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Effect of empowerment theory health education on disease control level and compliance of elderly T2DM

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Abstract: To study the effect of empowerment theory health education on disease control level and compliance of elderly patients with type 2 diabetes mellitus (T2DM). 200 elderly patients with T2DM admitted to our hospital (January 2017 to December 2019) were included in this study, and divided into a control group and an empowerment group by random number method. The control group was given routine health education, while the empowerment group was given empowerment theory health education. The treatment compliance, T2DM-related health literacy, self-management ability, blood glucose level and quality of life of the two groups of patients were evaluated after 3-month follow-up. Before education, the compliance, T2DM-related health literacy, self-management level, blood glucose level and quality of life scores was basically the same in the two groups ($P>0.05$); after education, the above scores of the two groups were improved ($P<0.05$), and the improvement in the empowerment group was better than that in the control group ($P<0.05$). Empowerment theory health education can improve the treatment compliance, disease control level and quality of life of elderly T2DM patients.

Keywords: Type 2 diabetes mellitus, elderly, empowerment theory, health education, compliance.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a syndrome of glucose and lipid metabolism disorder, which is the main type of diabetes and takes up 90% or more of the diabetes (Qasim *et al*., 2020; Song *et al*., 2016; Jiang *et al*., 2018). Abnormally high blood sugar levels and a series of induced complications are common in T2DM patients, which negatively affect patients' health and life (Rosella *et al*., 2015; Saslow *et al*., 2017; Saslow *et al*., 2017). Due to its hidden onset, the symptoms in the early stage are usually imperceptible and the incidence can increase with age. In recent years, with the deepening of aging population structure and the improvement of people's living standards in China, the incidence of T2DM tends to rise. Modern medical theory points out that although there is no cure for T2DM at present, it can enable patients to achieve conditional health standards through comprehensive treatment such as regular treatment, diet and exercise. Health education is a basic way to guide elderly patients with T2DM, which can enhance the patient's understanding of disease, treatment methods, medication methods, etc., thereby improving patients' compliance. However, under the adverse effects of memory loss, psychological factors, environmental factors and long-term treatment, the elderly have relatively poor compliance with T2DM treatment and daily self-management and conventional health education hardly meets clinical requirements. Empowerment theory is a new core theoretical system that integrates many disciplines such as society, education and politics (Morgado *et al*., 2021; Łuczyński *et al*., 2019; Irmak *et al*., 2021). It has now become a core guiding theory in many fields such as economic development, public health, and mental health. In recent years, empowerment has been proposed as a therapeutic process, aimed to increase the patient's own ability to think critically and act autonomously (Łuczyński *et al*., 2019). Empowerment theory insists patients as the main body of treatment and nursing, and provides knowledge, technology, psychology and other support byprofessionals, fully respecting patients' autonomy but perfecting related auxiliary work. In order to improve the compliance of elderly T2DM patients with medical care and control disease, our hospital has introduced empowerment theory into routine health education. This study was conducted to evaluate its specific outcomes.

MATERIALS AND METHODS

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General information

Inclusion criteria: (1) patients who met the diagnostic criteria of Guidelines for the Prevention and Treatment of Type 2 Diabetes in China (2022 Version) (Chinese Elderly Type 2 Diabetes Prevention and Treatment of Clinical Guidelines Writing Group *et al*., 2022). (2) patients who aged ≥65 years. (3) patients who voluntary participated, cooperated with follow-up and signed informed consent that was obtained prior to the enrollment. Exclusion criteria: (1) patients with major diseases and/or dysfunctions of heart, lung, brain, liver, kidney and other organs; (2) patients with unconsciousness, communication disorders, mental system diseases and psychological illnesses; (3) patients with blood system diseases and immune system diseases; (4) patients with severe T2DM complications; (5) patients who cannot cooperate with

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follow-up. Eventually, 200 patients were selected from T2DM patients admitted to our hospital (January 2017 to December 2019) in this study. 198 patients were enrolled after excluding 2 patients due to loss of follow-up. The random number method was used to divide them into a control group and an authorization group, with 99 patients each. In the control group, there were 58 males and 41 females; aged from 66 to 81 years, with an average of (73.52±5.98) years; the course of disease was 2 to 11 years, with an average of (7.59±1.16) years; educational backgrounds: there were 11 cases of primary school or below, 25 cases of middle school, 32 cases of high school (equivalent of high school) and 31 cases of college and above; comorbidities: 31 cases of hyperlipidemia, 29 cases of hypertension, 11 cases of hyperinsulinemia, 6 cases of thyroid disease, and 9 cases of hyperuricemia. In the empowerment group, there were 57 males and 42 females; aged 65-82 years, with an average of (73.61±6.02) years; course of disease was 2-13 years, with an average of (7.68±1.21) years; educational backgrounds: 12 cases of primary school or below, 27 cases of middle school, 28 cases of high school (equivalent of high school) and 32 cases of college and above; comorbidities: 28 cases of hyperlipidemia, 32 cases of hypertension, 12 cases of hyperinsulinemia, 7 cases of thyroid disease, 8 cases of hyperuricemia. The general data was basically the same in the two groups (P>0.05). This study was reviewed and approved by the ethic committee of Qinghai Provincial People's Hospital (license no. 2016/203/12).

Methods

Control group

The control group was given regular health education. The disease-related knowledge education, blood sugar control goals, treatment schemes, diet adjustment plan, exercise method, etc. were conducted; the patient's questions were answered; health education materials were handed out; the review time, daily precautions, and urges to follow the medical advice were informed.

Empowerment group

The empowerment group was given empowerment theory health education, and the specific measures are as follows. (1) The relevant information and education were instructed before conducting health education, the patient's mastery of T2DM and his own condition were assessed, so as to find the problem and correspondingly enable patients to aware of their current problems. (2) Patients were assisted to study their own problems, including listening to patients' complaints, answering patients' questions in a manner that patients can understand, encouraging patients to actively face and solve problems. (3) Patients were instructed to set goals with respect to blood glucose control and treatment and they were encouraged to take the initiative to implement and achieve the goals. (4) The degree of realization of the patient's goal was evaluated to guide the patient to analyze the experience gained in this process, and to sum up his own characteristics and deficiencies. (5) On the first week, one-on-one education was given 3 times, each 20~30 min; on the second week, all patients were organized to conduct group discussions and encouraged to share experiences and sum up deficiencies for 40～50 min. The education was conducted at the patient's bedside or ward on the first week and in the open area of hospital or through the WeChat and other interaction platforms on the second week. On the first week, targeted questionnaires were issued in terms of medication programs, diet adjustments, exercise programs, blood glucose monitoring, self-management ability, etc., including: What experience did you gain in this activity? What are your specific goals? What measures did you take to achieve the above goals? Who are required to assist you in completing the above measures? then the questionnaire was collected to evaluate the effect. On the second week, the improvement of the patient's self-management ability was observed, and the evaluation method was identical to that used on the first week. (6) WeChat groups with patients was established, and health education videos, audios and documents, etc. were regularly sent, education through text messages or phone follow-up were carried out for patients who did not register Wechat.

Observation indicators

The changes of treatment compliance, T2DM-related health literacy, self-management ability, blood glucose level and quality of life of the two groups of patients were evaluated after 3-month follow-up. (1) Compliance was evaluated by our hospital's self-designed compliance scale, which includes reasonable diet, regular exercise, psychological regulation, regular inspection, and **adherence to medical regimens**. All items were evaluated using a 4-level scaling method from total incompliance, slight compliance, basic compliance and complete compliance (1 to 4 points in turn). The reliability of the scale is 0.899, and the validity is 0.901. (2) T2DM-related health literacy questionnaire (Zhang *et al*., 2019)

includes disease knowledge, health beliefs, health behaviors, health skills, each sub-item includes 5 entries, with the correct answer scoring 2 points, wrong answer 0 points, and the total score is 0-40 points. The score is directionally proportional to the T2DM-related health literacy. (3) Self-management ability was evaluated with reference to *Diabetic Patient Self-Management Survey* (Ji *et al*., 2019). The content includes foot care, skin care, blood glucose monitoring, lifestyle intervention, with each item a full score of 100 points, and the higher the score, the better the self-management ability. The quality of life was evaluated with reference to the *Chinese Diabetics Quality of Life Specific Scale (*Mohammadi *et*

al., 2018), which includes physiological function, mental state and social relationship. A higher score indicates that the quality of the sub-item is worse. (4) Blood glucose levels include fasting blood glucose (FBG), 2h postprandial blood glucose (2hPG) and glycated hemoglobin (HbA1c).

STATISTICAL ANALYSIS

SPSS 21.0 software was employed as the statistical analysis tool. The measurement data was expressed by $\bar{x} \pm s$, the inter-group comparison was conducted by independent t test, and the intra-group comparison was conducted by paired t test. $P<0.05$ was considered statistically significant.

RESULTS

Comparison of compliance between two groups of patients

Before education, the compliance score was basically the same in the two groups ($P>0.05$); after education, the compliance scores of the two groups increased ($P<0.05$), and the increase in the empowerment group was more significant ($P <0.05$, table 1).

Comparison of T2DM-related health literacy between two groups of patients

Before education, the T2DM-related health literacy score was basically the same in the two groups ($P>0.05$); after education, the T2DM-related health literacy scores of the two groups increased ($P<0.05$), and the increase in the empowerment group was more significant ($P <0.05$, table 2).

Comparison of self-management level between two groups of patients

Before education, the self-management score was basically the same in the two groups ($P>0.05$); after education, the self-management scores of the two groups increased ($P<0.05$), and the increase in the empowerment group was more significant ($P <0.05$, table 3).

Comparison of blood glucose levels of the two groups of patients

Before education, the blood glucose levels was basically the same in the two groups ($P>0.05$); after education, the levels of GLU, 2hPG and HbA1c in the two groups decreased ($P<0.05$), and the decrease in the empowerment group was more significant ($P <0.05$, table 4).

Comparison of quality of life between two groups of patients

Before education, the quality of life score was basically the same in the two groups ($P>0.05$); after education, the quality of life score in the two groups decreased ($P<0.05$), and the decrease in the empowerment group was more significant ($P <0.05$, table 5).

DISCUSSION

T2DM is common in middle-aged and elderly people and it is a chronic disease that requires lifelong medication (Carallo *et al*., 2015; Cinar *et al*., 2014). The elderly are prone to suffer poor compliance due to the long course of the disease. Meanwhile, the elderly tend to neglect the disease, and their memory, pancreatic islet function and many other physical functions begin to degenerate. The traditional treatment focuses on blood glucose control, and the elderly are more subject to hypoglycemia (Caetano *et al*., 2018; Łuczyński *et al*., 2019). Conventional health education is one-way education, which cannot be well-acquired by the elderly patients and ensure the long-term management level outside the hospital (Sugiyama *et al*., 2015). Therefore, the education of elderly patients with T2DM is of vital significance.

So far, there have been relevant studies applying the empowerment theory to the health education of T2DM (Tucker *et al*., 2014; Wang *et al*., 2021). It has been proved to be feasible to improve treatment compliance and improve metabolic indicators in T2DM patients. The empowerment theory health education prevails over conventional education in the following aspects (Noori *et al*., 2021; Tjaden *et al*., 2021): (1) Conventional education serves T2DM disease as the main body, while empowerment education regards the patient as the main body, and can provide patients with comprehensive support for skills, psychology and related knowledge. Thereby, it plays a role in improving the patient's psychological state and fully mobilizing the patient's subjective initiative. (2) Conventional education is one-way education, and the patient is always passively accepted, while empowerment education places the patient in an active position. Through induction and assistance, the patient can actively formulate and implement health goals and programs, and it is not easy to induce patients' rebellious psychology. (3) Conventional education is indoctrination-oriented. And it is tricky for elderly patients to get used to this education mode due to their declined understanding ability, response speed, memory and even intelligence level. Empowerment education provides knowledge, information and technology to patients according to their needs, with the patient's subjective decision as the core and professional knowledge as protection, thus improving the patient's mastery of disease knowledge and self-management technology. (4) Conventional education concerns about changing the behavior of patients, yet the habits formed by elderly patients over the years are difficult to change quickly. Empowerment education instructs patients to discover their own problems and proactively solve them, which not only improves patient initiative but also reduces patients' excessive dependence behavior. (5) Conventional education is confined to pre-discharge education, and rarely involves management of patients

Table 1: Comparison of compliance between two groups of patients (x ± *s*, point)

Groups	Reasonable diet		Regular exercise		Psychological regulation		Regular inspection		Adherence to medical regimens	
	Before education	After education	Before education	After education	Before education	After education	Before education	After education	Before education	After education
Control group	1.06±0.40	2.36±0.64#	0.99±0.25	1.42±0.28#	0.85±0.19	1.92±0.25#	0.82±0.18	1.64±0.34#	1.22±0.32	2.34±0.46#
Empowerment group	1.04±0.31	3.03±0.77#	0.96±0.25	2.92±0.5#	0.83±0.18	2.98±0.34#	0.81±0.19	2.74±0.39#	1.20±0.29	3.2±0.53#
t	0.391	6.65	0.851	25.926	0.758	25.474	0.598	21.08	0.438	12.138
P	0.696	<0.001	0.396	<0.001	0.45	<0.001	0.551	<0.001	0.662	<0.001

Table 2: Comparison of T2DM-related health literacy between two groups of patients (x ± *s*, point)

Groups	Disease knowledge		Health beliefs		Health behaviors		Health skills	
	Before education	After education	Before education	After education	Before education	After education	Before education	After education
Control group	2.36±0.91	4.28±1.21#	5.05±1.16	6.05±1.98#	4.78±1.54	6.10±1.98#	3.53±1.06	6.09±1.65#
Empowerment group	2.32±0.90	7.85±1.66	4.83±1.11	8.55±2.15#	4.72±1.60	8.42±2.03#	3.48±0.94	8.27±2.00#
t	0.281	17.307#	1.324	8.506	0.277	8.138	0.356	8.399
P	0.779	<0.001	0.187	<0.001	0.782	<0.001	0.722	<0.001

Table 3: Comparison of self-management level between two groups of patients (x ± *s*, point)

Groups	Foot care		Skin care		Blood glucose monitoring		Lifestyle intervention	
	Before education	After education	Before education	After education	Before education	After education	Before education	After education
Control group	70.72±8.59	80.25±7.18#	70.25±6.59	79.62±7.75#	74.52±6.11	81.12±6.89#	75.33±6.33	80.31±7.76#
Empowerment group	69.85±9.44	86.59±6.98#	69.31±6.55	87.21±7.08#	74.38±6.18	88.88±6.29#	74.91±5.46	86.6±7.42#
t	0.677	6.303	1.002	7.197	0.163	8.276	0.493	5.822
P	0.499	<0.001	0.318	<0.001	0.871	<0.001	0.622	<0.001

Table 4: Comparison of blood glucose levels of the two groups of patients (x ± *s*)

Groups	GLU(mmol/L)		2hPG(mmol/L)		HbA1c (%)	
	Before education	After education	Before education	After education	Before education	After education
Control group	8.33±1.15	7.17±0.84#	10.76±0.91	8.17±0.77#	8.62±0.38	7.13±0.33#
Empowerment group	8.45±1.27	5.94±0.66#	10.95±2	7.42±0.67#	8.66±0.39	6.19±0.27#
t	0.672	11.493	0.899	7.321	0.627	21.821
P	0.502	<0.001	0.370	<0.001	0.531	<0.001

Table 5: Comparison of quality of life between two groups of patients (x ± *s*, point)

Groups	Physiological function		Mental state		Social relationship	
	Before education	After education	Before education	After education	Before education	After education
Control group	26.23±2.64	15.86±2.25#	25.43±2.60	15.42±2.07#	26.52±1.96	15.06±2.29#
Empowerment group	25.88±2.86	12.14±1.18#	25.67±2.95	11.15±1.06#	26.52±1.92	11.73±1.36#
t	0.900	14.596	0.616	18.293	0.021	12.433
P	0.369	<0.001	0.538	<0.001	0.983	<0.001

Note: compared with the data before education #P<0.05

outside the hospital. The empowerment theory makes the utmost of the modern Internet information interaction platform and enhances the supervision, counseling and support outside the hospital.

In this study, the compliance, T2DM-related health literacy, self-management level, blood glucose level, and quality of life scores was basically the same in the two groups before education; after education, all these indexes were improved, indicating that health education can improve the above scores of patients to a certain extent. After education, the compliance of the patients in the empowerment group was better than that of the control group. It was suggested that the empowerment theory health education could effectively improve the compliance of elderly T2DM patients with treatment and daily behavior management, and provide the necessary foundation for subsequent treatment. After education, the level of health literacy and self-management of patients in the empowerment group was better than that of the control group. It was indicated that empowerment theory health education can better improve the patient's health literacy and self-management level. Therefore, the blood glucose level of the empowerment group is lower than that of the control group, which is related to the higher compliance, self-management level and health literacy of the empowerment group (Tjaden *et al*., 2021; Waiswa *et al*., 2021). The patient's condition in the empowerment group was well controlled and the psychological state was further improved, so the patient's quality of life was greatly improved in comparison to the control group. Similarly, the present study results are in an agreement with the previous study that revealed implementing a guided self-determination approach (e.g., based on empowerment) that supports problem-solving and decision-making related to insulin therapy in adolescents with T1DM may improve their motivation to manage their diabetes care (Łuczyński *et al.*, 2019).

CONCLUSION

To conclude, the empowerment theory health education is more suitable for elderly patients with T2DM, which can effectively improve the patient's disease control level and compliance, and has a definite positive impact on the overall improvement of patients' health literacy and self-management level.

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