Original article

RESP

Effectiveness of therapeutic patient education on diabetes in prison*

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ABSTRACT

Objectives: Therapeutic education is one of the pillars of the approach to diabetes. The aim of this study is to evaluate the effectiveness of group therapeutic patient education in 15 people diagnosed with diabetes, with poor metabolic control, inmates of the Madrid III-Valdemoro Penitentiary Center (Madrid), whose population is exclusively male.

Material and method: Quasi-experimental study based on 4 training sessions aimed at a group of 15 people with diabetes and poor metabolic control. The intervention was carried out by 4 health professionals from the center. An evaluation of knowledge before and after the training and an assessment of the analytical and anthropometric parameters 5 months after the training were carried out. An anonymous self-evaluation questionnaire was also completed by the participants.

Results: After the intervention, a statistically significant reduction in weight, abdominal perimeter, glycosylated hemoglobin and diastolic blood pressure was obtained. The remaining parameters decreased non-significantly. The level of diabetes knowledge also improved significantly.

Discussion: The group intervention had a high potency in relation to the introduction of short-term changes in the group of patients with poor metabolic control.

Key words: diabetes mellitus; diabetes complications; patient education; health education; empowerment; prisons.

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INTRODUCTION

According to data from the International Diabetes Federation (IDF), The prevalence of diabetes disease in Spain stands at 14.8%, making it the European country with the second highest levels of prevalence, just behind Turkey¹. The percentage of persons diagnosed with diabetes in Spain has increased by 4.3% since 2019¹.

The prevalence of diabetes in prisons stood at 5.3% in 2014, according to data taken from the study "Prevalence of Chronic Diseases and Risk Factors in Spanish Prisons"². Bearing in mind the tendency towards an increase in diabetes, it is very likely that

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this percentage has been exceeded by a wide margin in the prison setting.

Diabetes *mellitus* (DM) is diagnosed when there is hyperglycaemia. However, this is the end result of many physio-pathological processes that lead to the inability of the pancreatic beta cells to secrete the quantity of insulin needed by the target tissues to meet their needs³.

This disease has classically been divided into several types: type 1, type 2, monogenic, druginduced secondary diabetes, diseases of the exocrine pancreas and gestational diabetes^{3,4}. Type 2 diabetes is the most common form since between 75% and 85% of patients diagnosed with diabetes are found to have this type³.

Type 2 diabetes is a disease where environmental and genetic factors play a role. The modifiable environmental factors include low activity levels and excess weight^{5,6}.

Adequate metabolic controls from the earliest phases of the disease are essential to avoid the so-called legacy effect⁷, which leads to an increased risk of long-term macrovascular and microvascular complications due to poor glycaemic control. This risk persists even when the disease is effectively controlled⁸. Such complications reduce quality of life and increase healthcare costs.

Traditional approaches to treating the disease, based on prescribing treatment regimens, offer no guarantees of compliance, which has a direct effect on defective metabolic control. Some studies on adherence to treatments for chronic conditions show figures for non-compliance of about 30% or more in terms of dosage^{9,10}. This has led to other approaches being established in the progressive transfer of disease management to the patient as part of a process known as empowerment¹¹.

The World Health Organisation declared in 1998 that the aim of therapeutic education is to train patients in self-management, in adapting the treatment to their own chronic disease and in coping skills and processes¹².

This type of educational intervention is designed for people with a disease, to prevent clinical symptoms and the complications and consequences they cause, unlike health education, which is a term used for primary prevention of the disease¹¹.

Diabetes treatment education (DTE) is not therefore an adjunct to therapy, but an integral part of it. It adds value to the treatment as a whole and, although it has traditionally been carried out by nursing professionals specialising in diabetes, it is not exclusively their domain: It can form part of the repertoire of any health professional who attends patients, showing increased efficacy when it is developed by multidisciplinary teams¹³.

DTE can be conducted individually or in group formats, as both approaches have been found to be equally effective and can complement each other¹⁴.

Four critical moments have been established for evaluating the support and educational needs for selfmanagement of diabetes¹⁵: the time of diagnosis; once a year and/or when treatment objectives are not met; when factors arise that complicate the disease, and in patient care transitions, which include incarceration.

The content of DTE should be geared towards treatment (diet, physical activity and drug therapy), self-management (weight, self-analysis, management of acute complications and drug adherence) and foot care¹⁴. Smoking cessation strategies should also form part of DTE programmes, given the increased cardiovascular risks smoking has for persons with diabetes¹⁵.

Generally speaking, the target for glycosylated haemoglobin (HbA1c) in persons with type 2 DM should be <7%. A lower level can be applied to younger persons, as long as this does not lead to hypoglycaemia and weight increases are avoided. On the other hand, higher levels of HbA1c (<8%) are acceptable amongst fragile elderly individuals with a high risk of hypoglycaemia^{16,17}.

This study sets out to evaluate the efficacy of a group treatment education intervention amongst 15 persons diagnosed with DM with HbAc1 levels of \geq 7%, who are inmates at Madrid III-Valdemoro Prison.

MATERIALS AND METHODS

This quasi-experimental study was carried out at Madrid III-Valdemoro Prison, whose resident population is exclusively male, over a period from 01/03/2022 to 30/09/2022. The study consisted of a DTE intervention with a group of 15 persons diagnosed with DM, whose metabolic control was deficient (HbAc1 \geq 7%). Five months after the intervention, changes in the patients' anthropometric and analytical results were assessed, along with any improvements in patients' knowledge of the disease.

Sampling

Purposive sampling was carried out on the population of inmates with the following inclusion criteria: diagnosed with DM and figures of HbAc1 \geq 7% from an analysis taken no more than three months previously.

The exclusion criteria were: difficulties in understanding Spanish or severe hearing problems that would make it difficult to participated in the sessions.

A group of 15 persons voluntarily agreed to participate in the study and signed an informed consent; one person refused to participate.

Ethical considerations

All the participants were informed in detail about the relevant aspects of the study, and what their participation consisted of, the absence of any prejudice or harm to inmates in terms of health or regulations for not accepting participation and the right to revoke participation at any time during the study.

They were informed that the data would be obtained, processed and analysed in accordance with General Data Protection Regulation 2016/679, of 27 April, and Organic Law 03/2018, of 5 December, on Protection of Personal Data and Guarantee of Digital Rights, and Law 41/2002, of 14 November, on the regulatory basis for patient autonomy, rights and obligations with respect to clinical information and documentation. To meet the above requirements, all

Table 1. Anonymous self-evaluation questionnaire of the activity.

the records, on paper and digitalised, were suitably anonymised to ensure that the participants could not be identified.

Instruments

To evaluate the level of knowledge of diabetes, the DKQ-24,or *Diabetes Knowledge Questionnaire-24*¹⁸ was used. This is a reduced version of the original questionnaire validated for use with a Spanish speaking population in the *the Starr County Diabetes Education Study* (1994-1998)¹⁹, which contains 60 items and is used in Spanish and English. The reduced version of this questionnaire consists of 24 items with three response options (yes, no and don't know). The main aim of the questionnaire is to evaluate the general level of knowledge amongst persons with diabetes about the disease, the associated complications and the data that indicates adequate or insufficient glycaemic control.

An ad hoc questionnaire was used to assess the level of satisfaction with the educational activity, consisting of the nine questions that appear in Table 1. These were evaluated with a Likert scale of 1 to 5, where 1 was the most negative value and 5 was the most positive. The aim of this questionnaire was to evaluate the participants' perspective of aspects of the workshop such as the content used, the quality of the facilities, the suitability of the technical resources used and the participants' perception of what they learnt.

Variables

The independent variables were: age in years, type of diabetes, period of evolution of the disease,

What is your overall satisfaction with the diabetes workshop?	1	2	3	4	5
Were the subjects interesting?	1	2	3	4	5
Were the subjects and issues clearly explained?	1	2	3	4	5
What did you think of the technical resources used in the course?	1	2	3	4	5
What did you think of the facilities where the workshops took place?	1	2	3	4	5
Give a score for the quality of the documents.	1	2	3	4	5
What do you think of the duration of the course?	1	2	3	4	5
Give a score for the knowledge acquired in the workshops.	1	2	3	4	5
Score you motivation for caring for your health after this course.	1	2	3	4	5

Note. 1 is the most negative score and 5 is the most positive one.

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smoker, serology of human immunodeficiency virus (HIV), complications from diabetes (retinopathy, cardiopathy, nephropathy, dermopathy, erectile dysfunction and fatty live), drug therapy.

The dependent variables were: HbAc1, total cholesterol, high density lipoprotein (HDL) cholesterol, low density lipoprotein (LDL) cholesterol, triglycerides, weight, body mass index (BMI), abdominal girth, blood pressure, glomerular filtration and level of knowledge of diabetes.

Description of intervention

Firstly, the data in the participants' clinical history was collected. This included the independent variables, the anthropometric data and results of the analyses that appeared in the study.

The data was recorded in a sheet designed for this purpose. A personal interview was conducted to ask question about any aspects of the clinical history that were unclear. The participants then completed the validated questionnaire about their knowledge of diabetes (DKQ-24¹⁸), which consisted of 24 items and was assessed on the basis of the number of correct answers. This instrument was used to establish the participants' initial level.

An educational intervention was then carried out, consisting of a workshop divided into four sessions of an hour and a half each one over four consecutive weeks. The subject matter was:

- Physiopathology of the disease, drug therapy and adherence.
- Diet, exercise and adapting them to different life situations (celebrations and alcohol consumption, periods of disease, immobility, etc.).
- Correct insulin injection techniques, managing acute complications, preventing chronic complications, importance of giving up smoking.
- Foot care (hygiene, moisturising, cutting nails, self-inspection, selecting footwear) and measures to take when ulcers and wounds appear. All the participants' feet were examined in this session.

Four professionals participated in the workshop: a pharmacist and three nurses, one of whom was also a podiatrist. They all formed part of the prison healthcare team. The seats were arranged in a semicircle in all the sessions to facilitate interaction between participants and professionals. The materials used in the course were audiovisual, and consisted of four Power Point presentations prepared specifically for each session.

When the course was completed, the participants individually completed the DKQ-24 questionnaire once again, to evaluate what the participants had learned from the intervention. Finally, the participants completed an anonymous, selfadministered questionnaire, consisting of the nine questions that appear in Table 1, to evaluate their level of satisfaction with the intervention.

Five months after the educational intervention, the most recent anthropometric and analytical data in the patients' clinical history, which form part of the habitual clinical monitoring for inmates at Madrid III-Valdemoro Prison, was assessed for any possible changes.

Administrative authorisation was received from the General Secretary of Prisons to carry out this study.

Statistical analysis

The qualitative variables were measured using absolute and relative frequencies; while the quantitative variables were measured by applying arithmetic averages with their corresponding standard deviations (SD). The significance of the results was evaluated using Student's t test, comparing the means for dependent samples, with a confidence interval of 95%. The statistical analysis was carried out with the Stata version 17 statistical package.

RESULTS

Sociodemographic characteristics

The average age of the group that participated in the intervention was 49 years (SD: 11.38). 100% of them were male.

Clinical characteristics

73.3% had type 2 DM, the disease had evolved for more than 10 years in 53.3% of the cases, 40% were smokers, 73.3% were overweight or obese (mean BMI of 29 kg/m², SD of 4.61) and 13.3% gave positive in the results of the HIV test.

As regards the complications associated with diabetes, 20% suffered from erectile dysfunction, 20% had some type of dermopathy, followed by retinopathy (13%), and cardiopathy, nephropathy

and fatty liver at 6.7%. 36.4% of the type 2 diabetics were undergoing treatment with insulin, as well as oral antidiabetics.

Data on participation

Participation in the course was 86.7% (13), with an average attendance of 2.73 sessions. Three cases were lost during the follow up: one was released while the other two were transferred to another prison.

Changes in the study variables

Table 2 shows the anthropometric and analytical changes found after the course, and their statistical significance. The results of the DKQ-24 knowledge test can also be seen.

Table 2. Results.

As Figure 1 shows, 100% of the participants gave very positive scores (4-5) for most of the items. The only scores that were equal to or less than 3 in percentages under 10% appeared in aspects such as increased knowledge, suitability of facilities and clarity of explanations.

DISCUSSION

The group DTE intervention was highly effective in introducing short-term changes in the group of persons with a diagnosis of diabetes and poor metabolic control at the Madrid III-Valdemoro Prison. This is demonstrated in parameters such as the HbAc1, BMI and diastolic blood pressure, where reductions were

Variables	Measurement	Mean	SD	Difference in means	Difference in SD	Student t	Value p
BMI (kg/m²)	1 ^a	28.83	5.08	- 2.25	2.18	3.58	0.0043*
	2ª	26.58	3.75	2.23			
Abdominal girth (cm)	1 ^a	102.73	14.8	- 3.64	4.7	2.57	0.028†
	2ª	99.09	12.73	5.04			
HbAc1 (%)	1 ^a	9.37	1.81	- 1.41	1.34	3.1654	0.009*
	2ª	7.96	1.65				
Systolic BP (mmHg)	1 ^a	129.3	13.73	- 7.67	19.97	1.57	0.1458
	2ª	121.67	16.08				
Diastolic BP (mmHg)	1 ^a	81.08	11.54	- 8.42	9.05	3.22	0.0081*
	2ª	72.67	8.34				
Total cholesterol (mg/dL)	1 ^a	177.75	46.93	- 2.08	36.78	1.89	0.0852
	2ª	157.67	39.54				
C-HDL 1 (mg/dL)	1 ^a	47.82	19.69	0.45	6.38	-0.24	0.8179
	2ª	48.27	17.73				
C-LDL 1 (mg/dL)	1ª	100.09	43.57	- 13.64	33.57	1.35	0.2077
	2ª	86.45	31.47				
Triglycerides (mg/dL)	1ª	144.75	68.44	- 30.42	65.13	1.62	0.134
	2ª	114.33	46.36				
Glomerular filtration (mL/min)	1ª	81	16.27	- 0.67	1.97	1.17	0.2657
	2ª	80.33	15.88				
Test DKQ-24 (no. of correct answers)	1 ^a	14.9	2.51	1.9	2 08	-2.89	0.0179+
	2ª	16.8	2.35		2.00	2.07	0.01/ /

Note. *p < 0.05 significant. †p < 0.01 very significant. †p < 0.05 significant.

DKQ-24: diabetes knowledge questionnaire 24; DS: standard deviation; HbAc1: glycosylated haemoglobin; C-HDL: high density lipoprotein cholesterol; IMC: body mass index; C-LDL: low density lipoprotein cholesterol; BP: blood pressure.



Figure 1. Anonymous assessment by participants.

found that were highly significant in statistical terms; abdominal girths were also significantly reduced. The level of knowledge about diabetes amongst the workshop participants likewise showed a statistically significant increase.

The items of the self-administered questionnaire showed a very positive response to the activity, with high scores (4-5) in 100% of the cases in overall satisfaction with the workshop. There were also high scores (4-5) in 100% of cases in terms of increased motivation for self-care after completing the activity. One interesting point to note is that 10% of participants found it difficult to understand the information.

A notable finding made after comparing the results of this study with others obtained from similar studies on the population outside prison is that in the study *"Efectividad de un programa de educación grupal estructurada en personas con* diabetes mellitus tipo 2"20, course attendance was also very high, showing a sustained and significant improvement of glycosylated haemoglobin 6 and 12 months after the intervention and high satisfaction levels amongst the course participants, as is the case in this study. The study carried out by Roselló-Araya²¹, on the effect of the methodology of therapeutic education on persons with type 2 diabetes showed a significant improvement in the glycaemic parameters (fasting and postprandial glycaemia and HbA1c), triglycerides and the abdominal girth after educational intervention. The systematic review by Nazar et al.22 on the efficacy of diabetes education and awareness raising with regard to DM showed that there were 11 studies in which education about diabetes improved glycaemic control and levels of knowledge levels about the disease amongst patients, which is an identical finding in this study.

Limitations and future research

One limitation of this study is the fact that it was carried out on a solely male population, given that it was impossible to include women in what is a maleonly prison.

Another limitation was the absence of a control group, so the changes found cannot be attributed solely to the intervention.

One final limitation that should be taken into consideration is the small size of the sample, although it should also be borne in mind that finding a sample of persons diagnosed with diabetes and poor metabolic control in a prison somewhat reduces the possibilities of finding a large sample.

It would be interesting to evaluate maintenance over time of the changes observed in this study using new measurements of the parameters. Another recommendation would be to carry out a specific intervention on smoking cessation to help smokers who want to give up.

Subsequent courses on diabetes would require greater homogenisation of the groups of participants, which would facilitate the process of adapting the knowledge levels to make them more accessible.

Future studies on the prison population should also include female participants, and a control group should be established to more effectively assess the importance of any changes that are found.

Conclusions

Group therapeutic education is a useful tool for improving the metabolic control of persons with diabetes, by improving the level of knowledge of the disease that they suffer from and increasing their motivation to engage in self-care. It is therefore vitally important to include such interventions as a part of diabetes treatment to prevent or delay that onset of complications caused by poor metabolic control.

CORRESPONDENCE

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