]. For the treatment of AD, it is usually necessary to take brain metabolism activating drugs, which can dilate cerebral vessels,

increase the utilization of oxygen, glucose, amino acids and phospholipids by cerebral cortical cells, and to a certain extent, can cause the increase of blood sugar [10]. The treatment of diabetes requires taking hypoglycemic drugs for a long time [11]. The treatment of the two diseases is conflicting, so the difficulty of treatment is greatly increased. For this reason, we should pay more attention to the treatment of AD patients with diabetes in clinic.

Clinical research has been devoted to finding an effective intervention to improve the treatment effect of AD patients with diabetes mellitus for a long time, but in recent years, it has gradually focused on the nursing intervention [12, 13]. Some studies have pointed out that the intervention of nursing can greatly improve the treatment effect of diabetic patients [14], and more studies have found that a more detailed nursing mode is helpful for postoperative recovery of hypertensive cerebral hemorrhage patients [15]. Therefore, we

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speculate that nursing mode different from the previous one may improve the treatment of AD patients with diabetes, but there are few researches on nursing guidance of AD patients with diabetes at present. Individual nursing is a nursing mode which is very suitable for rehabilitation of nervous system diseases and chronic diseases, and it has achieved remarkable results in elderly patients with kidney diseases and other diseases [16, 17]. Therefore, this experiment will provide reliable reference and guidance for future clinical treatment of this kind of patients by analyzing the effect of individual nursing on AD complicated with diabetes.

## Materials and methods

### *Research participants*

From January 2017 to January 2019, 119 patients with AD complicated with diabetes were admitted to Xingtai People's Hospital. There were 73 males and 46 females with an average age of  $64.4 \pm 8.4$  years. This experiment has been approved by the ethics committee of our hospital. This experiment conformed to the ethical standards of our hospital and international principles. All subjects have signed informed consent.

### *Inclusion and exclusion criteria*

Inclusion criteria: patients aged 40-76 years; patients were diagnosed as AD and complicated with type 2 diabetes in our hospital; patients were at the first or second stage of AD; patients had a diabetes history of 1-5 years. Exclusion criteria: patients with tumor, other system and organ diseases; patients with obvious history of head injury; patients with physical disabilities; patients could not take care of themselves; referred patients; pregnant and lactating patients; patients with a history of surgery within six months before admission; patients could not follow the doctor's advice.

### *Experimental grouping*

Among 119 patients, 64 patients received individual nursing mode, which was regarded as the personality group (PG). Another 55 patients received routine nursing mode and were regarded as the regular group (RG).

### *Experimental method*

Two groups of patients were given rehabilitation nursing for two months. RG nursing plan: the disease was explained to patients, patients were arranged to have corresponding examinations and were supervised to take medicine according to the doctor's advice every day, and the changes of vital signs and blood sugar were closely monitored. Patients were assisted in rehabilitation training, and the nursing staff was asked to patiently answer patients' questions and actively communicate with patients. Nursing plan of the PG: (1) Memory rehabilitation training was applied, including inducing patients to recall through their photos, diaries and articles, so that patients can explain related scenes. Patients were asked to recall their living location, environment, and objects in the room. Patients were guided to play simple calculation, guessing, jigsaw puzzles and other games. (2) Strict intervention in nutrition intake was applied, including regular and quantitative meals through the quantitative diet table; the diet structure was 12-25% meat and vegetables and 45-55% carbohydrate. Coarse grains were the main staple food, and it was strictly forbidden to eat things containing glucose, sucrose, honey and other ingredients. Three meals a day were distributed reasonably according to 2/5, 3/5 and 3/5. The blood sugar was strictly controlled, and patients with hypoglycemia could be treated with intravenous injection of about 45% glucose. (3) Safety management was applied, including accompanying cards indicating the patient's illness, ward, contact information of attending doctors and nurses. The eye-catching signs were set up everywhere in the hospital, including anti-skid and anti-fall warning. The control of dangerous goods such as scissors, razors, and kettles was improved. (4) Psychological counseling was applied, including actively communicating and chatting with patients and encouraging them. According to the psychological state of different patients, different psychological intervention measures were formulated to improve the treatment compliance of patients. (5) Rehabilitation training was applied, including assisting and guiding patients to take proper walking and gymnastics every day, to promote the recovery of patients' limb function.

## *Outcome measures and criteria*

Efficacy of AD: The efficacy of patients was evaluated with reference to Hasegawa dementia scale (HDS) scoring standard [18]. The patient's intelligence returned to normal or basically improved, which was judged to be cured; patients' HDS score increased significantly by  $\geq 10$  points, which was judged as effective. The HDS score of the patient increased significantly by  $< 10$  points, which was judged as general; HDS score was determined to be ineffective if it did not change or even decreased. Effective rate = (cure + effective)/total number  $\times 100\%$ . Blood sugar: 4 mL of fasting venous blood was taken at the time of admission, one month after admission and two months after admission, and sent to the laboratory of our hospital for testing fasting blood sugar and glycosylated hemoglobin. Activity of daily living (ADL) [19] and the generic quality of life inventory (GQOLI-74) [20] were used to evaluate patients before and after nursing intervention. The total score of ADL was 100 points, and the higher score indicated the better daily living ability. GQOLI-74 included four dimensions: physical function, psychological function, social function and living state, and 74 items. The higher score indicated the better quality of life. Cognitive function: patients were evaluated with MMSE [21] and CDR [22] before and after nursing intervention, with a total score of 30. The higher the MMES score, the better the cognitive function of patients. The higher the CDR score, the more severe the dementia. Self-care ability: The exercise of Self-care Agency (ESCA) [23] was used to evaluate patients after nursing intervention, including skills, goals and environment. The higher score indicated the higher self-care level. Nursing satisfaction: After nursing intervention, an anonymous self-designed questionnaire was conducted to evaluate Nursing work, and the evaluation results were divided into very satisfied, general and unsatisfied. Satisfaction rate = very satisfied/total  $\times 100\%$ .

## *Statistical methods*

SPSS22.0 statistical software was used for statistical calculation. Counting data were represented in the form of percentage (%), and Chi-square test was used for comparison between groups. The measurement data were

represented in the form of mean  $\pm$  standard deviation, and independent sample t test was used for comparison between groups. Paired t test was used before and after treatment. Multiple time points comparison was conducted by repeated measurement variance analysis and Bonferroni post hoc testing. When  $P < 0.05$ , the difference was statistically significant.

## **Results**

*There was no difference in clinical data between the two groups*

First of all, the clinical data of two groups of patients were compared, including age, sex, blood routine results at admission, smoking, drinking, morning exercise habits, course of disease, and family residence. There was no statistical difference between the two groups ( $P > 0.05$ ). See **Table 1**.

*There was no difference in AD efficacy between the two groups*

We compared the curative effect of AD between the two groups by HDS score and found that there was no statistical difference in effective rate between the two groups ( $P > 0.05$ ). See **Table 2**.

*The blood glucose of PG was better than that of RG*

We detected the blood glucose and glycosylated hemoglobin levels of the two groups at admission, one month and two months after admission, and found that there was no difference in blood glucose and glycosylated hemoglobin between the two groups at admission ( $P > 0.05$ ), but the blood glucose and glycosylated hemoglobin in the PG were lower than those in the RG at one month and two months after admission ( $P < 0.05$ ). The blood glucose and glycosylated hemoglobin of patients in the PG one month after admission were lower than those before admission, and decreased at two months after admission than those at one month after admission ( $P < 0.05$ ). However, in the RG, there was no difference between those at admission and one month after admission ( $P > 0.05$ ), but they decreased two months after admission ( $P < 0.05$ ). See **Figure 1**.

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**Table 1.** Comparison of clinical data between the two groups [n (%)]

Items	PG (64 cases)	RG (55 cases)	t value or $\chi^2$ value/P
Age (years)	63.4±8.7	65.2±9.4	1.084/0.281
BMI (kg/cm <sup>2</sup> )	21.05±4.84	20.97±5.14	0.087/0.931
Red blood cells ( $\times 10^{12}$ cells/L)	4.84±0.53	4.76±0.58	0.786/0.434
White blood cells ( $\times 10^9$ cells/L)	8.42±4.87	8.84±4.29	0.495/0.621
Platelets ( $\times 10^9$ /L)	194.26±54.26	186.49±58.42	0.752/0.454
Course of diabetes (years)	2.74±1.04	2.83±1.28	0.423/0.673
Gender			0.431/0.511
Male	41 (64.1)	32 (58.2)	
Female	23 (35.9)	23 (41.8)	
Smoking			0.170/0.681
Yes	35 (54.7)	28 (50.9)	
No	29 (45.3)	27 (49.1)	
Drinking			0.306/0.580
Yes	34 (53.1)	32 (58.2)	
No	30 (46.9)	23 (41.8)	
Morning exercise habits			0.034/0.854
Yes	4 (6.3)	3 (5.5)	
No	60 (93.8)	52 (94.5)	
AD degree			0.340/0.560
First stage	28 (43.8)	27 (49.1)	
Second stage	36 (56.3)	28 (50.9)	
Family history			0.779/0.378
Yes	12 (18.8)	14 (25.5)	
No	52 (81.3)	41 (74.5)	
Family residence			1.329/0.249
Urban	48 (75.0)	46 (83.6)	
Rural	16 (25.0)	9 (16.4)	

**Table 2.** Comparison of AD efficacy between two groups [n (%)]

Curative effect	PG (64 cases)	RG (55 cases)	$\chi^2$ values/P
Cure	42 (65.6)	31 (56.4)	
Effective	14 (21.9)	13 (23.6)	
General	6 (9.4)	7 (12.7)	
Invalid	2 (3.1)	4 (7.3)	
Effective rate	87.5%	80.0%	1.240/0.266

*The living ability of PG was better than that of RG*

The ADL and GQOLI-74 were used to evaluate the living ability of the patients in the two groups. The results showed that there was no difference in the scores of ADL and GQOLI-74 of the two groups before nursing ( $P > 0.05$ ), but the scores of ADL and GQOLI-74 in the PG after nursing were higher than those in the RG ( $P <$

$0.05$ ). The scores of ADL and GQOLI-74 after nursing were higher than those before nursing ( $P < 0.05$ ). See **Figure 2**.

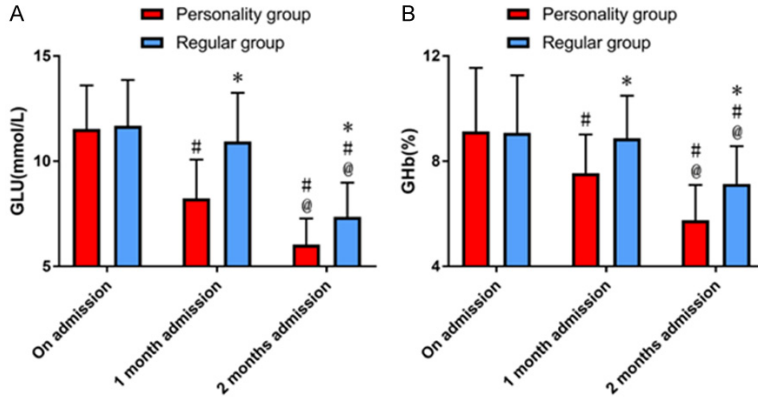
*There was no difference in cognitive function between the two groups*

The cognitive function of the two groups was evaluated by MMSE and CDR. The results showed that there was no difference in MMSE and CDR scores before and after nursing ( $P < 0.05$ ). After nursing, MMSE was higher and CDR score was lower in both groups ( $P < 0.05$ ). See **Figure 3**.

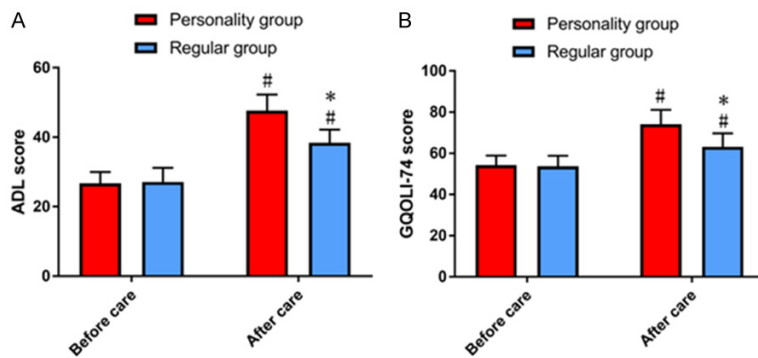
*Self-care ability of the PG was higher than that of the RG*

Self-care ability of patients in two groups was evaluated by ESCA, and it was found that the score of ESCA in the PG after nursing was high-

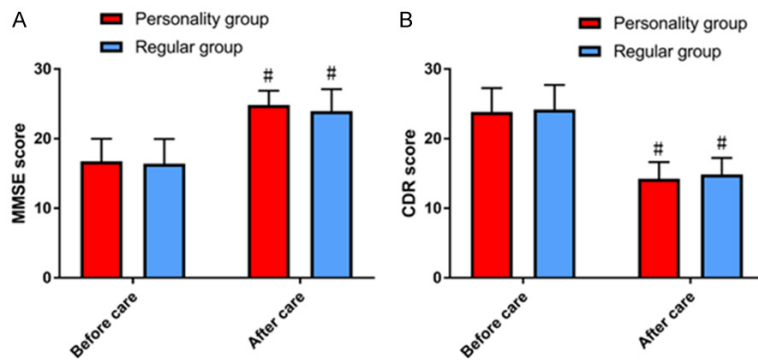
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**Figure 1.** Comparison of blood glucose between the two groups. A. Comparison of fasting blood glucose between the two groups; B. Comparison of glycosylated hemoglobin between the two groups; \* indicates there is a difference compared with the PG at the same time,  $P < 0.05$ ; # indicates there is a difference in the same group compared to that at admission,  $P < 0.05$ ; @ indicates there is a difference in the same group compared to that at one month after admission,  $P < 0.05$ .



**Figure 2.** Comparison of living ability between the two groups of patients. A. Comparison of ADL scores between the two groups; B. Comparison of GQOLI-74 scores between the two groups; \* indicates there is a difference compared with the PG at the same time,  $P < 0.05$ ; # indicates there is a difference in the same group compared to that before nursing,  $P < 0.05$ .



**Figure 3.** Comparison of cognitive function between the two groups of patients. A. Comparison of MMSE scores between the two groups; B. Comparison of CDR scores between the two groups; # indicates there is a difference in the same group compared to that before nursing,  $P < 0.05$ .

er than that in the RG ( $P < 0.05$ ). See **Figure 4**.

*The nursing satisfaction of the PG was higher than that of the RG*

After nursing intervention, we investigated the nursing satisfaction of two groups of patients and found that the nursing satisfaction of the PG was higher than that of the RG ( $P = 0.009$ ). See **Table 3**.

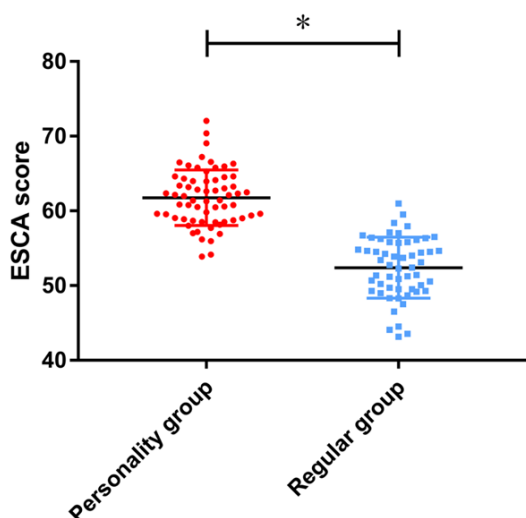
### Discussion

The treatment of diabetes and AD requires taking drugs for a long time, and the treatment difficulty of both diseases is greatly increased [24]. Therefore, effective physical intervention is one of the best choices to improve the prognosis of AD patients with diabetes. At present, the intervention of nursing has achieved remarkable results in the treatment of many diseases, and this study is of great significance for future clinical practice by exploring the improvement effect of individual nursing on AD complicated with diabetes.

First of all, in order to evaluate the effect of individual nursing on the basic clinical efficacy of AD patients with diabetes mellitus, we evaluated the AD efficacy of two groups of patients through HDS. The results showed that there was no statistical difference in the curative effect of AD between the two groups, indicating that individual nursing had no great influence on the curative effect of AD. Compared with other studies on individual nursing, there is no difference in our research results, which may be due to



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**Figure 4.** Comparison of ESCA scores between the two groups. \* indicates  $P < 0.05$ .

the small number of cases we have included, resulting in the chance of statistical analysis. In the specific statistical situation, we can find that the patients whose AD curative effect is cured in the PG account for about 10% more than that in the RG. Second, the specific improvement effect of individual nursing on AD patients with diabetes is not reflected in the curative effect of AD. Therefore, we further compared the blood glucose status of the two groups and found that there was no difference in fasting blood glucose and glycosylated hemoglobin between the two groups when they were admitted to hospital. At one month and two months after admission, the blood glucose status of patients in the PG was better than that in the RG. This result suggested that individual nursing could greatly improve the blood sugar control ability of patients, and it has certain application value for AD patients with diabetes. As we mentioned above, the use of some AD drugs may cause an increase in blood sugar, and blood sugar, as the most important index for evaluating diabetes, may cause more complications related to diabetes (such as diabetic nephropathy and osteopathy) once it is poorly controlled [25, 26]. However, the reason why patients in the PG have better control of blood sugar after individual nursing may be related to strict control of patients' diet and exercise. Diet, as the most important way for the human body to take in nutrition, determines the changes of many indexes in the patient's body to a

great extent [27], among which blood sugar is a representative one [28]. Reasonable and healthy diet can effectively supplement the nutrition needed by patients and avoid the increase of blood sugar. Moreover, through reasonable exercise training, it can not only improve the coordination ability of patients' limbs to a certain extent, but also improve the immune metabolism ability of patients. We know that the decrease of the body function of the elderly leads to poor nutrition metabolism ability and weak resistance to various diseases [29]. Appropriate physical training is one of the effective measures to fundamentally improve the body function. Then, we evaluated the living ability between the two groups by ADL and GQOLI-74, and the results also showed that patients in the PG were better than those in the RG. It also showed that individual nursing can gradually and comprehensively improve the living standard of patients, and the daily living ability of patients could be gradually restored through memory training. Not only that, with the improvement of patients' living ability, the confidence to overcome diseases is gradually increased. Optimistic and positive mental state can also significantly improve patients' treatment compliance and treatment effect. We evaluated the cognitive function of patients through MMSE and CDR. Although there was no difference in MMSE and CDR scores between the two groups after nursing, they were significantly improved compared with those before nursing. It showed that the patients' neurological function has been significantly improved after nursing, but the reason of no difference between the two groups may be similar to our above analysis. We evaluated the self-care ability of patients through ESCA and found that the score of ESCA in the PG was higher than that in the RG, suggesting that personalized care can improve the self-care ability of AD patients with diabetes mellitus. We speculated that this was also related to the communication between medical staff and patients. At present, the doctor-patient relationship is extremely tense all over the world [30]. In individual nursing, the medical staff's companionship greatly enhances the patients' trust, and it is easier for patients to learn and accept the knowledge taught by the medical staff in getting along. Finally, we investigated the nursing satisfaction of two groups of patients and found that the satisfaction of the PG was significantly higher than that of RG, which further explained the

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

Satisfaction	PG (64 cases)	RG (55 cases)	2 values/P
Very satisfied	59 (92.2)	41 (74.5)	
General	4 (6.3)	9 (16.4)	
Dissatisfied	1 (1.6)	5 (9.1)	
Satisfaction degree	92.2%	74.5%	6.862/0.009

value of applying individual nursing to AD patients with diabetes mellitus in the future.

To sum up, we believe that individual nursing can effectively improve the blood sugar control ability and daily living ability of AD patients with diabetes mellitus, and greatly enhance the patients' trust, dependence and satisfaction with medical staff, which is worth popularizing in clinical practice.

However, our research also has many shortcomings that need to be improved. For example, our research period is too short, and we cannot evaluate the long-term prognosis of the two groups of patients. In addition, the sample size in our study is too small, which may lead to the chance of statistical analysis. However, for the nursing intervention of AD patients with diabetes, there are still some details worthy of improvement. We will conduct a more in-depth and comprehensive experimental analysis as soon as possible to obtain more reliable results.

#### Disclosure of conflict of interest

None.

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