Knowledge of insulin treated diabetic patients about food carbohydrate content. Results of a survey

Conocimiento del contenido de hidratos de carbono de los alimentos en pacientes con diabetes tratados con insulina. Resultados de una encuesta

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Abstract

Medical nutritional therapy is an essential piece of diabetes treatment. Our objective was to investigate, with a survey, the knowledge about carbohydrates of a group of insulin treated diabetic patients, and the relationship between this knowledge and individual and treatment factors. A survey was made to obtain a score to measure the knowledge about carbohydrates. In the univariate analysis we observed some influences: age, general education, type of diabetes, diabetes education and insulin regime; sex didn’t showed any influence. In the multivariate analysis only general education and diabetes education showed influence on the score, being the diabetes education the more influential factor on the patient knowledge about carbohydrates. Our results emphasize, so, the importance of the diabetes education to improve the quality of our care to the patients with diabetes.

Keywords: survey, diabetes education, carbohydrate, nutrition therapy.

Resumen

La terapia médica nutricional es un elemento esencial en el tratamiento de la diabetes mellitus. El objetivo de este trabajo fue estimar mediante una encuesta el nivel de conocimiento sobre los hidratos de carbono en una muestra de pacientes con diabetes tratados con insulina, y analizar su relación con factores vinculados al sujeto y al tratamiento. Se confecció una encuesta para valorar con una puntuación dicho grado de conocimiento. En el análisis univariante mostraron tener influencia las variables de la edad, el nivel cultural, el tipo de diabetes, la educación diabetológica y la pauta de insulina, pero no el sexo. En el análisis multivariante sólo mostraron tener influencia el nivel cultural del paciente y la educación diabetológica recibida, siendo ésta el factor más influyente en el conocimiento sobre los hidratos de carbono. Nuestros resultados subrayan, pues, la importancia de potenciar la educación diabetológica para mejorar la calidad de la atención a los pacientes con diabetes.

Palabras clave: encuesta, educación diabetológica, hidratos de carbono, terapia nutricional.

Introduction

The medical nutrition therapy (MNT) is an essential element in the treatment of the diabetes mellitus and is part of the “education for the self-management” that each patient with diabetes has to achieve throughout his lifetime.1 In the MNT standards of the American Diabetes Association they are recognized with an evidence A level, that the control of the carbohydrates (by means of the count, conversion or estimation of volumes based on the experience) constitute a key strategy to achieve an adequate glycemic control.2 An individual diet plan based on the quantification and distribution of carbohydrates (CH) is valid for all the diabetic patients, and indispensable in those who undergo treatment with multiple insulin doses.3

The MNT, as the diabetological education (DE) in general, has evolved during the last decades as from a didactic-theoretical approach towards a more practical one, customized and based on active learning techniques to achieve the self-management.4 The first step of the diet education of the diabetic patient comprises the different-
tiation between the food groups and the identification of the CH. The initial level of instruction might be carried out in basic diabetes attention units and in primary care.

An adequate nutritional therapy has to start considering the individual reality of the subject. Taking into account this premise; the patient’s nutritional knowledge should be assessed before starting the learning process. Moreover, since the DE is a continuous process, a periodical evaluation of such knowledge should be convenient. The DKQ questionnaire is usually used in the therapeutic education programs in order to evaluate the general knowledge of the diabetic patient about the disease. It is made up of 16 questions of multiple answers; six of them are about food and one is focused on the identification of CH. However, specific tests have not been issued about the nutritional knowledge.

The objective of this work is to estimate the knowledge level about the CH identification in a sample of diabetic patients treated with insulin and to analyze its relation with factors linked to the subject and the treatment.

**Material and method**

**Study field and subjects**

The study population is constituted by diabetic patients seen at the Diabetes Unit of the Health Department of the Community of Valencia. Such Department comprises a population, of rural and semi-urban type, of approximately 70,000 people. The Diabetes Unit has a basic attention function, placed in an extra-hospital office and in this case, is made up of a specialist physician in endocrinology and nutrition.

In order to carry out the study, a sample has been screened that included diabetic patients undergoing insulin treatment who attended consecutively during a period of 3 months to the control medical consultation and who accepted to take part voluntarily. The exclusion criteria were: 1) recent insulinization (less than 6 months), 2) insufficient understanding capacity (according to the interviewer’s opinion) and 3) gestational diabetes.

**Survey**

A survey was done to each patient, without previous notice, during the medical control visit at the Diabetes Unit. All the surveys were conducted by the same interviewer: the physician of the Diabetes Unit.

The survey format consisted of a first introduction question followed by a multiple answer test. The initial question was asked orally: “Do you know what carbohydrates are?”. In case of an affirmative answer, the person passed directly to the test. A brief explanation was given to the patient in case of a doubtful or negative answer (“It is the food that contains sugar, flour, starch...”) and the test was done afterwards.

The test of multiple answers was in writing in capital letters of great size. The patients filled them out alone, unless there was certain difficulty in writing and reading, receiving the help of the interviewer in this case. The wording of the test coincides with the one of question No. 5 of the DKQ questionnaire: “Which of the following foods contain carbohydrates?”. There appeared below a list of 20 usual foods in our diet and pertaining to the different food groups (table 1). The score of the test is expressed as absolute number of correct answers.

**Socio-demographic and clinical variables**

The following variables have been collected: age, gender, cultural level, diabetes type, diabetes duration, received diabetological education and current guideline of insulin. For each of the following five variables and as regards to the data analysis, the patients have been grouped in three categories:

- **Age**: under 51 years of age, between 51 and 65 years and older than 65 years of age.
- **Cultural level**: “high” (university studies), “middle” (professional formation or secondary school) and “low” (primary studies or without studies).
- **Type of diabetes mellitus** (according to the classification of the World Health Organization): T1D, T2D and other specific types of diabetes (“Others DM”).
- **Diabetological education**: “advanced” (specific learning program about carbohydrates), “basic” (standard program of diabetological education of primary care) and “none”.
- **Insulin guideline** (associated or not to the oral antidiabetics): “bolus-basal” (1-2 doses of slow- or intermediate action insulin and 1-4 doses of fast-acting insulin), “mixed” (2-3 doses of premixed insulin) and “basal” (1-2 doses of slow-intermediate acting action insulin).

**Statistical analysis**

The data are processed with the information program SPSS, version 11. The variable “score” (number of cor-
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The correct answers of the test were considered as an estimation of the knowledge about CH, and it was proved that it did not fail to keep with the normality requirement by means of the test of Shapiro-Wilk. The mean scores of the groups of subjects were compared by means of the Student t test or the one way ANOVA test. Multiple post hoc comparisons were done with the procedure of Bonferroni if the ANOVA model was relevant. When it had to do with an ordinal independent variable (age group, cultural level, received diabetological education) and in order to assess the effect lineal tendency, a polynomial contrast of lineal order was also carried out. Finally, the interaction and the effect of the category variables were studied in the dependent variable “score” by means of a univariant general lineal model. A value of p <0.05 was accepted as bilateral statistical meaning level.

Results

From 196 diabetic patients under treatment with insulin who attended the consultation, 44 were excluded due to recent insulinization and 32 due to insufficient understanding capacity. The others (n= 120) took part in the study. The characteristics of our studied population sample are depicted in table 2.

To the introduction question (“Do you know what the carbohydrates are?”), 67 patients (55.8%) answered affirmatively. In a whole, the score obtained in the test was of 12.15 ± 2.66 (mean ± SD). Twelve (12) subjects exceeded the level of 15 correct answers (10% of the total).

The score of the different groups or categories of patients are collected in table 3. In all the variables, except in sex, the mean scores of the groups were relevantly different. When comparing the groups by means of the contrasts, the results were different for the groups <51 years of age and >65 years, T1D as regards to T2D, and the middle and high cultural levels compared to the low level. As regards to the diabetological education, the score of the group with advanced SD was higher than the one of the group with basic SD and of the group with no SD; in turn, there was no difference between these two last ones. Finally, among the insulin guidelines, the group with bolus-basal guideline was different compared to the group with basal guideline, while the mixed guideline did not show differences compared to the basal. A relevant lineal tendency was observed in the variables of the age group (F= 7.07; p= 0.009), cultural level (F= 25.86;
p <0.0001) and diabetological education (F= 75.86; p <0.0001).

No relevant interaction in variables combination was found when the univariant general lineal model was used. The only variables that showed a relevant effect in the score of the test was the SD and the cultural level of the patient. The summary of the results is depicted in table 4.

### Discussion

The characteristics of the studied sample (ratio 1:2 of T1D:T2D, mean age 57 and mean-low cultural level) fit with the population usually assisted in a diabetes basic unit, which supposes a intermediate step between the primary care and the mentioned specialized units. However, due to the heterogeneity of the assistance organization of the health departments, these data cannot be extrapolated to other geographic areas.

The global results state the scarce knowledge about the CH by the diabetic patients of this assistance unit: almost half of them did not know the meaning of the term “carbohydrates” and only 10% reached an “acceptable” or “sufficient” score (more than 15 correct answers).

The statistical analysis reveals that having followed a specific education program is the main determining factor in the knowledge on CH identification, influencing also the individual’s cultural level. The fact that the advanced program is precisely more applied among young subjects, with T1D, high cultural level and with bolus-basal guideline would explain mostly the better scores of these groups of patients. It is also logical that if the patient has a higher instruction he might assimilate better the specific knowledge. There are a few studies that assess the factors related to the diabetological instruction level. Zafra et al.9 observed that the young patients had a better diet knowledge and that the frequency to the nursing consultations was the main factor related to these knowledge. A recent North American study observes that a worse score in the “numeral skill related to the diabetes” is associated to an older age, low socio-cultural level and less time of diabetological education.10

As regards to the therapeutic education programs in this attention unit, the study shows, better results in the specific advanced program as it is logical. The scarce effi-
ciency of the basic program as regards to the supply of knowledge about the CH explains why such program has focused more on the promotion of a Mediterranean diet low in saturated fats than on the identification of CH.

On the other hand, a high percentage of patients of this sample treated with multiple insulin doses have not received specific instruction about CH. In other words, in many cases we are carrying out a “pharmacology intensification” of the diabetes treatment that is not accompanied by a “diet intensification”. There are multiple barriers to fully develop the MNT in the attention of the diabetic patient: lack of attention to the physician regarding to the MNT, lack of nursing staff specialized in diabetes and lack of nutritionists, attention overload that conditions the limited times, complexity of the own MNT, scarce compliance of the education program by the patient, etc.

The principles of a DE program have to be the transmission of information and the promotion of attitude changes to achieve an adequate autonomy of the diabetic person.11 This study reflects that we are far from reaching such objective in most of the patients.

Finally, we think that the specific questionnaires about the identification and quantification of the CH might be useful in the clinical practice. They allow evaluating objectively and in a fast way the patient’s knowledge and detecting mistakes that otherwise might pass unnoticed, therefore they represent an adequate complement to the current education tools. Thus, the design and validation of these questionnaires supposes an interesting work line in the diabetology clinical investigation.

Declaration of potential conflict of interests

I. Ramos and J. Girbés state that there are no conflicts of interest as regards to the content of this article.

References