Hormones (2018) 17:113–117
https://doi.org/10.1007/s42000-018-0005-9

ORIGINAL ARTICLE

Conversation Maps™, an effective tool for the management of males and females with type 2 diabetes and mildly impaired glycemic control

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Received: 22 January 2018 / Accepted: 31 January 2018 / Published online: 16 April 2018

Abstract

Purpose The purpose of this study is to evaluate the effectiveness of the educational tool, Conversation Maps™ (CM), combined with a weight loss program, in improving metabolic control of as well as knowledge about diabetes, in a population with type 2 diabetes (T2DM) with mildly impaired glycemic control.

Methods This is a longitudinal observational study in which 66 subjects, aged 67.8 ± 7.93, were included either in the educational program with CM, once weekly for 4 weeks (T4), combined with a weight loss regime (group A, $n = 32$), or in standard care with a weight loss regime (group B, $n = 34$), both followed for 3 months (T3M) after T4.

Results At T4, both groups A and B had significantly lost weight and reduced waist circumference. However, group B did not lose weight or reduce waist circumference at T3M compared to T4. At T3M, only group A significantly lowered glycated hemoglobin (A1c) from baseline. At T3M, only group A had a significant increase in knowledge on diabetes therapy and foot care.

Conclusions CM may also play a significant role in T2DM characterized by mildly impaired glycemic control. Moreover, a systematic use of CM could be suggested for management of diabetes together with lifestyle changes and a weight loss diet.

Keywords Conversation maps · Education · Diabetes

Introduction

Negative lifestyle changes, the reduction of regular physical activity, and the consequent obesity pandemic are increasing the number of people with type 2 diabetes (T2DM) worldwide. According to the International Diabetes Federation (IDF), 415 million people currently have diabetes and this number is expected to rise to 642 million by 2040 [1]. The American Diabetes Association (ADA) estimated the economic cost of diabetes in the USA for 2012 to have been $US 132 billion; this figure is projected to increase to $US 245 billion by 2022 [2].

The Diabetes Conversation Map program

Based on ample evidence that group diabetes education is more efficacious than individual as well as the fact that diabetes is a complex chronic disease demanding active involvement of patients in its management, a program has been developed promoting diabetes self-management that educates and empowers the patient. This is known as the "Diabetes Conversation Map program" consisting of conversation maps (CM), a tool created by Healthy-Interactions in collaboration with the IDF Europe. The program, which is currently being used in 105 countries in 34 different languages, includes two formative steps: (1) healthcare professionals' (HCP) training through continuous education in medicine (CMe) and (2) patients' education by trainers. Diabetes conversation maps comprise a simple and consistent delivery of educational therapy. This program is patient-centered and conversation-based and composes a verbal and visual learning journey. Through the active involvement of

Preliminary results were presented at the 73rd Scientific Sessions of the American Diabetes Association, San Francisco, CA, USA.

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the patient, conversation maps facilitate patients' diabetes knowledge by improving their awareness about the disease, health self-management, and treatment adherence. The program consists of four maps: each CM includes images and metaphors reproduced on a card table focusing on a specific topic (living with diabetes, how diabetes works, healthy habits, and starting insulin treatment) [3]. The interactive discussion about each map facilitates group education resulting in patient empowerment. Furthermore, it facilitates behavior change in people with T2DM [4]. Local certified trainers have also started educational sessions for patients with this new methodology [5]. However, there are a limited number of studies that have examined the influence of Maps™ on health outcomes [6]. Furthermore, though these studies have focused on patients with bad metabolic control, no robust evidence has been provided on T2DM subjects with mildly impaired metabolic control.

Aim

This is a longitudinal observational study to evaluate the efficacy of an educational program with Diabetes Conversation Map™ education tools combined with a weight loss regime compared to standard care for T2DM subjects with mildly impaired metabolic control.

Materials and methods

Sixty-six subjects with T2DM, 33 males and 33 females, mean age 67.8 ± 7.93 years, were recruited by doctors and dietitians from the outpatient at the department of the Unit of Endocrinology and Diabetes, University Campus Bio-Medico of Rome.

Inclusion and exclusion criteria

Eligibility criteria included T2DM and overweight or obesity (BMI > 25 kg/m^2) treated only with metformin. Exclusion criteria were insulin therapy, diabetes, chronic complications such as retinopathy, nephropathy, and neuropathy, participation in another educational program, and major disabilities. The trial was conducted in accordance with the Declaration of Helsinki and the Good Clinical Practice guidelines and approved by the Institutional Review Board of University Campus Bio-Medico of Rome.

Study design

Subjects' anthropometric measurements were taken and blood tests were performed for glycated hemoglobin (A1c) at baseline (T0). All participants were asked to fill in a validated questionnaire on diabetic knowledge [7] divided into different sections concerning diabetes care, such as glycemia, therapy, diabetic foot, and quality of life. They also answered a locus of control questionnaire [8]. Patients received a 1700-cal diet for women and a 1900-cal diet for men with 20% protein, 30% lipid, and 50% carbohydrate of total energy. Adherence to diet was measured via a food log that each subject had to complete immediately after meal consumption reporting food types and quantities. The subjects who wished to follow the educational program with CM combined with a weight loss regime (group A) were $n = 32$, while those who did not want to be included in the CM groups followed standard care combined with a weight loss regime (group B, $n = 34$). The subjects' baseline characteristics are displayed in Table 1. There were no significant differences in knowledge between the two groups at baseline (Table 2).

The intervention group (group A) was invited to attend a 75-min CM educational program once weekly for 4 weeks. The CM educational tool comprises four maps: living with diabetes, how diabetes works, healthy eating and keeping active, and starting insulin. They are designed as an educational tool for small groups of patients with the aim of improving diabetes literacy, decision-making, and self-management. At the beginning of each meeting, there was a 15-min session in which dietitians went over food diaries with patients to evaluate dietary habits, food choices, and physical activity. The educational sessions were held by a diabetologist, apart from that on "healthy eating and keeping active" which was supervised by a dietitian. Doctors and dietitians providing the map sessions were all certified expert trainers and educators. The control group (group B) was invited to standard care visits at the beginning of the intervention period (T0), after 4 weeks (T4), and at the 3-month (T3M) follow-up visit. At T4 and T3M, all subjects had their anthropometric measurements taken to assess weight loss and waist circumference reduction. At T3M, patients had blood tests for A1c values and were asked to fill in the abovementioned questionnaires once more.

Statistical analysis

Data analysis was carried out with the GraphPad Prism version 6.00 for Windows (GraphPad Software, La Jolla, California, USA). Baseline and follow-up differences between the two groups were analyzed using the unpaired *t* test. Differences within groups were analyzed with the paired *t* test.

Results

Student retention was satisfactory as participants from both groups attended most sessions, apart from three patients in the intervention group and two in the control group, who missed one appointment for health or family reasons. All participants completed the follow-up visits.

Table 1 Baseline subjects' characteristics of group A ($n = 32$) and group B ($n = 34$)

	Group A Mean ± SD	Group B Mean ± SD	p value
Age (years)	67.28 ± 6.52	68.29 ± 9.14	$p = 0.6081$
Body weight (kg)	85.20 ± 17.19	84.51 ± 18.72	$p = 0.8768$
Height (cm)	164.45 ± 8.71	161.5 ± 10.19	$p = 0.2121$
Body mass index (Kg/m^2)	31.4 ± 5.66	32.19 ± 5.09	$p = 0.5527$
Waist circumference (cm)	106.25 ± 17.6	105.47 ± 13.98	$p = 0.8423$
A1c % (mmol/mol)	7.21 (55) ± 0.89	7.54 (59) ± 1.04	$p = 0.1677$

Anthropometric measures

At T4, group A had significantly lost weight compared to baseline, from 85.20 ± 17.19 kg to 83.56 ± 16.95 kg ($p < 0.0001$) (Fig. 1). A significant reduction in waist circumference was also observed, from 106.25 ± 17.6 cm to 105.01 ± 17.31 cm ($p < 0.0001$). Group B had also significantly reduced body weight and waist circumference, respectively, from 84.51 ± 18.72 kg to 83.24 ± 18.62 kg ($p = 0.0078$) and from 105.47 ± 13.98 cm to 104.3 ± 14.09 cm ($p = 0.034$). However, group B did not lose weight (83.81 ± 18.58 kg) or reduce waist circumference (104.67 ± 14.49 cm) at T3M compared to T4. Group A too did not significantly lose weight at T3M (82.95 ± 16.09 kg, compared to T4, 83.56 ± 16.95 kg (p = ns), though they significantly reduced waist circumference, from 105.01 ± 17.31 cm to 103.73 ± 16.59 cm) (p = 0.01909).

Metabolic improvement

At T3M, group A significantly reduced A1c [% (mmol/mol)] from baseline [7.21 (55) ± 0.89 to 6.54 (48) ± 0.76; $p < 0.0001$] (Fig. 2). Group B did not improve glycemic control [7.54 (59) ± 1.04 versus 7.48 (58) ± 1.03; p = ns].

Diabetes care knowledge

Both groups showed internal locus of control and there were no significant differences at baseline and at T3M between groups. Quality of life scores were positive and did not differ between groups at all times. Knowledge assessment was analyzed and one point was given for every correct answer, while incorrect answers were given zero points. Mean scores were compared using the t test. At T3M, knowledge about glycemia increased in both groups compared to baseline, respectively, group A from 6.09 ± 2.51 (T0) to 9.14 ± 1–77 (0.0002) versus group B from 6.27 ± 2.27 (T0) to 8.36 ± 1.4 ($p = 0.0007$). Moreover, group A increased knowledge on diabetes therapy ($p = 0.0212$) and foot care ($p < 0.0001$), while group B did not increase knowledge on these topics.

Discussion and conclusions

Discussion

It was shown that Conversation Maps™ may represent a valuable tool to improve metabolic control also in subjects with mildly impaired metabolic control.

Several trials have analyzed the effects of CM in patients with T2DM. In 2010, the Italian study of Ciardullo et al. [5] observed clinical outcomes in 63 patients after 3 months of behavioral therapy including the use of CM. After this course, several clinical parameters improved: fasting glycemia, A1c, and BMI were reduced. Some studies compared instead the effectiveness of CM education tools versus regular care of adults with T2DM. The prospective multisite randomized control trial of Hillen et al. [9] studied adults from Minnesota and New Mexico with these criteria: T2DM, A1c in the last 6 months of 7% or higher, and no therapy with group education (GE) in the last 2 years or with individual education (IE) in the last year. Patients were randomized to (1) GE (using the US Diabetes Conversation Map program) including 243 patients, (2) IE (246 patients), or (3) usual care (UC) (134 patients).

Table 2 Subjects' knowledge scores at baseline of group A ($n = 32$) and group B ($n = 34$)

	Group A Mean score ± SD	Group B Mean score ± SD	p value
Glycemia	6.09 ± 2.51	6.27 ± 2.27	ns ($p = 0.8089$)
Therapy	3.09 ± 1.26	3.04 ± 1.33	ns ($p = 0.9003$)
Diabetic foot	6.33 ± 1.96	6.77 ± 2.20	ns ($p = 0.4940$)

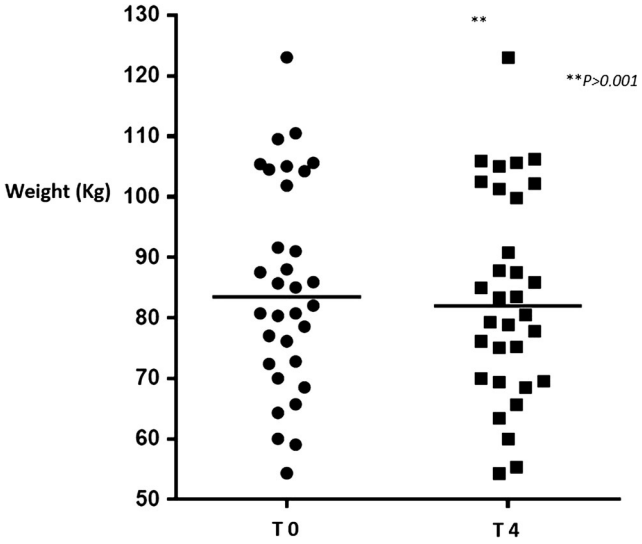

Fig. 1 Group A ($n = 32$): weight loss and waist circumference reduction from T0 to T4

IE represented the approach used traditionally for follow-up diabetes education. Patients were planned for three individual 1-h sessions with the certified diabetes educators at approximately 1-month intervals. GE consisted of 2-h sessions with groups of 8–10 patients planned at 1-week intervals. A1c improved in all groups, but significantly more with IE (− 0.51%), than with GE (− 0.27%) and UC (− 0.24). The number of patients with follow-up A1c concentration lower than 7% was higher for IE (21.2%) than for GE (13.9%) and UC (12.8%). Another randomized comparative study of Penalba et al. [10] compared CM-based education with regular care in T2DM. Total knowledge scores were increased in both groups in comparison to the baseline value (CM = 56.8 and UC = 56.3) after 6 weeks and after 6 months, but they were significantly higher in the CM group as compared to the UC group (at 6 weeks CM = 72.3 versus UC = 63.3, at 6 months CM = 71.4 versus UC = 65.5). There were no significant differences in clinical outcomes between the treatments: median (IQR) decrease in A1c values from study start to visit 3 was − 0.1% in the CM groups and − 0.1% in the RC groups.

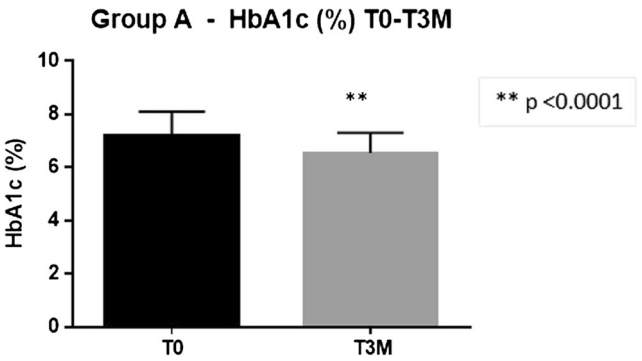

Fig. 2 Group A ($n = 32$): A1c reduction from baseline to T3M

These previous studies took into consideration T2DM subjects with poor metabolic control [A1c > 7.5% (58)] or did not have a well-matched control group (T2DM subjects without any specific diet). In the present evaluation, there was focus on the use of CM in patients with T2DM with mildly impaired metabolic control. Indeed, several studies have clearly shown that also a slight increase of A1c may be a good predictor of cardiovascular disease [11].

At T4, group A had significantly lost weight and reduced waist circumference and A1c compared to baseline and more than group B, demonstrating that more interest paid to patients in time and in quality of information could without doubt be an important component in the treatment of diabetes. Concerning internal locus of control and quality of life, no significant differences were found between group A and group B, but there was greater improvement in knowledge about the disease in group A than in group B.

There are several limitations in this study. In particular, sample size was quite small and recruitment was not randomized. Furthermore, it was not possible to evaluate actual adherence to the diet prescribed to each subject.

Conclusions

CM is an effective educational tool and its role is enhanced when combined with a weight loss program. Furthermore, its efficacy was demonstrated in a population with moderately well-balanced glycemic control. Obviously, it is recommended to have a tailor-made approach in treatment education based on the different features of each patient with diabetes.

Implications for research and practice

CM is highly likely to play a significant role in the future in diabetes management, especially in patients with moderately well-balanced glycemic control. Among this population, the patient-centered CM program should prove to increase its knowledge about diabetes and its complications; moreover, the skills and ability necessary for diabetes self-care need to be improved, leading to an acceptance of personal responsibility and long-term adherence. It thus appears reasonable to assume that a systematic use of CM, together with lifestyle changes and a weight loss diet, might become part of the standard management of diabetes.

Acknowledgements Francesca Mosaico and Elena Roncella contributed to our study during the recruitment phase.

Compliance with ethical standards

The trial was conducted in accordance with the Declaration of Helsinki and the Good Clinical Practice guidelines and approved by the Institutional Review Board of University Campus Bio-Medico of Rome.

Conflict of interest GD: nothing to declare; YMK: nothing to declare; CDR: nothing to declare; CS: nothing to declare; AM: nothing to declare; ARM: nothing to declare; AP: nothing to declare; PP: nothing to declare; SM: Lilly.

References

1. Federation ID. IDF Diabetes Atlas. Seventh edition ed 2015: www.diabetesatlas.org. Accessed 21/11/2017
2. (2014) Diagnosis and classification of diabetes mellitus. Diabetes Care 37(Suppl 1):81–90
3. Agrusta AFC, Rossi A, Scarpa L, 2009 Il programma educazionale strutturato Diabetes Conversation Maps nella gestione terapeutica del Diabete Mellito tipo 2. Paper presented at: Congresso AMD 2009; Rimini, Italy
4. Ghafoor E, Riaz M, Eichorst B, Fawwad A, Basit A (2015) Evaluation of diabetes conversation map™ education tools for diabetes self-management education. Diabetes Spectr 28:230–235
5. Ciardullo AV, Daghio MM, Fattori G, Giudici G, Rossii L, Vagnini C (2010) Effectiveness of the kit conversation map in the therapeutic education of diabetic people attending the diabetes unit in carpi, Italy. Recenti Prog Med 101:471–474
6. Srulovici E, Kay C, Rotem M, Golfenshtein N, Balicer R, Shadmi E (2015) Diabetes Conversation Maps and health outcomes: a systematic literature review. Value Health 1):A617–618
7. Vespasiani G, Nicolucci A, Erle G, Trento M, Miselli V (2002) Validazione del questionario sulla conoscenza del diabete GISED 2001. Giorn It Diabetol 22:109–120
8. Rotter JB (1966) Generalized expectancies for internal versus external control of reinforcement. Psychol Monogr 80:1–28
9. Sperl-Hillen J, Beaton S, Fernandes O et al (2011) Comparative effectiveness of patient education methods for type 2 diabetes: a randomized controlled trial. Arch Intern Med 171:2001–2010
10. Penalba M, Moreno L, Cobo A et al (2014) Impact of the <<Conversation Map>> tools on understanding of diabetes by Spanish patients with type 2 diabetes mellitus: a randomized, comparative study. Endocrinol Nutr 61:505–515
11. Lin Y, Xu Y, Chen G, Huang B, Chen Z, Yao L (2012) Glycated hemoglobin, diabetes mellitus, and cardiovascular risk in a cross-sectional study among She Chinese population. J Endocrinol Investig 35:35–41