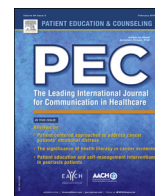




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Effectiveness of family involvement in newly diagnosed type 2 diabetes patients: a follow-up study

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ABSTRACT

Objective: To investigate the effects of family-involvement on health education for T2DM from the aspects of knowledge, attitude and practice (KAP), health-related quality of life (HRQoL), body mass index (BMI) and glucose control.

Methods: A follow-up study was performed and patients with newly diagnosed T2DM were divided into family-involved group (FIG, $n=60$) and single-involved group (SIG, $n=60$). Hierarchical linear models were used to assess within-group changes and between-group differences in the glycosylated hemoglobin A1c (HbA1c), KAP, SF-36 and BMI.

Results: Significant improvements in FIG along with significant differences between-group were seen for HbA1c levels (9.73, 8.92, 5.55, 5.79, 5.30 vs. 10.05, 9.53, 6.36, 8.41, 6.58) in baseline, M3, M6, M12, M24 compared with SIG, respectively (all $P \leq 0.001$). Significant improvements in FIG along with significant differences between-group were seen for KAP (16.23, 46.98, 48.93 vs. 16.65, 29.07, 37.62), SF-36 (78.04, 92.68, 92.34 vs. 74.96, 77.03, 78.25), and BMI (24.74, 23.46, 22.96 vs. 24.00, 23.45, 23.50) in baseline, M12 and M24, respectively (all $P \leq 0.05$).

Conclusion: Family involvement is beneficial to the control of T2DM and should be suggested for T2DM newly diagnosed.

Practice implications: Health education should encourage the family to participate in the whole process to improve the efficacy of education.

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1. Introduction

In recent years, the global prevalence of diabetes has increased significantly. The number of Chinese patients with type 2 diabetes mellitus (T2DM) ranks first in the world. Diabetes ranks in the third place among chronic non-communicable diseases according to the morbidity, disability and mortality as well as the degree of harm to human health, and it has brought a heavy burden on healthcare [1–3]. The family is an important place for people to influence lifestyle intervention of family members to participate may improve health and reduce disease relapse rate, increase well-being of the family, help improve diabetes, hypertension, stroke,

dialysis, cancer treatment compliance and correct bad habits [4,5]. Family members through interaction, suggesting changes and promoting awareness of the patient, attitude, and behavior, change bad behavior gradually. At present in China, due to lack of professionals in the community, professional health education of diabetes is provided to patients by the hospitals, scientific research institutions and community service stations [6]. All education organizations are dedicated to verifying the internationally recognized education modes and to exploring more effective forms of education.

Patients who are newly diagnosed with T2DM are often scared due to their poor knowledge of this disease, which seriously affects their subsequent treatments [7,8]. As diabetes is a chronic metabolic disease, patients must receive lifelong treatments. The daily care, support and supervision from family members are the premise and foundation for the recovery of patients from diabetes [9–11]. Due to lack of time and the number of subjects,

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family-involved educational model is still in the exploratory stage, the objective data and the results about the studies on families to participate in need to be further tracked, observed and concluded [12]. Since 2011, school of management begun to offer courses on health education to the relevant staff, and formed a multidisciplinary diabetes health management team to provide health education service for patients. However, the family involvement was scarcely evaluated from multiple aspects.

In this study, we performed a follow-up study, and grouped the individuals who participated in the health education for the patients with newly diagnosed T2DM, according to whether their family members were fully involved in order to evaluate the effect of family involvement on health education for controlling the diabetes and improving the quality of life.

2. Methods

2.1. Participants

From July 2011 to June 2012, 1256 patients with T2DM from 3 hospitals received health education provided by health management team in School of Administration. This study met the following criteria: (1) they were diagnosed with T2DM for the first time by the endocrine specialists according to the T2DM Diagnostic Criteria (2010) [13] and the periods from diagnosis were less than two weeks (1039 patients excluded); (2) the patients completed the whole education courses for 4 times (38 patients excluded); (3) the patients had not participated in other health education for T2DM (54 patients excluded); (4) aged ≥ 18 years old (5 patients excluded); (5) the patients agreed to establish health management files, filled out the questionnaires before health education, received regular follow-up visits and refilled the questionnaires every year. 120 adult patients with newly diagnosed T2DM received the whole education courses and completed the regular follow-ups. Family members involved in this study included the spouses, children, parents, siblings long-term living with the patients. There were 47 spouses, 6 parents, 5 children, 2 siblings accompanied the patients to participate in the whole educational courses.

The family-involved group included the patients accompanied by their family members when receiving health education, and the single-involved group included the patients receiving health education alone and filling out the questionnaire by themselves.

Written informed consents were acquired from all the participants. The study protocol was reviewed and approved by the Ethics Review committee of Beijing University of Chinese Medicine. The methods were carried out in accordance with the approved guidelines. Quality control of the program was incorporated into the design, implementation and the data processing under the organization and supervision of the Beijing University of Chinese Medicine.

2.2. Multidisciplinary health education and management

A professional team of health management was made up of various professionals, including endocrine doctors, dietitians, pharmacists, psychological doctors, specialist nurses, etc. The patients were provided with comprehensive knowledge of diabetes through classroom education and education handbooks of diabetes mellitus written by the professional teams. These teams also provided patients outpatient clinic visits and telephone counseling to answer the questions of the patients, and provided regular follow-up counseling for patients to track the effects of education. Education courses included psychological intervention, nutritional therapy, exercise intervention, medicine care, blood glucose monitoring and oral care. Education schedules were

arranged at the first and the third weekends per month for 4 lessons with a monthly cycle. Patients arranged time to attend the 4 times of courses.

2.3. Outcomes

Primary outcome of this study was the HbA1c levels at baseline, month 3 (M3), M6, M12 and M24. Blood samples were collected at baseline and each point to determine HbA1c using ion exchange high pressure liquid chromatography. Secondary outcomes were the changes in BMI, scores of KAP and scores of Short-Form 36 Health Survey (SF-36) at baseline, M12 and M24.

2.4. Measures and questionnaires

A standardized questionnaire was designed and used to collect the socio-demographic information, such as the year of birth, educational level (years), marital status (yes/no), occupation (mental/manual/home), chronic disease (yes/no), and acute complications (yes/no) by the professional healthcare educators. The height and weight were measured with a standard technical method by the trained investigators. BMI was calculated by the weight (kg) divided by the square of height (m).

The KAP questionnaire of diabetes was designed and developed by endocrine specialists and nurses, nutritionists, psychologists and pharmacists in accordance with China authoritative clinical guideline for T2DM (2010) [14], including 30 questions about knowledge, 15 questions about attitudes and 15 questions about practice. The total score was calculated by the sum of self-reported questions (no, 0 and yes, 1), and higher scores represented better knowledge, attitude and practice, respectively. SF-36 was used to measure overall health-related quality of life [15].

2.5. Statistical analyses

Descriptive statistics were calculated for all variables; continuous variables were summarized as means and standard deviations (SD) or as medians and ranges, and categorical variables were summarized as frequencies and proportions. To determine the difference between groups, an independent *t* test, a χ^2 test, a Fisher exact test, or a nonparametric test was used where appropriate. The level of education was divided into three categories (low, moderate, or high), and marital status was grouped as married or unmarried.

Hierarchical linear models (HLMs) were used for multivariate analysis, which helped to handle multiple measurements, intra-individual correlation in observations over time, and the nested structure of the data [16]. For the analyses, each available measurement of each participant was treated as one single observation, i.e. there were up to four observations per participant. Separate models were computed for each outcome, adjusted for sex, age, marital status and educational level (all fixed effects, time-invariant), and accounting for intra-individual correlation over time (first-order autoregressive covariance structure). To allow for non-linear development of outcomes, time was treated as a categorical variable with each measurement representing one category, and was included as time-varying fixed effect. To test for between-group differences in within-group changes over time, a time-by-group interaction term was added as time-varying fixed effect. Estimates for within group changes over time and *P*-values of between-group differences in within-group changes over time were reported for each outcome.

A 2-sided *P* value of <0.05 was considered to be statistically significant. All analyses were performed using SAS software, version 9.1.3(SAS Institute Inc., Cary, NC, USA).

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