

Effect of a group-based intervention programme on self-efficacy in type 2 diabetes mellitus patients

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ABSTRACT

Aim: The aim of this study is to investigate the effectiveness of a group-based intervention of patients with T2DM on self-efficacy. The main objective of the study was to explore the appropriateness and feasibility of diabetes intervention as a motivational strategy to enhance self-care of patients with T2DM and its possible integration in primary care from health professionals.

Materials and Methods: A quasi-experimental study was conducted with a pre- and post-test design in an experimental group and a control group, in Larissa Greece, at the patients with T2DM during their regular visits in Primary Care Units.

Results: The study samples were comprised 2 groups from forty one patients each. None of the patients in either group had received intervention programme previously. The study was conducted throughout in 4 sessions during the period of 3 months. Self-efficacy scores in intervention group differed statistically significantly in all items before and after the experimental procedure, ($p < 0.05$). Intervention group achieved significantly higher scores compared with the control group in certain items (Diet, Medical therapy, Medication-feet check, and Physical activity $p = 0.001$, $p = 0.001$, $p = 0.001$ and $p = 0.007$, respectively).

Conclusions: Our study confirms the positive effect of a group-based intervention programme of patients with T2DM on self-efficacy. Future research should assess the viability of group-based intervention to be extended to more adults with T2DM in the community.

KEYWORDS: community, diabetes mellitus, diabetes self-efficacy, group intervention program

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) accounting for approximately 90% diabetes cases and is a chronic progressive disease with high prevalence, posing significant challenge to healthcare systems worldwide [1]. T2DM in Greece follows the prevalence patterns of other developed countries, and the estimated prevalence of type 2 diabetes in the population is 11,9% %, based on cases [2]. Since the demands and the integration of T2DM is mainly accomplished by patients, these lead to reduced well-being and discouraged [3]. Previous studies have found that persons with diabetes often lacked sufficient knowledge about their condition and reported poor self-care skills [4]. This would mean a high likelihood of diabetes complications leading to a reduction in quality of life, disability, or even death [5]. Self-care refers to the ability to promote and maintain health, prevent disease, and cope with illness, either independently or with the support of health care providers [6]. In addition to structuring the primary care provided, inclusion of a patient

education program including instruction in self-management skills show to be valuable [7]. Self-efficacy has been found to have a direct relation with self-care in T2DM therefore developing effective and efficient strategies to promote self-efficacy is important in order to prevent serious complications[8]. Many diabetes intervention studies have explored how challenging it is for diabetic people to maintain active self-efficacy [8]. There is a need to assess whether community-based interventions with a collaborative approach would also be effective in improving self-care among adults with T2DM in Greece, a region with the high prevalence for diabetes [9]. However, increasing patients' knowledge about their condition could potentially be the first step to enhancing diabetes self-care. Although there is some evidence that a program of structured primary care, such a group-based intervention programme is effective in improving self-efficacy on patients with T2DM, the findings are inconclusive and further investigation is necessary.

AIM

The aim of this study is to investigate the effectiveness of a group-based intervention of patients with T2DM on self-efficacy. The main objective of the study was to explore the appropriateness and feasibility of diabetes intervention as a motivational strategy to enhance self-care of patients with T2DM and its possible integration in primary care from health professionals. In T2DM, self-efficacy has been found to have a direct relation with self-care, in a way that this construct owns the predictability power of self-care behavior. Several tools have been developed and used for evaluating self-efficacy of diabetic patients, the most widely used being the Diabetes Management Self-Efficacy Scale (DMSES) [10].

MATERIALS AND METHODS

STUDY DESIGN

A quasi -experimental study was conducted with a pre- and post-test design in an experimental group and a control group, in Larissa Greece, in diabetic patients visiting public primary care units.

POPULATION AND SAMPLE

The study population consisted of a convenience sample of eighty two patients with T2DM. The study samples comprised forty one patients each group and created the Intervention (n=41) and Control (n=41) Group . Groups are randomly created alternaty in order visiting the primary care unit. The study was conducted throughout in 4 sessions during the period of 3 months and conducted by collecting data from the outpatient Primary Care Units, within its territory from November 2024 to January 2025. None of the patient in either group had participated in interventional program previously. Significance level ($\alpha = 0.05$), large level of significance (Cohen's $d = .70$), and test power (90%). Therefore, the subjects selected for this study met the required number.

INTERVENTION

The integration of the intervention programme began with the planning and development stage of the sessions, before the actual intervention programme and the design of every session took place. The Intervention Group participants, instead of receiving standard care, attended a structure 12 hours educational programme group in 4 sessions for 2 weeks. The intervention conducted in small groups of 10-12 people under the

guidance of family doctor. Initially, the first session was held with the patients in intervention group, where the objectives of the practice and the characteristics of the intervention programme were discussed. All participants were administered the questionnaires before the study and the same questionnaires were filled in at the end of intervention, and 3 months after, always with informed consent in detail about all the procedures and sessions of the study. Participation in the study was voluntary. Participants were informed that the questionnaires were anonymous and that they could stop participating in the research at any time. The clinical training took place at the outpatient primary health units of the public 5th Regional Health Authority of Thessaly and Sterea in Greece (IRB approval No:44729/23.05.2023).

THE GROUP-INTERVENTION PROGRAM

The Intervention Group participants, instead of receiving standard care, attended a structure 12 hours educational programme group in 4 sessions for 2 weeks. The health education lead by family doctor, community nurse, nutritionists and exercise included information on life-style modification, dietary strategies and exercise. Each session was designed for multidisciplinary education and collaborative learning, to teach knowledge and practical skills in diabetes self-care. The emphasis was on empowering individuals to make choices and lifestyle changes. The content and delivery format were designed using the group-based self-empowerment intervention.

A STRUCTURE 12 HOURS EDUCATIONAL PROGRAMME

On the first day the first session, the basic concepts of the intervention programme were introduced. The group-intervention was based on the Consensus Report of the American Diabetes Association [9]. On the first session participants have better understanding on overview of diabetes and perfume regular self-monitoring of blood glucose (BG). On the second session patients with T2DM identify common factors that influence their BG, list causes and common signs and symptoms of high and low BG and discuss ways to prevent and manage diabetes emergencies. At the third session discuss general principles of meal planning, identifying common food groups and preparation which can affect glycemic level and propose ways for dietary adjustment. On fourth session discuss benefits and safety precaution for exercise and physical activity, recap the key points for T2DM and self-care and summarize the intervention programme.

Table 1. Cronbach's alpha for GR-DMSES

	Number of items	Cronbach's alpha
GR-DMSES	20	0.93
Diet (items 4, 5, 9, 10, 13, 14, 15, 16, 17)	9	0.92
Medical therapy (items 1, 2, 3, 6, 18)	5	0.76
Medication and feet check (items 7, 19, 20)	3	0.70
Physical activity (items 8, 11, 12)	3	0.79

*GR-DMSES Greek version of the Diabetes Management Self-Efficacy Scale

Source: compiled by the authors of this study

Table 2. Cronbach's alpha for GR-DMSES during the intervention programme

Diabetes Management Self-Efficacy Scale	Pre Intervention	0.95
	Post Intervention	0.92
	3 months after Intervention	0.95
Diet	Pre Intervention	0.94
	Post Intervention	0.94
	3 months after Intervention	0.95
Medical Therapy	Pre Intervention	0.81
	Post Intervention	0.82
	3 months after Intervention	0.84
Medication and feet check	Pre Intervention	0.63
	Post Intervention	0.65
	3 months after Intervention	0.66
Physical therapy	Pre Intervention	0.88
	Post Intervention	0.91
	3 months after Intervention	0.90

Source: compiled by the authors of this study

Participants in the Intervention Group were divided into 3 groups (12-15 people per group) attended four sessions and each session lasting approximately 180 minutes. The purpose of the process evaluation was to explore the strengths of the intervention program and to obtain suggestions from the participants for future improvements.

ASSESSMENT TOOLS

All patients of both groups (intervention and control) were asked to fill in questionnaires both at the beginning and at the end of the study, and 3 months after which, in addition to demographic characteristics, included the validated Greek version of Diabetes Management Self-Efficacy Scale (GR-DMSES). The GR-DMSES contains four items Diet, Medical therapy, Medication-feet check and Physical activity. Responses

for all questions usually ranged from 1 to 5, Likert scale (5 = "Certainly YES", 4 = "Probably YES", 3 = "Possibly YES, Possibly NO" 2= "Probably NO" 1= "Certainly NO") with a higher summed scores are indicative of higher levels of self-efficacy in that domain. Based on the available literature this tool has been found to be a reliable and valid self-report measure of diabetes self-efficacy [10].

RECORD SHEET OF INDIVIDUAL CHARACTERISTICS

It included questions about demographic, social and educational characteristics, such as gender, age, marital status, the chronicity of the disease, and adherence to treatment based on self-report, concerning the frequency of skipping the treatment and its possible interruption.

Table 3. Demographical profiles and baseline data of study subjects

Characteristics	Group				P-value
	Control		Intervention		
	N	%	N	%	
Sex					0.83 ^a
Female	21	51.2	22	53.7	
Male	20	48.8	19	46.3	
Age	68.8	10.3	71.6	9.5	0.20 ^b
Marital status					0.57 ^a
Married	35	85.4	33	80.5	
Single	0	0	1	2.4	
Widowed	6	14.6	7	17.1	
Place of residence					0.001 ^a
Town	12	29.3	1	2.4	
Village	29	70.7	40	97.6	
Live with family					0.02 ^a
No	2	4.9	9	22.0	
Yes	39	95.1	32	78.0	
Education background					0.08 ^c
No formal education	2	4.9	3	7.3	
Primary level	24	58.5	28	68.3	
Secondary	2	4.9	5	12.2	
Postsecondary/junior college	8	19.5	3	7.3	
University and above	5	12.2	2	4.9	
Current working status					0.16 ^a
Private workers	5	12.2	1	2.4	
Public workers	6	14.6	2	4.9	
Self- employment	2	4.9	1	2.4	
Not working (Homemaker)	8	19.5	7	17.1	
Not working (Retired)	18	43.9	29	70.7	
Technicians/Farmers	2	4.9	1	2.4	
Monthly Household (€)					0.46 ^c
<600	18	43.9	19	46.3	
600-1000	14	34.1	17	41.5	
1001-1500	9	22.0	5	12.2	
Insurance Status					0.99 ^a
No	1	2.4	0	0	
Yes	40	97.6	41	100	
Body Mass Index (kg/m ²)	30.4	8.2	29.4	4.8	0.49 ^b
Waist circumference (cm)	107.4	16.8	104.3	13.8	0.37 ^b
Smoking					0.10 ^a
No	30	73.2	36	87.8	
Yes	11	26.8	5	12.2	
Daily number of cigarettes	4.9	9.6	1.9	5.9	0.09 ^d

^a chi-square test^b independent samples t-test^c chi-square trend test^d Mann-Whitney test

Source: compiled by the authors of this study

Table 4. Subscales Diet Medical Care Medication Exercise of DMSES

Independent variables	Coefficient b	95% interval of confidence for b	P-value
Item Diet			
Intervention	-3.56	-8.88 to 1.76	0.19
Time	1.65	0.65 to 2.67	0.002
Interaction of intervention and time	3.87	2.12 to 5.61	<0.001
Item Medical therapy			
Intervention	-1.28	-3.89 to 1.34	0.34
Time	0.82	0.14 to 1.49	0.02
Interaction of intervention and time	1.49	0.61 to 2.37	0.001
Item Medication and feet check			
Intervention	-1.47	-3.06 to 0.13	0.07
Time	0.50	0.10 to 0.90	0.01
Interaction of intervention and time	0.98	0.40 to 1.56	0.001
Item Physical activity			
Intervention	-1.69	-3.89 to 0.52	0.13
Time	0.82	0.29 to 1.33	0.002
Interaction of intervention and time	1.05	0.28 to 1.82	0.007

Source: compiled by the authors of this study

STATISTICAL ANALYSIS

We present categorical variables as numbers and percentages. Also, we use mean, standard deviation (SD), median, and interquartile range to present continuous variables. We used the Kolmogorov-Smirnov test and Q-Q plots to examine the distribution of continuous variables. Bivariate analysis included four statistical tests: (a) chi-square to compare two categorical variables, (b) chi-square trend test to compare one categorical with one ordinal variable, (c) independent samples t-test to examine mean differences between two groups when the continuous variable followed normal distribution, (d) Mann-Whitney test to examine median differences between two groups when the continuous variable did not follow normal distribution. To examine the impact of independent variables on the dependent variables, the Generalized Estimating Equations model was employed. This model is particularly suited for clusters of observations that vary over time, making it appropriate for longitudinal data, as it remains robust regardless of the distribution of the variables. The application of the Generalized Estimating Equations model allowed for the control of confounding effects. In this context, the b coefficients of the multivariable models, along with their corresponding 95% confidence intervals and p-values, are presented. P-values less than 0.05 were considered statistically significant. We used the IBM SPSS 28.0 (IBM Corp. Released 2021. IBM SPSS Statistics for Windows, Version 28.0. Armonk, NY: IBM Corp) for the analysis.

The GR-DMSES had an overall coefficient alpha of 0.93 (Table 1) The corrected item-total correlations indicated good correlations (different from zero) for all the items. Cronbach's alpha coefficients, for each of the subscales identified during the intervention programme, before intervention (pre-intervention), after the intervention (post-intervention) and after 3 months of the intervention (Table 2).

RESULTS

Each group comprised 41 patients (22 women in control group -54% and 21 women in intervention group-51%). Most participants were married, were retired and had primary level education. The 41 control participants had a mean age of 68.8 years old and 41 intervention participants had a mean age of 71,6 years old. The only variables in which the two groups differed were place of residence and mode of accommodation. More specifically patients living in the city from the control group was 29.3% and patients living in the city from the intervention group it was 2.4% (p=0.001). Patients living with others from the control group were 95.1% and from the intervention group patients were 78% (p=0.02). There was no other statistically significant difference regarding baseline demographic characteristics between the two groups (Table 3).

The GR-DMSES scores in intervention group differed statistically significantly in all subscales before and after the experimental procedure, in contrast with the

control group, since patients in the intervention group improved their scores in all four subscales $p < 0.05$).

Interventional group had a statistically significant higher score on the subscale diet, medical treatment, medication and exercise of Diabetes Management Self-Efficacy Scale compared to control group Table 4.

Regarding the intervention group, gender did not have an effect on explanation and inference. There was no effect of demographic variables on GR-DMSES subscale scores.

DISCUSSION

One reason for the poor outcomes in patients with T2DM is the lack of participation in the treatment of the disease and the low levels of self-care [11]. This participation is important factor in the treatment of T2DM that demands motivation, knowledge, and improve the self-efficacy [12]. The primary outcome variables showed a response to the intervention programme when compared with baseline data and included significantly increased self-efficacy of patients with T2DM [13]. The results of this study show that group interviewing can be an effective method of working with T2DM management, producing improvements in self-care.

According to the findings of the present study, group-based intervention programme on diabetic patients did have an effect on self-efficacy subscales (diet, medical treatment, medication and exercise) [14]. The importance of group-based intervention programme at all levels of self-efficacy on patients with T2DM has been recognized and a large literature has been generated on the subject. It was concluded that motivational interviewing was a highly acceptable intervention for increasing self-efficacy to change their behaviors [15,16].

This finding was similar to the other study where an intervention based on the integrated health management model including components such as skills training in health management among adults with T2DM [17]. In addition the results was similar to Lynch and colleagues finding, where the lifestyle intervention, a culturally

tailored program focusing on diet and physical activity, resulted in an increased nutrition knowledge and diet quality among adults with T2DM. Findings from the lifestyle intervention and the process evaluation results indicated the importance of teaching knowledge and skills on how to eat healthily was essential in facilitating self-care in general diet control among adults with T2DM [18]. In addition, higher levels of knowledge about diabetes have been found to predict higher levels of adherence to self-care behaviors among individuals with T2DM, because they would have a better understanding and be more motivated to perform self-care to manage their condition [19-21].

This study has several limitations.. The study population consisted of a sample of patients residing in the area of the rural medical center. Neither the small training duration nor the sample allow generalizing of our results. The results, which were based on the respondents' self-reported data regarding their self-management, their exercise and diet behavior, may have been subject to recall bias.

CONCLUSIONS

This study has demonstrated that a group-based intervention program designed to teach knowledge and practical skills in diabetes self-care. Goal setting and motivational interviewing could improve the self-efficacy, exercise and general diet among adults with T2DM. Therefore, diabetes care and education community partners, public health professionals, health promotion program planners, and policy makers who have an interest in improving diabetes self-care should work together to extend such programs to more adults with T2DM in the community. Applying the group-based intervention program to diabetic patients presents many advantages. We strongly recommend the incorporation of group-based intervention and motivational practices that systematically promote self-efficacy of patients with T2DM. This research provided evidence for future clinical practices in diabetes care.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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