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The effect of diabetes self-management education on psychological status and blood glucose in newly diagnosed patients with diabetes type 2

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ABSTRACT

Objective: The purpose of this study was to evaluate the efficacy of self-management education on psychological outcomes and glycemic control in type 2 diabetes mellitus.
Methods: Patients were randomly assigned to education group and control group. Education group received professional education and control group received routine outpatient education.
Results: A total of 118 patients were randomly assigned to two groups (education group, n = 63; control group, n = 55). Compared with control group, the anxiety score (36.00 vs. 42.50, $P < 0.05$) and depression score (35.50 vs. 44.00, $P < 0.05$) significantly decreased at the sixth month in education group, respectively. Compared with control group, fasting blood glucose (6.78 mmol/L vs. 7.70 mmol/L, $P < 0.00$), postprandial blood glucose (7.90 mmol/L vs. 10.58 mmol/L, $P < 0.00$) and glycosylated haemoglobin $A1_C$ level [6.20 (5.80, 6.60)% vs. 6.70 (6.40, 7.30)%, $P < 0.01$] significantly decreased after the sixth month in education group.
Conclusion: The psychological status and blood glucose of patients with diabetes receiving self-management education were significantly improved. Practice Implications: Type 2 diabetes mellitus has been usually linked to increased prevalence and risk of depression and anxiety, which can affect blood glucose levels. Through education, the mood of newly diagnosed patients with diabetes improved, resulting in better blood glucose control.

1. Introduction

Type 2 diabetes mellitus (T2DM) is a worldwide epidemic, and its prevalence is growing, creating a global healthcare burden. It is linked to increased risk of severe cardiovascular complications, morbidity and mortality which can be reduced by optimal glycemic control [1]. According to the International Diabetes Federation, in 2015 it was estimated that there were 415 million people with diabetes aged 20–79 years, and this figure was predicted to rise to 642 million by 2040 [2]. To effectively manage individuals with diabetes, appropriate education, lifestyle modification, medication treatment and blood glucose monitoring are all required. Education is the foundation of care for all diabetes patients who want to achieve successful health related outcomes [3]. Diabetes self-management training, the process of teaching individuals to manage their diabetes, has been considered as an important part of clinical management since the 1930s. 50–80% individuals with diabetes lack of knowledge about diabetes education, and ideal glycosylated haemoglobin $A1_C$ ($HbA1_C$) 7.0% target is achieved in less than half of type 2 diabetes [4,5,6]. Extensive self-management related to diet, exercise and medication are regarded as critical treatment for all patients with diabetes [7]. As such, diabetes self-management education (DSME) is widely recommended and carried out. However, despite the great variety of DSME programs that are currently available internationally, there is a lack of knowledge about the importance of diabetes education in the treatment of diabetes and in prevention of diabetes complications in developing countries [8,9]. Also patients with diabetes have an increased risk of developing mental disorders and psychological disturbances. Previous studies suggested that compared to the general population, individuals with diabetes have a higher

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prevalence of depression and anxiety [10,11]. Therefore, the primary objective of the present study was to evaluate the efficacy of self-management education on psychological outcomes and glycemic control in newly diagnosed T2DM.

2. Methods

2.1. Study design

The study was approved by the Ethics Committee in the First Hospital of Dandong. The patients involved in the study were recruited from both outpatients and inpatients of the First Hospital of Dandong. The physician in charge of this research first introduced the program to patients eligible. With patients' consent, the Informed Consent Forms were signed hereafter. Based on the statistical analysis, there was about 5% patient eligible but failing to participate in this study. Patients had the right to refuse to participate in or withdraw from the study at any time. From May 1 2016 to July 1 2016, a total of 118 newly diagnosed T2DM were recruited into our study. The inclusion criteria were newly diagnosed type 2 diabetes (≥18 years) treated with oral hypoglycemic agents combined with or without insulin. Nursing mothers, pregnant woman, hepatorenal disease, or psychotic disorders were excluded. Eligible participants were divided into two groups according to completely randomized design: education group and control group. The program duration was six months. The education of the patients was accomplished by professional education nurses. All nurses were well-trained. The education courses in this study were delivered under the guidance of Problem Based Learning (PBL). Lecturing approach, audio-visual approach, discussion approach and demonstration approaches were adopted. Lecturing approach was targeted at all patients and helped them to receive knowledge systematically. Audio-visual approach was implemented with the assistance of PowerPoint and video projector etc. Discussion approach was used to encourage patients to proactively ask questions and express their own feelings. Through discussion, patients were able to learn from each other and communicate on knowledge and experience of diabetes. In demonstration approach, further explanation was given to patients with the help of specific models and teaching aids. As for the content of education courses, we designed a detailed curriculum in advance. We offered a two-hour course each week, comprising of two sessions of lectures (40 minutes each), two breaks (10 min each) and interactive session (20 min). In the interactive session, patients could communicate with each other in groups or raise any questions to the lecturers. In control group, doctors make more health education with patients. Patients in the education group were given daily record sheets to track the diet, physical activities, medications and blood glucose. Patients should fill in the sheets based on their own conditions and return them by week. Based on the real-time information, we would assess the patient conditions and offer corresponding suggestions for better self-management. The Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) are the scales for assessing anxiety and depression, which includes 20 problems respectively, using a 4-point scale ranging from 1 (none, or a little of the time) to 4 (most, or all of the time) [12,13]. The statistical score of all questions were calculated after completion of the answers.

2.2. Education group

Patients in the education group were delivered 2-h diabetes education course by professional educational nurses every week. Patients in education group were divided into different groups by their most remarkable feature: overweight group (BMI ≥ 24 kg/m^2, 30 patients); smoking group (≥10 cigarettes per day, 10 patients); sedentary group (≥7 hours per day, 12 patients); low education group (high school degree and less, 5 patients); drinking group (≥50 g per day, 6 patients). The content of education included healthy diet, exercise, self-monitoring of blood glucose, complication prevention and understanding the risk factors of diabetes. Meanwhile, the patients were provided with medical history assessment, physical examination and laboratory evaluation. The anxiety and depression scale was used to assess the psychological status of the patients at the beginning and end of the study.

2.3. Control group

Patients in the control group did not receive diabetes education provided by professional education nurses. Diabetes education was usually provided upon routine outpatient visits. The length of education varied from 5 to 10 min. The content of education included healthy diet, exercise, self-monitoring of blood glucose, complication prevention and understanding the risk factors of diabetes. In addition, they were provided with medical history assessment, physical examination and laboratory evaluation. The anxiety and depression scale was used to assess the psychological status of the patients at the beginning and end of the study.

2.4. Statistical analysis

SPSS 16 was used for statistical analysis. Data were expressed as mean ± standard deviation or median (p25, p75). Statistical analysis included independent *t*-test, paired *t*-test and Mann-Whitney *U* test. $P < 0.05$ was considered statistically significant.

3. Results

3.1. Baseline data

A total of 118 patients were assigned to the education group (n = 63) and control group (n = 55). No significant differences between groups were detected with respect to baseline clinical data and laboratory findings between the two groups. (Table 1)

3.2. Six months outcomes

In education group, anxiety score decreased from 40.00 (38.00, 47.00) at baseline to 36.00 (30.75, 40.50) at the sixth month ($P < 0.05$), and depression score decreased from 41.00 (38.00, 47.75) at baseline to 35.50 (30.75, 42.25) at the sixth month ($P < 0.05$), respectively. In control group, anxiety score [42.00 (40.00, 44.50) vs. 42.50 (36.50, 47.50), $P = 0.73$] and depression score [42.00 (40.00, 42.00) vs. 44.00 (41.00, 47.50), $P = 0.10$] were not significantly lower at the sixth month, respectively. As compared with baseline, education group showed reduced fasting blood glucose (FBG) (8.00 mmol/L vs. 6.78 mmol/L, $P < 0.00$) and showed reduced postprandial blood glucose (PBG) (13.29 mmol/L vs. 7.90 mmol/L, $P < 0.00$) at the sixth month. In education group, $HbA1_C$ significantly decreased at the sixth month compared with baseline [7.20% (6.40%, 9.10%) at baseline and 6.20% (5.80%, 6.60%) at the sixth month, $P < 0.00$]. FBG (8.00 mmol/L vs 7.70 mmol/L, $P < 0.00$) and PBG (12.67 mmol/L vs 10.58 mmol/L, $P < 0.00$) were significantly lower at the sixth month in control group than baseline. $HbA1_C$ decreased from 7.90% (6.80%, 10.30%) at baseline to 6.70% (6.40%, 7.30%) ($P < 0.00$) at the sixth month in control group. (Table 2)

3.3. Group comparisons

The education group showed significantly reduced anxiety score [36.00 (30.75, 40.50) vs. 42.50 (38.00, 47.00), $P < 0.05$] and depression score [35.50 (30.75, 42.25) vs. 44.00 (41.00, 47.50), $P < 0.05$] at the sixth month, compared with control group (Fig. 1A). Compared with control group, FBG [6.78 (6.43, 7.18) mmol/L vs. 7.70 (7.22, 8.23)mmol/L, $P < 0.00$] and PBG [7.90 (6.93,

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