Educational intervention in primary care on blood glucose control in patients with type 2 diabetes mellitus

Intervención educativa en atención primaria sobre el control de la glucosa en sangre en pacientes con diabetes mellitus tipo 2

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Abstract

Introduction: Type 2 diabetes mellitus is increasing in rural areas of Tungurahua, making educational interventions necessary.
Objective: to evaluate the long-term impact of an educational intervention on diabetes knowledge.
Methods: The study was nested in an educational intervention project in primary health care in Tungurahua. Questionnaires and medical records were compared at the beginning and end of the intervention.
Results: diabetes knowledge score increased in the intervention group in 2021 compared to 2020.
Conclusions: the educational intervention improved the diabetes knowledge score in the intervention group.

Keywords: diabetes mellitus, glycemia, educational intervention, source control: DeCS
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Resumen

Introducción: la diabetes mellitus tipo 2 está aumentando en las zonas rurales de Tungurahua, por lo que las intervenciones educativas son una necesidad.
Objetivo:evaluar el impacto a largo plazo de una intervención educativa sobre el conocimiento de la diabetes.
Métodos: El estudio se anidó en un proyecto de intervención educativa en la atención primaria de salud en Tungurahua.Se compararon cuestionarios y registros médicos al inicio y al final de la intervención.
Resultados: la puntuación de conocimientos sobre diabetes aumentó en el grupo de intervención en 2021, en comparación con 2020.
Conclusiones: la intervención educativa mejoró la puntuación de conocimientos sobre diabetes en el grupo de intervención.

Palabras clave: diabetes mellitus, glicemia, intervención educativa, control fuente: DeCS

Introduction

Type 2 diabetes mellitus (DM2) remains a major health problem worldwide, as the number of patients has almost quadrupled in the last 30 years[1–10]. Rapid urbanization, population aging and lifestyle changes, and increasing obesity, may explain the rapid growth of DM2[11,12].

Therefore, efforts are required to strengthen and increase knowledge in PHC to improve the care of patients with chronic diseases [13].

Two systematic reviews found several educational interventions for patients with DM2 to improve glucose control and empower patients to control their disease[2,9].

Family and community-based educational interventions have been widely employed, and reviews concluded that educational interventions could benefit patients by improving blood glucose levels and diabetes knowledge[7].

However, evidence supporting the efficacy of educational interventions is limited to short-term studies, usually less than one year[9].In addition, few studies were found with long-term follow-up in different settings[12,14–17].

The present study focuses on the follow-up of the educational intervention and its impact on diabetes knowledge.

METHOD

The study was conducted in Tungurahua. The research team was responsible for selecting the counties for the study. Participants were selected in the respective counties (1 and 2) in 2020. Physicians at the health centers in the municipalities contacted patients with DM2 who met the inclusion criteria according to their records. Patients were asked to participate in the project and written informed consent was obtained. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

The inclusion criteria were (1) meeting the diagnostic criteria for type 2 diabetes mellitus; (2) being between 35 and 75 years of age; (3) having lived at the site for more than two years with no records of moving in the last year; (4) having personal records in the chronic disease management information system in the health area centers; and (5) being willing to participate in the project and also to acquire new knowledge about diabetes. In addition, patients were excluded from the study if they had severe diabetic complications, had been diagnosed with any other serious disease, were pregnant, or had psychiatric disorders.

The intervention for patients included educational lectures, follow-up services and special medical services, while PHC health professionals received professional skills training, team discussions and regular meetings.

The educational intervention was carried out by service teams, in the intervention areas. Each service team consisted of physicians, nurses, public health physicians and diabetes specialists from the health care institutions.

The intervention for patients with DM2 lasted two years, from 2020 to 2021. In addition to routine service, participating patients in the intervention areas received services that included 1) health education talks every two months; 2) regular home follow-up visits with an annual physical examination; 3) special medical services (including assisting patients with medical treatment, transfer treatment, return visit, and clinical care).

The health education lectures contained information on 1) basic information about diabetes, including typical symptoms, essential diagnostic criteria, diabetes-related complications, and basic epidemiological data; 2) self-management strategies, including instructions for controlling blood glucose at home, food recommendations, and suggestions on how to use medications; 3) advice on physical exercise and diet therapy; 4) advice to patients when they have high blood glucose, such as balancing sugar, protein and fat intake; quitting smoking and drinking; and controlling cholesterol intake; 5) introduction of blood glucose measurement and severe acute complications; 6) diabetes prevention, based on the Triple Diabetes Prevention Strategy, which is recommended in the guidelines for DM2.

The service team in each county decided the detailed content of the lectures. Diabetes experts from the service team delivered the lectures to patients in the intervention areas.

Patients in the control areas received routine health care services as usual, including clinic visits to a physician and referrals as needed according to the patient's condition, and testing every four

to six months, and received diabetes information booklets once a year.

The intervention for health professionals in PHC included: 1) professional skills training in hospitals at the county level; 2) team discussions on patient cases; 3) regular meetings to discuss the progress of teamwork; 4) technical checks to inspect prevention and treatment plans; 5) performance evaluations, which were monitored, to encourage professionals to participate in the study actively.

Independent t-test and Pearson's χ2 test were used to study differences in sociodemographic characteristics between the intervention and control groups,to analyze changes between baseline and the two follow-up data collection points within the intervention and control groups, and a paired t-test was used to compare the mean difference in diabetes knowledge score.

The database and statistical processing of the data were performed and analyzed in the statistical program SPSS 26 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation.

Results

The initial questionnaire comprised 10 parts related to patients' perspectives on diabetes and diabetes care, including diabetes knowledge and sociodemographic characteristics. Sociodemographic characteristics of patients included age (in years); sex (male vs. female); marital status (married/cohabitant vs. single); level of education (lower vs. higher); type of occupation (farmer/housework vs. other); and the duration (in years) of DM2 diagnosis.

Diabetes knowledge score and sociodemographic characteristics among patients in 2020 and 2021were analyzed. The diabetes knowledge score was measured as a summary score based on the questionnaire's correct answer to nine questions.

The control group had a higher diabetes knowledge score than the intervention group in 2021. However, the intervention group experienced a continued increase in diabetes knowledge scores in 2021.

In 2021, the mean diabetes knowledge score in the intervention group increased significantly compared to 2020 (mean difference was 0.70, 95 % CI 0.48, 0.93), while it decreased significantly in the control group (mean difference was -0.30, 95 % CI - 0.53, -0.82). In addition, county 1 significantly improved the level of knowledge over county 2.

When comparing the diabetes knowledge score in 2021, the intervention and control groups increased significantly, while the intervention group increased more than the control group with a mean difference of 0.77, 95% CI 0.53 to 1.01.

The mean diabetes knowledge score increased significantly by 1.47 (95 % CI 1.24 to 1.71) and 0.31 (95 % CI 0.09 to 0.53) in 2021 in the intervention and control groups, respectively, compared to 2020.

Table 1: Sociodemograph iccharacteristics of participants

	Intervention (389)		Control (394)		p
	n	%	n	%	
Averageage (standard deviation)	62,4 (8,43)		62,3 (8,20)		0,973
Years of diagnosis (standard deviation)	7,4 (5,05)		7,3 (5,16)		0,587
County					

1	201	51,7	234	59,4	0,030
	188	48,3	160	40,6	
Sex					
Male	110	28,3	120	30,5	0,503
Female	279	71,7	274	69,5	
Marital status					
single		15,9	68	17,3	0,620
married	327	84,1	326	82,7	
Educationallevel					
under	308	79,2	294	74,6	0,130
high		20,8	100	25,4	
Typeofoccupation					
Farmlaborerorhousewife	344	88,4	339	86	0,316
Othertypes	45	11,6	55		

Source: statistical analysis, $p \leq 0.05$

Discussion

The educational intervention improved the level of diabetes knowledge in the intervention group compared to the control group at the first and second follow-ups. In addition, participants improved their level of diabetes knowledge at the 2-year follow-up.

In other settings, some previous studies reported the long-term impact (usually more than one year) of educational interventions for patients with DM2. In addition, previous studies reported changes in blood glucose control[1,4,7,18].

Johnson et al.[4] conducted a two-year educational intervention for patients with DM2 in the USA., which consisted of personal counseling by the study nurse, also personalized for the patient. The study reported that the blood glucose level, measured by HbA1c, for patients who received education was significantly lower than those who did not after two years of observation. However, another study in England and Scotland showed no significant difference in HbA1c level between patients with a structured group education program and patients with usual care after a 3-year follow-up[7].

Meanwhile, Hamidi et al.[17] compared an intensive lifestyle intervention (IEV) and diabetes support and education (DE) for patients with diabetes at a 4-year follow-up. Participants with IEV had a greater improvement in blood glucose level reduction than with DE. Another study also reported an improvement in the level of diabetes knowledge for patients after having a 2-year educational intervention[18].

It is difficult to quantitatively compare the impact of different educational interventions due to heterogeneity in study design, educational content, evaluation methods and the disparity of evaluation tools[2,5,19,20].

The intervention had other components besides education (e.g., follow-up home visits, case management) that may also have contributed to the impact.

There are several limitations to the present study. First, the study was implemented in a real-life setting in primary health care in a rural area, which could be both a strength and a limitation. The implementation was conducted in a setting where the research team had no control over the implementation process.

For example, routine health care services for patients in the control group may have been performed differently in different counties. In designing the content of the educational lecture and questionnaire, simple and fundamental information about diabetes was emphasized. As a result, the impact on the diabetes knowledge score was limited. However, the improvement in

diabetes knowledge was sustained in the second year, whereas a few other studies have shown sustained changes over time.

The present study shows that it could be important to perform stratified analyses to assess whether the impact of the intervention differs by geographic area since the implementation of an intervention may vary and the impact of other factors may also differ between areas.

Conclusions

The educational intervention improved the diabetes knowledge score in the intervention group. However, analyses stratified by the county showed a differential impact concerning diabetes knowledge scores, suggesting that local intervention implementation may have differed between counties. Combined with the findings on the influence of the intervention among health professionals, the intervention had a positive influence on both patients and health professionals.

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