STANDARDIZED EDUCATIONAL PROGRAM IN PERSONS WITH TYPE 2 DIABETES ON ORAL HYPOGLYCEMIC THERAPY: EFFECTS ON GLYCEMIC CONTROL AND BODY MASS INDEX

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SUMMARY

The aim of this study was to assess glycemic control, knowledge about diabetes and the impact of structured educational program on glycemic control and knowledge as measured by HbA1c in type 2 diabetic patients. Thirty-two participants with type 2 diabetes mellitus on oral hypoglycemic therapy from the Slatina Diabetes Consulting Unit completed a 4-week diabetes education course. Disease knowledge test was used to evaluate basic knowledge about diabetes and glycemic control as assessed by HbA1c at the beginning of the survey and 3 months after program completion. HbA1c was measured at the beginning, and at 3 and 6 months after the survey. Patient education was found to have significantly improved glycemic control (7.94±1.42 vs. 7.52±1.04; P=0.011), body mass index (30.3±4.2 vs. 29.5±4.0; P<0.001) and knowledge about the disease (P<0.001) six months after the program, without significant differences in systolic (P=0.521) and diastolic pressure (P=0.946).

INTRODUCTION

Diabetes mellitus is a public health problem and the leading cause of morbidity and mortality worldwide. Global diabetes incidence is increasing rapidly, the number of people with diabetes being expected to approximately double by 2030 (1). The prevalence of diabetes in Croatia, according to a study carried out as part of the first Croatian Health Project, is 6.1% (2). Diabetic patients are at a higher risk of developing concomitant diseases and complications of diabetes, which are far less common in people with well-managed blood glucose levels. Diabetes self-management training, the process of teaching individuals to manage their diabetes (3), helps diabetic patients achieve therapeutic goals and good quality of life. The primary goal of diabetes management is to keep blood glucose levels as near normal as possible without causing severe hypoglycemia. Some studies have shown that only 23%-25% of individuals with diabetes know what the target HbA1c level is, and about the same percent of patients know how to interpret HbA1c values in relation to their own
glycemic control (4,5). A large prospective study from 1998 has shown that a 1% reduction in HbA1c is followed by reduction in overall deaths from diabetes by 21%, from microvascular complications by 37% and from myocardial infarction by 14% (6). One of the goals of the Healthy People 2010 initiative is to increase the proportion of individuals with diabetes who receive formal diabetes education to 60% (7). Moreover, diabetes-related knowledge and skills should be improved in the general population, since as many as 50%-80% of individuals with diabetes and healthy adults lack relevant knowledge (8,9). Healthy population should be taught to further educate and help their diabetic relatives or friends to comply with the follow-up and treatment, thus reducing the medical and economic burden of diabetes and its complications (10).

The key to achieving this goal is effective diabetes self-management, the empowerment of patients to monitor their diabetes regulation and make necessary lifestyle adjustments. Patients should become active partners in disease management and an effective diabetes education program needs to be tailored to the needs of the educator and the patient. It should offer materials providing clear and illustrative details and simple messages. Education is the key element in successful management of diabetes, as knowledge about diabetes empowers patients to play an active role in effective diabetes self-management.

As to the best of our knowledge no studies have investigated the influence of diabetes education on health parameters in Croatia, we set to determine the effect of diabetes education on glycemic control and body mass index (BMI) in patients with type 2 diabetes mellitus.

The aim of the present study was to draw attention to the importance of patient education in improving knowledge about the disease and glycemic control in type 2 diabetes mellitus.

STUDY DESIGN AND METHODS

The study was carried out from December 2009 to July 2010. A random sample of 32 diabetic patients from the Slatina Diabetes Consulting Unit were selected from CroDiab (11), the Croatian national diabetes registry. Eligibility criteria included type 2 diabetes, age above 50 years, both sexes, oral hypoglycemic treatment, and agreement to participate in education about their disease. Disease knowledge test was used to evaluate basic knowledge about diabetes and glycemic control as assessed by HbA1c. Participants were tested at the beginning of the survey and after 3 months of educational program. A 10-item questionnaire was used to assess diabetes-related knowledge and self-care practices, each answer scoring one point, up to a maximum of 10. Body weight, body height, BMI, blood pressure and HbA1c were measured before and 3 months after the program. Six months after the completion of the program, body weight, body height and HbA1c were determined again.

The 4-week program consisted of 4 educational units, each session lasting for 1 hour. Participants were educated about the basics of disease management, home management and lifestyle improvement according to the educational unit framework:

1st educational unit:
Learning about diabetes mellitus
Learning how to recognize and treat low blood sugar (hypoglycemia) and high blood sugar (hyperglycemia)
Learning how, when and how often to monitor urine glucose

2nd educational unit:
Learning how to select the right food and when to eat it
Learning where to buy diabetes supplies and how to store them

3rd educational unit:
Learning about the complications caused by high blood glucose levels
Learning about diabetic foot and foot care
Learning about the positive impact of regular physical activity and weight loss on decrease in blood glucose levels

4th educational unit:
Learning about the importance of routine care and regular medical check-ups
Learning to watch for long-term complications of diabetes and manage commonly associated conditions such as obesity, high blood pressure, cardiovascular disease, chronic renal failure and retinal damage

All participants remained on oral therapy throughout the study.

Statistical methods

Data were tested for normality using Shapiro-Wilk test. Descriptive analysis included calculations of means and standard deviations, or medians and interquartile range, depending on the distribution of variables. Differences between levels of variables with more than two measurements were assessed using repeated ANOVA measures and post-hoc paired t-tests with Bonferroni correction for number of comparisons. The level of statistical significance was set at \( P=0.05/3=0.016 \). Paired t-test was used for variables with two measurements and normal distribution, while Wilcoxon test was used for comparing levels of knowledge about diabetes. The level of significance for these analyses was set at \( P=0.05 \). All statistical analyses were carried out using SAS 9.1.3.

RESULTS

The study was carried out in 32 patients (20 women and 12 men), whose anthropometric characteristics are shown in Table 1. Repeated ANOVA measures showed significant differences in the levels of HbA1c (\( P=0.013 \)) and BMI (\( P<0.001 \)). As in both instances Mauchly’s test indicated violation of sphericity, Greenhouse-Geisser correction was used. Values of the studied parameters are shown in Table 2. Post-hoc paired t-test showed significant differences in the levels of HbA1c between 0 and 6 months (\( P=0.011 \)) and 3-6 months (\( P<0.001 \)). A statistically significant decrease in BMI was observed at each consecutive measurement (3 m vs. 0 m, 6 m vs. 0 m and 6 m vs. 3 m). Systolic and diastolic blood pressures were not significantly different. Patient knowledge about diabetes was shown to have significantly improved during the study (\( P<0.001 \)).

Table 1. Baseline characteristics of study subjects

<table>
<thead>
<tr>
<th>Sex</th>
<th>M 12 (38%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>60.2±9.5</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>162.8±8.0</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>80.8±14.7</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>30.3±4.2</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>104.1±9.5</td>
</tr>
</tbody>
</table>

Table 2. Values of studied parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Baseline values</th>
<th>After three months</th>
<th>After six months</th>
<th>P (0-3m)</th>
<th>P (3-6 m)</th>
<th>P (0-6 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c (%)</td>
<td>7.94±1.42</td>
<td>7.86±1.14</td>
<td>7.52±1.04</td>
<td>0.598</td>
<td>&lt;0.001</td>
<td>0.011</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>30.3±4.2</td>
<td>29.8±4.0</td>
<td>29.5±4.0</td>
<td>0.004</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Systolic blood pressure (mm Hg)</td>
<td>135.2±26.0</td>
<td>133.0±16.7</td>
<td>N/A</td>
<td>0.521</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diastolic blood pressure (mm Hg)</td>
<td>78.4±12.8</td>
<td>78.6±8.9</td>
<td>N/A</td>
<td>0.946</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge about diabetes (0-10)</td>
<td>5.5 (3.3-6.8)</td>
<td>9 (9-10)</td>
<td>N/A</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
</tr>
</tbody>
</table>

Data are expressed as mean ± standard deviation unless noted otherwise; *median (interquartile range); N/A: not available
DISCUSSION

Patient education is an ongoing process, which should be aimed at helping patients to better manage glycemic control, overcome behavioral and psychological barriers, improve self-management skills, and become empowered to make informed choices. In this study, participants improved their knowledge on the disease, glycemic control and BMI by means of an educational program. Glycemic control results improved after 6 months, patient knowledge score increased from 5.5 to 9 and HbA1c was shown to improve more in subjects with lower basic knowledge at the beginning of the survey. The results obtained point to poor basic knowledge about diabetes among type 2 diabetic patients, and the need for improving patient motivation to better disease control.

Evidence supports the effectiveness of self-management training on glycemic control and diabetes knowledge, but not on weight, BMI or blood pressure in type 2 diabetes. Most of the studies demonstrating improvement in glycemic control by measuring HbA1c had short follow-up periods (<6 months) (12). Several studies have shown the effect of education on weight reduction (13). It is apparent that factors other than knowledge are required to achieve long-term behavioral change, as integrating education with other therapies to improve personal attitudes and motivations can be more effective than knowledge per se in improving metabolic control (14). There is also a need for psychosocial empowering education in type 2 diabetic patients, as this kind of approach seems to help patients connect their beliefs with their actual behavior (15).

Some studies have shown that setting individual goals has an impact on patients’ ability to reach national treatment target (16,17). It has been shown that the dialogue between care providers and patients needs to be improved (18,19) and education individualized (20). Patients must feel free to ask questions, express an opinion and demonstrate their experience in a friendly surrounding. They should become active partners in the management of their disease. There is evidence that participation of diabetic patients with type 2 diabetes mellitus in a diabetes educational program is associated with better compliance (21). Face-to-face interventions that used exercise or cognitive reframing teaching method have pointed to a greater reduction in post-intervention HbA1c (22). Improvement from pre- to post-test in this study was not the same for all individuals; it was higher for patients with lower pre-test scores and vice versa, which corresponds to the results of other training programs (23).

In view of the general burden of diabetes and its increasing economic costs, every attempt should be made to achieve therapeutic goals and thus prevent diabetes-related complications in diabetic population. This study clearly demonstrated the important role of diabetes education in the treatment of patients with type 2 diabetes. Further improvements should be made to adjust educational programs to the needs of persons with diabetes and increase their awareness of the necessity of active involvement.
REFERENCES


