Group patient education: effectiveness of a brief intervention in people with type 2 diabetes mellitus in primary health care in Greece: a clinically controlled trial

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Abstract

This study aims to assess the impact of a brief patient group education intervention in people with type 2 diabetes mellitus. The sample, 193 people with type 2 diabetes mellitus who were patients at the diabetic clinic of a primary health care setting in Attica, was assigned to two groups, intervention (138 individuals) and control group (55 individuals). The intervention group, instead of receiving standard care, attended a structured group educational programme using Conversation Maps while the control group had standard care. The main outcome measures were HbA1c, body mass index (BMI), triglycerides, high density lipoprotein (HDL), low density lipoprotein (LDL), measured at baseline and 6 months after the intervention. After 6 months, significant differences in changes of the studied parameters were observed between the groups in HbA1c, 1.4 (95% CI: 1.1, 1.7), (P < 0.001) and HDL, −4.4 (95% CI: −8.1, −0.8), (P < 0.001) in favour of group education. Within the groups, the intervention group presented a significant reduction in HbA1c, −0.6 (95% CI: −0.8, −0.3), (P < 0.001), in BMI, −0.7 (95% CI: −0.9, −0.1), (P = 0.007), in triglycerides, −21.1 (95% CI: −47.1, −9.9), (P = 0.003) and LDL, −10.0 (95% CI: −22.5, −5.7), (P < 0.001), while in the control group significant reductions were observed in HbA1c, −0.5 (95% CI: −0.5, −0.3), (P = 0.003), in HLD, −4.1 (95% CI: −7.7, −2.3), (P = 0.001) and in LDL, −9.4 (95% CI: −19.9, −3.9), (P = 0.018). Group-based patient education using Conversation Maps for people with type 2 diabetes is more effective, compared with individual education, in diabetes self-management.

Introduction

Diabetes Mellitus (DM) is one of the most costly chronic diseases worldwide. According to the International Diabetes Federation (IDF), 382 million people had diabetes in 2013 and this number is expected to rise to 592 million by 2035, while 175 million people remain undiagnosed. Ninety percent of these people suffer from type 2 DM [1].

Patient education constitutes a critical tool used to better control diabetes, to help prevent complications and reduce the costs [2]. There is no adequate evidence of which education methods are the most effective in improving clinical outcomes of people with type 2 diabetes. Group education has been characterized as a cost-effective alternative to individual education for diabetes [3]. Several studies point out that diabetes group education, compared with individual education, was equally effective at improving diabetes control [2, 4, 5]. A review of 11 studies points out that group-based education for people with type 2 DM has been shown effective in improving HbA1c, diabetes knowledge, reduction of systolic blood pressure levels, body weight and
requirement for diabetes medication [6]. Moreover, a recent systematic review with meta-analysis of 21 studies showed that group education had significant changes, compared with individual education in HbA1c in 6 months ($P=0.001$), in 12 months ($P=0.001$) and in 2 years ($P=0.000$). Also, according to the same study, significant changes were observed in fasting blood glucose in 12 months ($P=0.000$), diabetes knowledge in 6 months ($P=0.000$) and self-management skills in 6 months ($P=0.015$) self-efficacy/empowerment in 6 months ($P=0.012$) as well as weight in 12 months ($P=0.021$) [7]. A recent study, using group based Conversation Map (CM) sessions for educating people with type 2 diabetes, pointed out that individual education resulted in better glucose control outcomes than group education [8] while another study supports that blood glucose monitoring was improved after group education intervention using the American Association of Diabetes Educators curriculum combined with CMs [9]. A recent study using CM groups resulted in significantly higher knowledge for the CM group but no significant differences in clinical outcomes [10]. Moreover, Hwee et al. [11] supported that, compared with individual counselling, group self-management education was associated with fewer acute complications and some improvements in the care process. On the other hand, in Italy, HbA1c and body mass index (BMI) decreased significantly in patients with type 2 DM after attending a course using CM group education [12]. Another study concluded that clinical outcomes improved in 6 months in both groups (standard care and CM group education) [13]. Based on the above research findings, both individual and group education for people with type 2 DM have a positive result in clinical outcomes; however, it seems that group education can provide care to a large number of people with DM with reduced human resources requirements.

In Greece, existing evidence in assessing the effectiveness of diabetes self-management education, especially group-based education, is sparse and new studies are needed.

Objectives

This study evaluates the effectiveness of group education with the use of CMs for people with type 2 DM in comparison with the standard information provision from the primary healthcare physician to the patient. Specific objectives of the study include evaluation of:

- The changes in HbA1c,
- The changes in BMI,
- The changes in the lipidemic profile [triglycerides, high density lipoprotein (HDL) and low density lipoprotein (LDL)]

In the intervention study our main hypothesis was if the group education improved biochemical markers (HbA1c, BMI, triglycerides, LDL, and HDL) at a higher level than individual education.

Materials and methods

Participants

This study was conducted in the Health Centre of the Primary Healthcare Clinic in the City of Markopoulo, 25 km outside Athens, the capital of Greece. People with type 2 DM who have been regular patients of the physicians at the Health Centre participated in the study. The eligibility criteria included: people diagnosed with type 2 DM, living in the region, aged 18 and over, who did not suffer from hypertension or other serious diseases (heart, stroke, kidney or mental disease), did not take insulin, had not developed any complications, spoke and comprehended the Greek language sufficiently and were willing to participate.

Recruitment

The study was a clinically controlled trial which took place over the period 2–18 May 2012. Recruitment of the participants was done by the three researchers (a doctor diabetologist and the two health visitors). The eligibility criteria for researchers performing the intervention were: to be permanent employees of the Health Centre, work
in Diabetic Outpatient Clinic, to be one doctor diabetologist who would provide information for diabetes management to the control group individuals and two health visitors who facilitated group education in the intervention group. All patients who were registered on the outpatient list at the diabetic clinic were eligible to participate in the study. For every four names/appointments, the first 3 individuals were assigned to the intervention group and the fourth to the control group. The intervention group, instead of receiving standard care, would attend an educational group programme for diabetes management using CMs while the control group would only receive standard care in the context of their regular appointment including information and guidelines from their consultant on an individual level. Figure I show the CONSORT (Consolidated Standards of Reporting Trials) flow diagram.

Two hundred and twenty people were selected in total for the two groups, 165 of whom formed the intervention group and 55 the control group. Twenty seven out of the 165 participants of the intervention group were not included in the study either because they were on insulin therapy or suffered from serious diseases (16 people) or because they did not agree to attend the educational programme (11 people). Finally, 138 people participated in the intervention group and 55 in the control group, which gives us a total of 193 people participating in the study. The study sample size was estimated at 95% strength, to detect significant differences between the study groups with an effect size equal to 0.6 or more at 0.05 significance level.

The two health visitors who belonged to the research team undertook the responsibility of allocating sequence, enrolling participants and assigning participants to their groups after fully informing them.

Patient educational intervention

The intervention group participants, who instead of receiving the standard care attended an educational programme, were divided into 19 groups (3–8 people per group) and each group attended a 6-h educational programme, 2h per week each, and spread, in three sessions, over a period of 3 weeks. The education for all groups lasted from May to September 2012. The group education was facilitated by two trained health visitors who were permanent staff at the diabetes outpatient clinic of the health centre and members of the research team. Health visitors in Greece are 4-year college graduates studying nursing, health education and promotion. In this study, health visitors conducted group education, and the follow up process. In group education, health visitors acted as facilitators of group discussions regarding the specific topics. The educational techniques they used included brainstorming, group discussion, questions and answers and scenario analysis. The research protocol was assessed by the Director of the Health Centre.

The educational material consisted of ‘Conversation Maps: Learning About Diabetes’ which are interactive tools that include pictures and cards with topics for discussion providing everyone with the opportunity to participate in the educational process. This material is the product of a 3-year international collaboration between the Pharmaceutical Company Lilly and the company Healthy Interactions that works worldwide on health education, as well as the European Branch of the IDF [14].

The educational material consists of four visual maps (CMs) sized 91, 44 cm \times 152, 4 cm. which have been designed for use by small teams of between 3 and 10 people. CMs cover four issues about diabetes. However, in our study the first three were used, such as:

(i) ‘Living with diabetes’ which constitutes a review of diabetes and includes a description of what the disease is as well as some of the most widely spread myths about diabetes.

(ii) ‘How diabetes works’ gives the participants the opportunity to discuss in depth the pathophysiology of diabetes.

(iii) ‘Healthy diet and physical exercise’ which focuses on the changes the patients should make to their lifestyle in order to gain a
better quality of life and avoid or slow down potential complications.

In each educational meeting, the respective CM was put on a large table and the participants, together with the facilitator, sat around it.

**Outcomes**

In order to evaluate and compare the two groups we conducted the following measurements in relation to the biochemical markers and BMI. Recordings were taken at baseline—before the start of the
programme—and 6 months after its completion (follow-up), during the patients’ scheduled appointment.

**Biochemical markers**

- HbA1c (mmol/mol). Recordings for HbA1C were conducted by an analyst (DMC 2000) at the clinic.
- Triglycerides (mmol/l)
- HDL-cholesterol (mmol/l)
- LDL-cholesterol (mmol/l)

Blood samples were collected and analyzed by the Health Centre laboratory personnel. All participants of the study fasted hours before giving blood.

**Anthropometry**

BMI is calculated by dividing the weight (kg) with the square of the height (m²) and is used as an assessment indicator for obesity. Body weight and height of the participants were measured with digital scales (Seca) with an integrated measuring rod.

**Sample size**

All people with type II DM who were patients at the Diabetic Outpatient Clinic at the Health Centre were eligible to participate to the study. The sample size of this study was determined at 10% of the total number of people attending the Diabetic Clinic the previous year (2200 individuals). Therefore, 220 individuals constituted the sample of this study.

**Ethical dimensions of the study**

Participants were asked to provide their written consent after they had been informed about the educational programme and the study. Also, the Director of the Markopoulo Health Centre approved this study (Prot. No.1712/2012).

**Statistical methods**

Average values (mean) and standard deviations (SD) were used to describe the continuous variables. Absolute (N) and relative (%) frequencies were used for the description of categorical variables. For the comparison of proportions chi-square and Fisher’s exact tests were used. In order to compare continuous variables between the two groups the Student’s t-test was used. Analysis of covariance adjusted for baseline value was used to evaluate between-group differences for the study variables. Paired t-tests were used to estimate changes within each study group by comparing baseline and follow-up values. Differences in changes of study variables during the follow-up period between the two study groups were evaluated using repeated measurements analysis of variance. All reported P values are two-tailed. Statistical significance was set at P < 0.05 and analyses were conducted using SPSS statistical software (version 17.0).

**Results**

**Recruitment**

Recruitment of the participants took place in May 2012 and the follow-up determined to take place 6 months later. Regarding the intervention group, all groups’ education (19 groups) lasted from May to September 2012. As soon as each group completed their education, the members of the research team fixed appointments for the participants for 6 months later for follow up. Therefore, follow-up period lasted from November 2012 to March 2013. Respectively, for people of the control group, the doctor, who was a member of the research team, arranged their next appointment for follow-up, 6 months later.

**Baseline data**

The sample consisted of 193 persons, who were divided into two groups. 28.5% of all participants (N = 55) constituted the control group and the remaining 71.5% (N = 138) the intervention group.

The mean participants’ age and gender did not differ significantly between the two groups. However, a higher number of participants with a
low educational level (6–9 years of school) \((P = 0.050)\), with less years since diabetes diagnosis \((P = 0.035)\) and with a lower mean value of HbA1c \((P < 0.001)\) participated significantly in the intervention group. Moreover, a higher percentage of people in the intervention group had values of HbA1c < 7 mmol/mol \((P < 0.001; \text{Table I})\).

**HbA1c**

Although between the groups a statistical difference was observed in favour of the intervention group, both groups had significantly lower values at follow up. Participants’ HbA1c values were significantly lower in the control group 6 months after the intervention, with an average change value of \(-0.5 \ (95\% \ CI: -1.4, -0.3)\). Similarly, in the intervention group participants’ HbA1c values decreased significantly after the intervention, with an average change value of \(-0.6 \ (95\% \ CI: -0.8, -0.3; \text{Table II})\). Additionally, 6 months after the intervention, the increase in the percentage of people with HbA1c < 7 mmol/mol was statistically significant only in the intervention group \((N = 27, 28.7\% \text{ before and } N = 4, 3.8\% \text{ after}) \ (P < 0.001)\).

**Body mass index**

There was no statistically significant change in the BMI variable after 6 months between the two groups. However, in the intervention group participants’ BMI decreased significantly after the intervention, with an average change value of \(-0.7 \ (95\% \ CI: -0.9, -0.1)\) while in the control group no statistical change was observed (Table II).

**Lipidemic profile**

Only HDL presented statistical change between the groups \((P = 0.003)\). Within groups, the intervention group presented a statistically significant decrease of the triglycerides value \((P = 0.003)\) and in LDL \((P = 0.001)\). On the other hand, HDL values \((P = 0.001)\) and LDL \((P = 0.018)\) decreased significantly after 6 months in the control group (Table II).

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**Discussion**

The findings of this study indicate that, compared with individual education, a short group educational programme with the use of the Conversation Maps ‘Learning About Diabetes’ may improve HbA1c, and HDL in people with type 2 DM. Significant changes between the groups presented by HbA1c and HDL in favour of group education. Within groups, participants in the control group only improved HbA1c and LDL and decreased HDL while participants in the intervention group improved most of the parameters that were measured (HbA1c, BMI, triglycerides and LDL).

**HbA1c**

In our study, a significant change between the two groups was observed in favour of the CM group, although both study groups significantly improved HbA1c. A1 c was reduced by 0.60 ± 1.1 U in the intervention group and by 0.50 ± 1.7 U in the control group. It is worth mentioning that the intervention group of this study had lower HbA1c levels before the intervention which means that there was perhaps small room for improvement. However, this observation cannot be attributed to the educational procedure due to the limited size of the study.

Regarding group education for people with type 2 DM using CMs, studies are contradictory. Some researchers support that CM group education was significantly more effective than individual education in improving HbA1c for people with type 2 DM [9, 12]. Another study in Spain and Germany, comparing the effectiveness of CMs versus standard care of adults with type 2 diabetes, concluded that clinical outcomes improved in 6 months in both groups (CMs and control) and countries [13]. On the other hand, another study concluded that individual education for people with type 2 DM is more effective in HbA1 control than group education using CMs [8].

Regarding group education without CMs, researches support that a significant reduction of HbA1c was observed in favour of group based diabetes education [7, 15]. Of course, other studies point out the opposite. An older study by Aubert
et al. [16] indicated that the reduction in HbA1c was 0.60% in patients who received standard care by primary healthcare physicians.

The time spent with the instructor appears to affect A1c reduction. Norris et al. [17] report that, in order to achieve a reduction of 1% for A1c, 23.6 h are required to be spent with the instructor. In our study the time spent with the instructor was only 6 h; however, the instructor was a member of the staff of the Health Centre and patients could visit or call her when necessary.

**Body mass index**

There was no statistical difference in the change in BMI between the two groups. This finding coincides with what another study reveals; that CM group discussion for type 2 diabetic people did not significantly modify BMI [18]. Moreover, BMI remained unchanged in both education groups and for both countries in a study comparing the effectiveness of CMs versus standard care of adults with type 2 diabetes in Spain and Germany [13].

In this study, however, a significant reduction of BMI within the intervention group was observed at follow-up. Ciardullo et al. [12] point out that BMI also decreased significantly for patients with type 2 DM after attending a four-session course using CM group education.

In a recent study in Greece, where educational sessions for people with type 2 DM were conducted...
in groups, medium weight loss was achieved without being statistically significant [19]. Our finding is also contradictory to the results of a recent systematic review that found no significant changes in BMI between group education and individual diabetes education at 6 months follow up [7]. Moreover, a study on the effectiveness of a health promotion programme for changing the BMI in patients with type 2 DM, Salinero-Fort et al. [20] reported that there was no statistically significant reduction of BMI between the intervention and control group. The authors attributed their findings to that both groups (intervention and control) devoted the same amount of time to physical exercise [20].

### Lipidemic profile

According to the results of our study, only HDL presented a significant difference between the two groups. Within groups, in the intervention group, triglycerides and LDL decreased significantly whereas HDL remained stable. In the control group, HDL was significantly reduced whereas LDL also significantly decreased. This finding is not in line with other researchers’ findings. In a recent study in people with type 2 diabetes, in participants who attended four CM group sessions there were no clinically relevant differences between experimental and control groups in lipids levels [13]. Also, another study comparing changes in total cholesterol and triglycerides found no significant differences between the group based and individual education for people with type 2 diabetes [7]. Similar results have been reported by other studies that evaluated the effectiveness of group education interventions compared with individual education in the primary health care setting in people with type 2 DM [21, 22].

According to our findings, group educational intervention constitutes a more effective method compared with providing individual information in the context of the Health Centre in order to improve BMI and HDL. A possible explanation for the significant improvement of only BMI and HDL and not the other clinical outcomes may be that group-based education with the use of CM may have enhanced

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**Table II. Risk factor changes (HbA1c, BMI, tryglycerides, HDL and LDL) for participants before and after the intervention between and within groups**

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Before intervention</th>
<th>After intervention</th>
<th>Between groups</th>
<th>Within groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td>Difference (95% CI)</td>
<td>P*</td>
</tr>
<tr>
<td>HbA1c (%) (mmol/mol)</td>
<td></td>
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</tr>
<tr>
<td>Control group</td>
<td>8.2 ± 1.6</td>
<td>7.7 ± 1.2</td>
<td>1.4 (1.1, 1.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Intervention group</td>
<td>6.9 ± 1.3</td>
<td>6.3 ± 0.6</td>
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<tr>
<td>BMI</td>
<td></td>
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<tr>
<td>Control group</td>
<td>33.3 ± 6.4</td>
<td>33.4 ± 5.7</td>
<td>1.3 (-0.5, 3.4)</td>
<td>0.117</td>
</tr>
<tr>
<td>Intervention group</td>
<td>32.4 ± 5.5</td>
<td>31.7 ± 5.5</td>
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<tr>
<td>Triglycerides (mmol/l)</td>
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<td></td>
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<tr>
<td>Control group</td>
<td>173.6 ± 123.2</td>
<td>171.9 ± 81.6</td>
<td>25.3 (-1.4, 52.0)</td>
<td>0.055</td>
</tr>
<tr>
<td>Intervention group</td>
<td>167.7 ± 99.9</td>
<td>146.6 ± 79.1</td>
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<tr>
<td>HDL (mmol/l)</td>
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<tr>
<td>Control group</td>
<td>46.9 ± 8.1</td>
<td>42.8 ± 9.5</td>
<td>-4.4 (-8.1, -0.8)</td>
<td>0.003</td>
</tr>
<tr>
<td>Intervention group</td>
<td>47.3 ± 11.9</td>
<td>47.2 ± 11.4</td>
<td></td>
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<tr>
<td>LDL (mmol/l)</td>
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<tr>
<td>Control group</td>
<td>120 ± 39</td>
<td>110.6 ± 40.7</td>
<td>-3.2 (-15.1, 8.6)</td>
<td>0.106</td>
</tr>
<tr>
<td>Intervention group</td>
<td>123.8 ± 40.1</td>
<td>113.8 ± 31.7</td>
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</tbody>
</table>

*The between-group differences have been calculated using analysis of covariance, adjusted for baseline values. **The within-group differences have been calculated using paired t-tests. The bold values are significant at <0.001 and 0.003.
the physical activity of people participating in the intervention group. Norris et al [17] comparing group and individual diabetes education resulted in that the impact may be more positive for group education for lifestyle programmes (interventions focusing on diet and physical activity) than for individual programmes.

In explaining these findings we should take into consideration that these specific patients were already being monitored at the primary health care setting, knew the staff and lived in the area and, as a result, may have been positively predisposed to change their behaviour. Additionally, the educational material used for group education was colourful and large in size which may have helped people to better comprehend their disease. Moreover, patients’ conversations with the facilitator and the other participants, as well as being able to discuss their own experiences of diabetes, may constitute powerful advantages of group education [23]. Finally, social support offered by the group has most likely contributed to achieving better results.

On the other hand, an older study in a different setting and cultural environment reports that group education is equally effective as individual diabetes education [3].

**Limitations**

This study has a number of limitations. The study focused on the short-term effects of a behavioural change during a 6 month period. Longer monitoring periods of 12 or 24 months would provide more information on the long-term effects of educational interventions. Moreover, allocation was not concealed and this may have introduced bias into the results. Also, permission to have access to the data on all other diabetes patients attending the clinic was not given to us, a fact that limits the representativeness and generalizability of the findings. Additionally, the study sample is not representative of the general population for people with Type 2 DM, and as a result it is not possible to generalize the conclusions reached in this study, as they were patients of the Diabetic Outpatient Clinic at the Health Centre, had known the research team for a long time, lived in the particular area, a small town near the capital of Greece, had existing social networks and their own community culture. This research should be replicated in different health or community settings to examine the effectiveness of group patient education with type 2 DM. Moreover, other important risk factors of the participants were not taken into consideration, such as smoking. Additionally, other success factors of the programme such as the excellent size of the group, the economic evaluation of group education in comparison to standard care as well as the efficiency assessment in relation to the resources available (money, personnel, etc) were not investigated. Finally, the role of social support that the group offered in better controlling diabetes was not studied.

**Implications**

Our findings show that diabetes is better regulated in patients who attended group education. Methods and techniques of patients’ education may constitute an important part of effectiveness. Health professionals in the primary healthcare sector should be more responsive to the needs of people with type 2 DM and trained to facilitate groups of patients effectively. Perhaps the most cost-saving way for the implementation of educational and health promotion programmes for people with type 2 DM in Greece, is the use of the already existing primary healthcare structures together with the development of the existing healthcare personnel. Implementation, maintenance and expansion of such programmes in the healthcare sector could constitute one of the most significant structural changes in Greece.

**Conclusions**

Up until now, according to evidence provided, it is not yet very clear if group education using CMs for people with type 2 DM is more effective than individual education in the improvement of clinical outcomes. The findings of this study show that a short educational programme in a group using the
Conversation Maps ‘Learning About Diabetes’ may be more effective than individual education in regulating HbA1c and HDL in people with type 2 DM. More research is needed to document the advantages of group education methods versus individual education for people with type 2 DM. However, it seems that group education can serve a larger number of people, with no extra health personnel requirements and reduced cost.

References