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Long-term effects of an intensive-practical diabetes education program on HbA1c and self-care

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ABSTRACT

Objective: The purpose of this study was to implement an intensive and practical diabetes education program (DEP) and evaluate its long-term effects and its impact on psychosocial variables. It was hypothesized that the DEP would improve patients' metabolic control (A1c hemoglobin – HbA1c), technical knowledge, self-efficacy and frequency of self-care and decrease barriers and other parameters such as the body mass index (BMI) and LDL cholesterol. These results should be maintained at one-year follow-up.
Design and setting: The sample was composed of 40 patients with diabetes type I who attended a diabetes outpatient clinic. A repeated measures design, considering medical and psychosocial variables at six months and one year, was used.
Results: Results have statistical and clinical implications. They revealed significant changes that were maintained at one-year follow-up in HbA1c, barriers to self-care, frequency of self-care, knowledge about the disease and perceived self-efficacy. The areas of self-care where the fewest changes took place were diet and exercise, which are highly related to cardiovascular risk factors and are very present in patients with diabetes. Specifically, no changes were observed in BMI or LDL cholesterol.
Conclusion: The intensive DEP proved to be effective, although specific efforts should be made in certain areas to ensure longer-lasting benefits. Besides, including not only educational but also psychological strategies in patients' education to motivate them to make real lifestyle changes should be a priority in the design of any DEP.

1. Introduction

Diabetes mellitus is a disease that affects 246 million people worldwide (Steinsbekk, Rygg, Lisulo, Rise, & Fretheim, 2012) and has a high prevalence in the Spanish population (Soriguer et al., 2012). According to the World Health Organization, adequate control of the disease unequivocally requires educating patients and developing their skills to manage their treatment and prevent complications (World Health Organization, 1998). Education is achieved through diabetes education programs (DEPs), which are part of what is known as "therapeutic education". The main objective of such programs is to help patients develop skills to conduct behaviors leading to better health-related parameters and quality of life.

DEPs are available in various formats and types (i.e., more or less intensive, longer or shorter, involving more or less follow-up, delivered in groups or individually) and have widely proven to be useful in improving biological, psychosocial and behavioral parameters (Steinsbekk et al., 2012). Recent meta-analyses of controlled studies (Hopkins, Lawrence, Mansell, et al., 2012; Tricco, Ivers, Grimshaw, et al., 2012) have shown improvements ranging from .52% to .81% in levels of hemoglobin (HbA1c) when training in disease management is included. In addition, interventions including flexibility of eating/insulin regimen such as the dose adjustment for normal eating (DAFNE) program have achieved highly positive results in metabolic control. In a recent intervention (Hopkins et al., 2012), researchers reported a .44% decrease in HbA1c from baseline to one-year follow-up and a significant reduction in episodes of severe hypoglycemia (ranging from 1.7 to 0.6 per individual) as well as a 43% increase in the ability to detect them. Similar results have been observed by the authors of other studies, who have also shown considerable improvements in other areas such as self-efficacy and knowledge (Rankin et al., 2011), satisfaction and quality of life (Rankin et al., 2011) and psychological distress (Hopkins et al., 2012).

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A significant decrease in hemoglobin implies a substantial improvement in the prognosis of complications (i.e., micro and macrovascular or renal complications, neuropathy, retinopathy) on a primary and secondary preventive level. Specifically, longitudinal studies with patients with type 2 diabetes in which intensive insulin therapy was compared to conventional therapy have shown that a 1–2% decrease in A1c hemoglobin considerably decreased the risk of retinopathy and kidney disease (American Diabetes Association, 2000; Shichiri, Ohkubo, Kishikawa, & Wake, 2000) as well as microvascular damage, risk of amputation and coronary disease (Diabetes Control and Complications Trial Research Group (DCCT), 1993; Zhang, Hu, Yuan, & Chen, 2012).

Although the benefits of metabolic control are evident, the specific strategies and contents of the diabetes education programs that promote it are not clearly known. Moreover, although there is evidence supporting the beneficial effects of such programs, their long-term effects have not been clearly demonstrated yet, as few longitudinal studies have included one-year follow-up, or more (Steinsbekk et al., 2012; Tricco et al., 2012). Certain contents and formats of diabetes education programs seem to promote longer-lasting achievements. A few examples are the involvement of one single educator, group format (Hwee, Cauch-Dudek, Victor, Ng, & Shah, 2014), a duration of 6–10 sessions (Steinsbekk et al., 2012) and ongoing training, as well as monitoring and supporting interventions that may include telephone reminders (Lorig, Ritter, Villa, & Piette, 2008). Previous studies have revealed that many patients already have knowledge about the disease and how to control it. Yet, this knowledge, itself, is not reflected in better metabolic control, since making significant lifestyle changes is a remarkably complicated task that requires working on other aspects that influence patients' decision-making (Serrano-Gil & Jacob, 2010). In this regard, DEPs that include psychological techniques such as counseling or motivational interviewing (Rosenbek Minet, Wagner, Lønvig, Hjelmborg, & Henriksen, 2011) seem to lead to positive results.

Despite there are many important variables in education and it is important to consider patient's profile (Kroese, Adriaanse, & De Ridder, 2013; De los Santos-Roig et al., 2014), few studies have included them in the same DEP or have assessed their long-term effects. In addition, the effectiveness of DEPs should be determined by their influence on both biomedical and psychosocial variables (i.e., perceived barriers, self-care, self-efficacy and knowledge about the disease). An additional problem in the Spanish health-care context is that, despite DEPs include theoretical learning of certain skills, patients do not always have the opportunity to participate in practical sessions or receive feedback to ensure proper learning has taken place.

The main objectives of this paper were (1) to test an intensive and ongoing DEP that not only included the elements recommended by the literature but focused particularly on practicing skills and (2) to obtain evidence of its long-term efficacy (at six months and one year). Biomedical (A1c hemoglobin, total and LDL cholesterol, body mass index) and psychosocial variables (knowledge, perceived barriers to self-care, frequency of self-care behaviors and self-efficacy, defined as the perceived ability to conduct such behaviors) were assessed.

The following hypotheses were developed: (1) after the DEP patients will have lower levels of A1c hemoglobin, greater theoretical and practical knowledge about diabetes, fewer barriers, a higher frequency of self-care and greater self-efficacy; (2) these changes will remain stable at six-month and one-year follow-up; (3) after the DEP patients will show improvements in biomedical measures, particularly in cardiovascular risk factors such as cholesterol (total and LDL) and the body mass index.

2. Method

2.1. Participants

The initial sample was composed of 115 diabetic patients who agreed to collaborate. All of them filled out the questionnaires at beginning and 3 days after (at the end of program). However, not all of them completed all the instruments or measures at six-month and one-year follow-up. The main reasons for this experimental mortality were lack of motivation and difficulty in attending the sessions, mostly due to work-related reasons or to the inability to travel to the outpatient clinic. Due to this experimental mortality, the final sample was composed of 40 participants.

All of them were insulin dependent, type 1 in 95% of cases, and attended the outpatient clinic of San Cecilio University Hospital in Granada, Spain. It was therefore an incidental sample. Sample selection and data collection took place in the room used for the diabetes education sessions attended by a small group of patients (3–4 per week). Data collection took place on a two years period of time.

Exclusion criteria were (i) having a physical impairment (e.g., visual impairment), (ii) a psychological impairment (e.g., a psychopathology), (iii) having been recently diagnosed, or (iv) not being a native Spanish speaker. The most relevant characteristics of the sample are shown on Table 1.

2.2. Design

A cross-sectional study, repeated measures design, was conducted. This within-subjects design, where every single participant is subjected to every single treatment (including the control) gives as many data sets as conditions for each participant. The fact that subjects act as their own control provides a way of reducing the amount of error arising from natural variance between individuals.

2.3. Measures

2.3.1. Knowledge of diabetes

The scale of knowledge about diabetes – ECODI – (Bueno, Marco, Leal, Orozco, & Mira, 1993) was employed. This instrument is composed of 24 items with four response choices (a correct response, two incorrect responses and a response of “not sure”) that represent various areas of knowledge related to diabetes. The authors used an adaptation of the original scale, whose authors reported Cronbach's alpha reliability values of 0.87 and a Kuder–Richardson Formula 20 (KR-20) value of 0.86 (Bueno et al., 1993). In the present study, the scale obtained a KR-20 value of 0.70. Five questions were added to this instrument to assess patients' “technical knowledge” about the insulin injection technique (e.g., rotation of sites, waiting time to press the plunger, needle change). Items had the same format as in the original scale. The KR-20 value was 0.57.

Table 1
Characteristics of the sample.

	N = 40
Sex	
Female	23 (57.5%)
Male	17 (42.5%)
Education	
No studies	1 (2.5%)
Basic studies	11 (27.5%)
Secondary studies/vocational training	15 (37.5%)
Higher studies	13 (32.5%)
Marital status	
Married	18 (45%)
Single	21 (52.5%)
Divorced	1 (2.5%)
Complications	
Yes	9 (22.5%)
No	31 (77.5%)
Age (years)	32.80 (14.16)
Time of evolution (years)	15.16 (10.92)
HbA1c	160.52 mg/dl (8.91 mmol/l) (SD = 1.32)