Quality of life, knowledge and attitude after educational program for Diabetes

Qualidade de vida, conhecimento e atitude após programa educativo para Diabetes

Gabriela Menezes Gonçalves de Brito[1]
Cristiane Franca Lisboa Gois[1]
Maria Lúcia Zanetti[2]
Gabryella Garibalde Santana Resende[1]
José Rodrigo Santos Silva[1]

Keywords
Patient education; Health education; Diabetes *mellitus*, type 2; Quality of life

Descritores
Educação do paciente; Educação em saúde; Diabetes *mellitus* tipo 2; Qualidade de vida

Submitted
February 1, 2016

Accepted
July 21, 2016

Corresponding author
Gabriela Menezes Gonçalves de Brito
Marechal Rondon avenue, unnumbered, 49100-000, SE, Brazil.
gabriela.menezes.g@hotmail.com

DOI
http://dx.doi.org/10.1590/1982-0194201600042

Abstract

Objective: To assess the quality of life, knowledge about the disease and the attitude of individuals with type 2 diabetes mellitus before and after participation in an educational program.

Methods: Quasi-experimental study conducted with 110 patients seen at the clinic of a teaching hospital. In the Control Group subjects received routine care (n=74) and in the Experimental Group received routine care and participated in educational interventions (n=36). The WHOQOL-BREF and B-PAID were used to assess the quality of life; DKN-A to assess the knowledge and the ATT-19 to assess attitude.

Results: There was improvement in quality of life after participation in the educational program, particularly in social relations domain; decrease the suffering of living with DM and knowledge acquisition were statistically significant. Attitude increase was discreet.

Conclusion: The educational program for DM2 contributed to increase quality of life, with reduction of suffering; increased knowledge about disease, treatment and better coping the disease.

Resumo

Objetivo: Avaliar a qualidade de vida, o conhecimento sobre a doença e a atitude de indivíduos com diabetes mellitus tipo 2 antes e após participação em programa educativo.

Métodos: Estudo quase experimental, realizado com 110 indivíduos atendidos no ambulatório de um Hospital Universitário. No Grupo Controle, os indivíduos receberam o atendimento de rotina (n=74) e no Grupo Teste, além de receber o acompanhamento de rotina participaram das intervenções educativas (n=36). Foram utilizados o *Whoqol-bref* e o B-PAID para avaliar a qualidade de vida; DKN-A para avaliação do conhecimento e o ATT-19, a atitude.

Resultados: Houve melhora da qualidade de vida após participação no programa educativo, particularmente, no domínio Relações sociais; diminuição do sofrimento em viver com DM e aquisição de conhecimento estatisticamente significante. Na atitude o aumento foi discreto.

Conclusão: O programa educativo para DM2 contribuiu para o aumento da qualidade de vida, com diminuição do sofrimento; aumento do conhecimento sobre a doença, tratamento e melhor enfrentamento a doença.

[1]Universidade Federal de Sergipe, Aracaju, SE, Brazil.
[2]Escola de Enfermagem, Universidade de São Paulo, Ribeirão Preto, SP, Brazil.

Conflict of interest: there are no conflicts of interest to declare.

Introduction

Diabetes *Mellitus* (DM) is a chronic disease with upward growth curve. According to data from the International Diabetes Federation (IDF) in 2014, 387 million people were accounted with diabetes worldwide, corresponding to a prevalence of 8.3%. It is estimated that in 2035 the number will increase to approximately 592 million individuals. In the countries of North America and the Caribbean there are about 39 million people with the disease, giving a prevalence of 11.4%. In South and Central America the number is closer to 25 million people, with 8.1% prevalence.[1]

Among the countries of Central and South America, Brazil stands in first place in the ranking of DM cases in the age group of 20 to 79 years, accounting for about 12 million people.[1]

Among the types of DM, type 2 diabetes *mellitus* (DM2) is the most common and account for approximately 90 to 95% of all cases.[2]

Research results performed in all states of Brazil from a telephone survey reported that 24.4% of individuals aged equal and over 65 years reported a medical diagnosis of DM, which is the age group most affected by the disease. In the northeastern region of Brazil, 6.9% of people over 18 reported a medical diagnosis of DM. Additionally, according to the national trend, in the city of Aracaju, state of Sergipe, 7.2% of individuals in the same age group, reported having the disease.[3]

To maintain stabilized blood sugar levels and prevent chronic complications of the disease, it is important that the individual monitor blood glucose regularly, practice physical activity regularly, maintaining a healthy diet and take medication when necessary.[4,5] All this context surrounding the individual with DM2 can negatively impact quality of life (QOL).[6]

For the self-management of DM2, it is important that individuals are aware about the disease, its treatment and chronic complications. In this sense, empowerment and the attitude towards the disease are variables that have been related to the QOL of patients with DM2. It is believed that the greater knowledge he/she has about the disease and treatment, the more likely a positive attitude to adopt self-management of their health,[7] aspects that can be reflected directly or indirectly in its QOL.[8]

Health education is one of the low cost strategies used in the training of individuals with DM for self-management,[9] since it favors the acquisition of knowledge, encouraging the attitude of adherence beneficial to the disease and treatment, metabolic control, reduction of acute and chronic complications and, therefore, improved QOL.[10]

Thus, it is considered that the nursing care objective is to achieve the improvement of QOL of individuals and health education programs can positively add value to the acquisition of knowledge and the adoption of positive attitude towards the disease and treatment, reflecting, therefore, QOL. Thus, it is understood that investigating the impact of health education programs for individuals with DM can provide valuable information for service planning aimed at this population. Besides, encouraging the development of research involving the epidemiology of DM, new strategies for facing it is one of the items of the National Agenda for Research Priorities in Health.[11]

Although surveys have already been conducted to assess the QOL of individuals with DM living in the northeast of Brazil, it has not been identified study assessing the impact of health education on QOL, in the acquisition of knowledge and change of attitude of these individuals. This study aimed to assess QOL, knowledge about the disease and the attitude of individuals with type 2 diabetes before and after participation in an educational program.

Methods

This is a quasi-experimental study and the type was before and after, developed with individuals with

DM2 treated at the Endocrinology Clinic of the Teaching Hospital of the *Universidade Federal de Sergipe* (HU-UFS), from December 2014 to October 2015. This clinic covers approximately 250 individuals registered with DM2, who are consulted on a quarterly basis by a multidisciplinary team of physicians, nurses and nutritionist.

The subjects were divided into two groups: the control group (CG), consisting of individuals who received care by the multi-professional staff of the clinic and an Experimental Group (EG), composed of individuals who in addition to routine care from the clinic participated in the interventions proposed in the educational group.

All individuals who agreed to participate signed the Informed Consent Form. For the sample size we considered the 95% confidence interval and 5% error. We considered as a basis for calculating the maximum standard deviation obtained in specific instrument validation process used in this study to assess QOL.[12] The minimum sample consisted of 110 individuals, however, considering possible losses, a final sample of 122 individuals was established. For the study, the inclusion criteria were established: being 18 years or older, having the cognitive ability to understand and answer the questions of data collection instruments and living in the metropolitan area of Aracaju. It was also established discontinuity criteria for participants in the EG, presence in at least two interventions of all five proposals.

A total of 122 individuals were invited to participate in the EG, of those, 48 agreed to participate, however, considering the established discontinuity criteria, the final sample of this group was composed of 36 individuals, while the control group was composed of 74 individuals, that is, those who refused to participate in the educational group.

The recruitment of individuals with DM2 occurred from December 2014 to April 2015 and the interventions of the educational programs between the months of May to October 2015. In the first phase of the research, which took place before starting the intervention, data collection was carried out through interviews at that Clinic. In the second phase, and after completion of the proposed interventions by the education program for the EG, data collection took place at the clinic or at the home of participants, in the latter case when CG individuals did not attend to the scheduled return. In both phases of the study, interviews were conducted with 122 individuals, separated only by EG and CG.

For data collection we used five instruments, which were applied in both phases of the research: a questionnaire for sociodemographic and clinical assessment, a generic instrument and the other specific for assessment of QOL, an instrument for assessment of knowledge and the other to evaluate their attitudes. The first questionnaire contained the sociodemographic data (date of birth, gender, marital status, education level, complete formal education time, employment status, family income) and clinical (admission at the clinic, diagnostic time, glycated hemoglobin (HbA1c), postprandial glucose, fasting glucose, systolic blood pressure (SBP) and diastolic (DBP). The tests such as fasting glucose, HbA1c and postprandial glucose levels were obtained from the results of the tests requested by endocrinologists, since the test date was not more than three months old.

For the analysis of fasting glucose we considered abnormal value ≥126 mg/dl and for postprandial glucose ≥ 200 mg/dl[13] for HbA1c value considered as normal parameter close to 7%.[13] For blood pressure we used as a normal parameter: SBP <130 mmHg and DBP <85 mmHg.[14] The measurement of blood pressure was performed by auscultation, which identify the onset and disappearance of Korotkoff sounds, which correspond respectively to the SBP and DBP.[14]

The generic instrument to assess QOL was the WHOQOL-BREF[15] containing 26 questions, questions 1 and 2 on the overall QOL. The responses followed a Likert scale from 1 to 5, the higher the score the better QOL. Excepting the two questions on general QOL, the instrument has 24 facets, which are grouped into four domains: physical health, psychological health, social relationship and environment.[15]

The specific instrument to assess QOL was the Brazilian version of the Problem Areas in Diabetes Scale (B-PAID), composed of 20 questions that report emotional problems caused by the disease. [12] The scores are transformed on a scale from 0 to 100, where the maximum score is configured as greater suffering. The total score is obtained by adding the responses of 20 items of PAID multiplying by 1.25. For the analysis of the results it has a cutoff score of 40, with values equal to or higher indicating high degree of emotional distress.[12]

Knowledge can be defined as a set of information that the individual needs to learn to manage their health condition.[16] To assess the knowledge, we used the Diabetes Knowledge Scale (DKN-A). This is a self-administered questionnaire containing 15 questions, with multiple choice answers on the various aspects related to general knowledge of DM.[16] To measure the answers there was a measurement scale in which the score ranges from 0-15, with higher scores than eight indicating high knowledge of the DM.[17]

Attitude is a construct that can be understood as the probability of an individual to adopt and maintain certain standards of behavior.[16] The attitude of individuals with DM2 was assessed with the Diabetes Attitudes Questionnaire (ATT-19), which also allows the assessment of the psychological adjustment measure for DM. It is a self-administered questionnaire developed in response to assessment needs of psychological and emotional aspects of the disease.[17] It consists of 19 items and the main application range of attitudes is related to the assessment of educational intervention. The total score ranges from 19 to 95 points, a high score corresponds to a positive attitude towards the disease.[16]

Health education strategy, the American Diabetes Association (2015), proposes a plan involving educational courses for self-management and support of individuals with DM, from strategies and techniques that include the provision and problem solving in education and development of skills to deal with all aspects of DM.[2]

The educational program for individuals with DM2 was designed and developed taking as a reference the Type 2 Diabetes BASICS Patient Book[18] and the Type 2 Curriculum Guide.[19] Five interventions were performed, about one each month, with mean duration of two hours each, always on Mondays, from 1:00pm to 3:00pm from May to October 2015. Among the contents addressed we mention: DM pathophysiology, insulin action mechanism, signs of hypoglycemia and hyperglycemia, food groups and possible replacements, oral and injectable medications, physical activity, foot care, self-management of diabetes. Their participation was stimulated in the construction of knowledge, sharing with other individuals of the gaps in the knowledge of DM and difficulty in coping with the disease.

Moreover, the presence of family members, caregivers and individuals involved in the participant's daily life was allowed to create a warm and friendly environment for the expression of feelings, doubts and anxieties.

The mean time of the questionnaires application was: in the first phase of the research 34.5 minutes and in the second phase 31 minutes of EG and 35 minutes in the two phases of CG.

For the analysis, the data was originally entered in the Excel software, version 2013, with double entry and validation for error checking. Later, the data was exported to R version 3.2., available as free software. Descriptive analyzes were performed using position measurements (mean, median) and variability (standard deviation) for continuous variables and simple frequency for categorical variables.

The tests performed were: Student's t test to compare continuous variables with normal distribution (post-prandial glucose, SBP, Social Relationship domain of the WHOQOL-BREF, B-PAID, DKN-A and ATT-19), Wilcoxon test to compare continuous variables in which at least one does not present normal distribution (HbA1c, fasting glucose, DBP, WHOQOL-BREF, Psychological health, Physical health and Environment domains of WHOQOL-BREF); Pearson correlation test for continuous variables with normal distribution (postprandial glycemia, SBP, diagnostic time, Social Relationship domain of WHOQOL-BREF, B-PAID, DKN-A and ATT-19); Kendall correlation test for continuous variables that did not show normal distribution (HbA1c, fasting glucose, DBP, WHOQOL-BREF, psychological health and Phys-

ical health, Environment domains of WHOQOL BREF); Biserial point correlation test for correlation between continuous variables with binary variables (physical activity and gender).

The significance level was 0.05. To analyze the strength of the correlation between the measurements we used the classification proposed by Ajzen, Fishbein (1998)[20] which states that correlation values lower than 0.30, even when statistically significant, no clinical importance is observed; values between 0.30 to 0.50 indicates moderate correlation and above 0.50, a strong correlation. The reliability of the scales was calculated using Cronbach's alpha.

The development of the study met the standards of research ethics and reached the approval number 37894414.2.0000.5546 - Presentation of Certificate of Ethics Appreciation- CAAE.

Results

The characterization of individuals with DM2 are presented according to the groups. In EG the mean age was 61.97±10.3 years, most were female (27.75%) and less than half of the individuals had a partner (15.42%). As for education, 28 (78%) had studied up to elementary school and the mean years of education was 6.8±11 years. Family income ranged from one to two minimum salaries (R$ 788.00 to R$ 1,576.00[1]) and the members of this group had a mean of 11.5±8.5 years of registration in the Endocrinology Clinic of HU/UFS.

In the control group the mean age was 60.41±11.29 years, most were female (60, 81%) and had a partner (45, 61%). The mean years of education was 6.22±4.51 and 49 (66%) had not completed elementary school. Family income ranged from one to three times the minimum salary (R$ 788,00 to R$ 2.364,00)* and individuals had mean of 9.62±6.88 years of registration in the Endocrinology Clinic of HU/UFS.

Regarding clinical variables, we observed the significant reduction in HbA1c in both groups, fasting and DBP in EG (Table 1).

When evaluating QOL using the WHOQOL-BREF instrument, it was found that in the first phase of the research the Psychological health domain showed the highest mean (14.98 and 14.22) and the domain Environment, the smallest (12.94 and 12.28), in EG and CG, respectively. It was also observed differences between groups in Social relationships domain, with EG presenting better assessment after the intervention ($p<0.05$) (Table 2).

Regarding the reliability of the scales used, the first and second phase of the study used the Cronbach's Alpha for Total WHOQOL BREF was 0.83 and 0.88 and between domains the variation was 0.33 (Social relationship) 0.71 (Physical health) and 0.62 (Environment) 0.75 (Psychological health), respectively, in EG. In the control group the total value was 0.85 and 0.81 and between domains the variation was 0.49 (Social relationship) to 0.74 (Physical health) and 0.34 (Social relationship) to 0.69 (Physical health), the first and second phase, respectively.

Regarding the measure B-PAID, in the second phase of the study, we observed decreased suffering of living with DM in both groups. However, participants in the control group showed mean above the cutoff point 40, suggesting a high degree of emo-

Table 1. Descriptive statistics and results of association tests between groups (Wilcoxon test and Student's t-test) in the two phases of the research for the variables: HbA1c, postprandial glucose, fasting glucose, SBP and DBP

Variables	EG (n=36)		p-value	CG (n=74)		p-value
	1st Phase Mean (SD)	2nd Phase Mean(SD)		1st Phase Mean (SD)	2nd Phase Mean (SD)	
HbA1c	8.4(2)	7.9(2)	0.00*	8.72(2.13)	8.52 (2.07)	0.02*
Postprandial glycemia	189(78)	167(72)	0.13**	214.45(118.08)	221.31 (116.5)	0.33**
Fasting glycemia	164(69.5)	140(50)	0.00*	169(71.87)	166.95 (65.75)	0.65*
SBP	140(20)	135(21.5)	0.06**	135.72(23.25)	136.24 (21.66)	0.50**
DBP	83(12)	77(11)	0.01*	80.68(15.40)	82.36 (16.45)	0.22*

*= Wilcoxon t test; **= Student t test; HbA1c-Glycated hemoglobin; SD-Standard deviation; EG-Experimental group CG-Control group; SBP-Systolic blood pressure; DBP-Diastolic blood pressure

[1]The minimum wage per month in Brazil corresponds to R$ 788,00 reais or U$ 232,17 American dollars according to the Central Bank of Brazil on July 31st, 2016

tional distress. Cronbach's Alpha B-PAID was 0.89 and 0.90 in EG and 0.66 and 0.67 in the CG, the first and second phase, respectively.

The acquisition of knowledge about the disease and treatment was observed in EG and the difference was statistically significant (p<0,05) (Table 2). Cronbach's Alpha DKN-A in EG was 0.57 and 0.77; 0.88 in the and 0.91 in the control group in the first and second phases, respectively.

As for the attitude, there was a slight increase in EG and a decrease in the CG (Table 2). Cronbach's Alpha ATT-19 in EG was 0.77 and 0.75; 0.76 and 0.78 in the CG for the first and second phase, respectively.

In the second phase of the study, the EG, overall WHOQOL-BREF and the Psychological health domain showed negative, moderate correlations (r>0.30) and statistically significance (p<0.05) with B-PAID and ATT-19. The Physical health and Environment domain showed negative and moderate correlations with the B-PAID. The B-PAID showed negative, moderate correlation with the DKN-A (r=-0.33, p=0.05) and positive and strong correlation with the ATT-19 (r=0.56, p<0.05). In the control group we observed negative and moderate correlation between the Psychological health domain of the WHOQOL-BREF and the ATT-19 (r=-0.30, p=0.00) (Table 3).

Table 2. Results of association tests between groups (Wilcoxon test and Student's t test) in the two phases of the research for the scores of WHOQOL-BREF, B-PAID, DKN-A and ATT-19 instruments

Variables	EG (n=36)		p-value	CG (n=74)		p-value
	1st Phase Mean (SD)	2nd Phase Mean (SD)		1st Phase Mean (SD)	2nd Phase Mean (SD)	
Whoqol-bref	13.87(1.79)	14.23(2.05)	0.34*	13.44(2.05)	13.57(1.84)	0.51*
Psichological health	14.98(2.03)	15.33(3.1)	0.93*	14.22(2.33)	14.05(2.31)	0.27*
Social relationship	13.89(3.05)	15.02(2.41)	0.01**	13.71(3.74)	14.18(2.95)	0.41**
Physical health	13.65(2.37)	13.51(2.55)	0.79*	13.54(2.64)	13.54(2.62)	1.00*
Environment	12.94(2.09)	13.06(2.2)	0.82*	12.28(2.09)	12.53(2.24)	0.21*
B-PAID	45.63(25.01)	34.38(23.05)	0.05**	56.18(23.53)	45.25(25.84)	0.00**
DKN-A	7.97(2.35)	11.72(2.83)	0.00**	8.11(2.62)	7.76(2.81)	0.12**
ATT-19	46.22(8.72)	46.25(8.68)	0.81**	50.16(9.27)	49.09(9.16)	0.08**

*= Wilcoxon test; **= Student's t test; B-PAID-Problem areas in diabetes; DKN-A-Diabetes knowledge scale; ATT-19-Attitudes questionnaires; SD-Standard deviation; GC-Control group; GT-Test grup

Table 3. Correlation coefficients between the domains of QOL, B-PAID, DKN-A and ATT-19 between groups (EG and CG) in both phases of the study

1st Phase												
Variables	GT (n=36)					p-value	GC (n=74)					p-value
	B-PAID		DKN-A		ATT-19		B-PAID		DKN-A		ATT-19	
	r	p-value	r	p p-value	r		r	p-value	r	p-value	r	
Whoqol-bref	-0.36	0.03[a]	0.15	0.38[a]	-0.34	0.04[a]	-0.27	0.00[b]	0.02	0.82[b]	-0.10	0.21[b]
Psichological health	-0.24	0.15[a]	0.14	0.41[a]	-0.34	0.05[a]	-0.29	0.00[b]	0.14	0.10[b]	-0.15	0.07[b]
Social relationship	-0.11	0.51[a]	0.23	0.17[a]	-0.13	0.45[a]	-0.11	0.18[b]	-0.05	0.58[b]	-0.02	0.86[b]
Physical health	-0.46	0.00[a]	0.00	0.98[a]	-0.31	0.07[a]	-0.29	0.00[b]	0.04	0.63[b]	-0.11	0.18[b]
Environment	-0.32	0.06[a]	0.04	0.82[a]	-0.30	0.08[a]	-0.18	0.03[b]	-0.01	0.95[b]	-0.12	0.15[b]
B-PAID	-	-	0.16	0.35[a]	0.45	0.01[a]	-	-	0.09	0.31[b]	0.15	0.07[b]
DKN-A	-	-	-	-	-0.19	0.28[a]	-	-	-	-	-0.25	0.00[b]
2nd Phase												
Variables	GT (n=36)					p-value	GC (n=74)					p-value
	B-PAID		DKN-A		ATT-19		B-PAID		DKN-A		ATT-19	
	r	p-value	r	p-value	r		r	p-value	r	p-value	r	
Whoqol-bref	-0.43	0.01[a]	0.24	0.15[a]	-0.34	0.04[a]	-0.29	0.00[b]	0.02	0.85[b]	-0.17	0.04[b]
Psichological health	-0.35	0.04[a]	0.22	0.19[a]	-0.49	0.00[a]	-0.27	0.00[b]	0.15	0.09[b]	-0.30	0.00[b]
Social relationship	-0.20	0.23[a]	-0.22	0.20[a]	-0.22	0.19[a]	-0.18	0.03[b]	-0.09	0.31[b]	-0.11	0.19[b]
Physical health	-0.50	0.00[a]	0.13	0.46[a]	-0.25	0.14[a]	-0.21	0.01[b]	0.07	0.43[b]	-0.04	0.66[b]
Environment	-0.35	0.04[a]	0.21	0.22[a]	-0.11	0.52[a]	-0.23	0.01[b]	-0.02	0.83[b]	-0.18	0.03[b]
B-PAID	-	-	-0.33	0.05[a]	0.56	0.00[a]	-	-	0.09	0.26[b]	0.22	0.01[b]
DKN-A	-	-	-	-	-0.31	0.06[a]	-	-	-	-	-0.24	0.00[b]

[a]Pearson correlation; [b]Kendall correlation; B-PAID-Problem areas in diabetes; DKN-A-Diabetes knowledge scale; ATT-19-Attitudes questionnaires; GC-Control group; GT-Test grup

The correlations were analyzed between the measuring instruments and sociodemographic variables (age and years of study) and clinical (time of diabetes, physical activity, HbA1c, fasting glucose, postprandial glucose, SBP and DBP).

It was found that the EG after the educational program showed correlation between the WHOQOL-BREF and fasting plasma glucose ($r=0.36$, $p<0.05$) and between the ATT-19 with HbA1c ($r=0.49$ and $p<0.05$).

Discussion

The sociodemographic characteristics of individuals participating in the study are similar to other studies of individuals with DM, as age over 60 years;[21,22] most female,[22] with a partner[23], low level of education,[22] retired[23] and an income above the minimum salary.[22]

In the second phase of the study, there was an increase of postprandial blood glucose and blood pressure in the control group and showed statistically significant reduction in HbA1c in both groups, as well as fasting glucose and DBP in EG. Some of these results are shown in other studies. Individuals who participated in health education programs showed reduced levels of HbA1c, fasting glucose levels for a few months[23] and blood pressure.[21]

Health education can contribute to the reduction of glycemic indexes in individuals presenting values above normal.[9,10] However, even without the reduction of the values, it is emphasized that health education should be considered, due to their cost-effectiveness.[9] The empowerment of the individual concerning the disease and treatment can be an element that adds value to the glycemic control, health promotion and prevention of cardiovascular risk factors.[9]

Health education in group mode is considered the most appropriate for public health, for achieving a higher number of individuals,[9] besides objectifying approaches to individuals with DM of their family, community and health professionals.[13]

In meetings with the EG, we made possible the sharing of experiences, anxieties and doubts according to the desire of each one, as the participation of family members or significant person was stimulated, which is believed to have favored the creation of bonds between the participants and the improvement in coping with the disease and treatment. Coexistence encourages socialization and encourages the support of members of the groups, contributing to the achievement of health education goals.[9]

When QOL was assessed with the B-PAID, there was a decrease mean in both groups in the second phase of the research, however, CG individuals continued to show high emotional suffering (score> 40), while the EG showed mean below this cutoff point. It is believed that the educational intervention contributed to the reduction of suffering of living with the disease.

The reduction of suffering when living with DM may have contributed to the participants of the EG to positively assess the direction of their lives, the ability to concentrate, physical appearance, self-satisfaction, as well as decrease frequency of negative feelings as bad mood, despair, anxiety, depression (Psychological health domain of WHOQOL-BREF).

It was also observed that the B-PAID correlated with other WHOQOL-BREF domains in EG and the number of correlations is higher in the second phase of the research. The results suggested that the reduction of suffering to live with DM interferes positively to the improvement of pain and discomfort, increased energy, sleep and rest, mobility, development of activities of daily living, depending on the treatment and ability to work (Physical domain of the WHOQOL-BREF), and promote feelings of safety and improved home and physical environmental assessment, the financial resources available, the opportunity to acquire new information and skills, participation in recreational activities/leisure, availability and quality of health, social care and access to transportation (Environment domain of WHOQOL-BREF).

Participants in the EG showed increased knowledge after participation in the program, which corroborates the results reported in other studies.[23,25] The acquisition of knowledge about the dis-

ease among individuals with DM is important, given the chronicity of the disease and need for skills development to promote self-care of individuals.[22]

Although there has been a significant increase in knowledge in EG after participation in the program, the participants in this group had a slight increase in attitude scores. The DM is a chronic disease whose treatment requires major changes in lifestyle,[2] as well as potential factors for chronic complications, all of which can interfere with coping with the disease. A study conducted in Brazil identified increased knowledge of the participants on DM after participation in an educational program, however, this result was not reflected in increased attitude to the most appropriate coping strategies with the disease.[26] Authors suggested that education and disease duration can influence their attitudes,[16] however, in this study there was no significant correlation between these variables.

The B-PAID showed strong positive correlation with the ATT-19, suggesting that the increased suffering generates more confrontational attitudes of the disease. In this sense, an international study with 200 individuals with type 2 diabetes found that the worse the individual's health, the greater the knowledge, attitudes and practices concerning DM.[27]

This apparent paradox can be understood by the characteristics of individuals with DM, ambivalence and way of experiencing the disease itself. Negative feelings may be present due to limitations required for the maintenance of the disease under control, as well as positive feelings can also bring out the responsibility and generate a certain attitude about the disease.[28]

The attitude is related to the psychological and emotional issues of individuals facing the behavioral changes necessary for self-management of DM2, such as diet and physical activity.[17] It is assumed that individuals with DM are always looking for ways to manage their condition.[28] Furthermore, depending on the meanings that it is likely to build and their attitudes in relation to disease is the closest feeling of acceptance, acquiring the performance of the subject and more responsible attitude provider before the DM.[28]

The main limitation of this study was the small sample size of the EG. Still, it was possible to identify changes in QOL, knowledge and attitude among individuals who participated in the educational program developed.

Conclusion

There was improvement in quality of life after participation in the educational program, particularly in the social relationships domain and decrease the suffering of living with diabetes. There was statistically significant acquisition of knowledge. However, for attitude the increase was slight. It is expected that the results of this research subsidize the planning of nursing care aimed at these participants in Primary Health Care and sensitize health workers about the importance of health education for the improvement of QOL among individuals with DM.

Collaborations

Brito GMG, Gois CFL, Zanetti ML and Resende GGS declare that contributed to the writing of the article, relevant critical review of the intellectual content and final approval of the version to be published. Brito GMG, Gois CFL, Zanetti ML and Silva JRS collaborated in the design stages of the study, analysis, data interpretation, article writing, relevant critical review of the intellectual content and final approval of the version to be published.

References

1. International Diabetes Federation. Atlas de diabetes de la FID. 6a ed. [Internet]. 2014 [cited 2015 Oct 11]. Available from: https://www.idf.org/sites/default/files/Atlas-poster-2014_ES.pdf.

2. American Diabetes Association. Standards of medical care in diabetes-2015 abridged for primary care providers. Clin Diabetes. 2015; 33(2):97-111.

3. Brasil. Ministério da Saúde. Departamento de Análise de Situação de Saúde. Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico, VIGITEL. 2014. Brasília(DF): Ministério da Saúde; 2014.

4. Ramos L, Ferreira EA. Fatores emocionais, qualidade de vida e adesão ao tratamento em adultos com diabetes tipo 2. Rev Bras Cresc Desenvolv Humano. 2011; 21 3):867-77.

5. Brasil. Ministério da Saúde. Secretário de Atenção à Saúde. Departamento de Atenção Básica. Estratégia para o cuidado da pessoa com doença crônica: diabetes *mellitus*/ Ministério da Saúde, Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Brasília(DF): Ministério da Saúde; 2013.

6. Avramopoulos I, Moulis A, Nikas N. Glycaemic control, treatment satisfactionand quality of life in type 2 diabetes patients in Greece: The PANORAMA study Greek results. World J Diabetes. 2015; 6(1):208-16.

7. Binh TQ, Phuong PT, Nhung BT. Knowledge and associated factors towards type 2 diabetes among a rural population in the Red River Delta region, Vietnam. Rural Remote Health. 2015; 15(3):3275.

8. Kueh YC, Morris T, Borkoles E, Shee H. Modelling of diabetes knowledge, attitudes, self-management, and quality of life: a cross-sectional study with an Australian sample. Health Qual Life Outcomes. 2015; 13(129): 2-11.

9. Grillo MF, Neumann CR, Scain SF, Rozeno RF, Gross JL, Leitão CB. Efeito de diferentes modalidades de educação para o autocuidado a pacientes com diabetes. Rev Assoc. Med Bras. 2013; 59(4):400-5. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S010442302013000400021&lng=en.

10. Herrera VR, Zéron HM, Alcántara MR. Adherence to two methods of education and metabolic control in type 2 diabetics. Ethiop J Health Sei. 2015; 25(2):163-70.

11. Brasil. Ministério da Saúde. Secretaria de Ciência, Tecnologia e Insumos Estratégicos. Departamento de Ciência e Tecnologia. Agenda nacional de prioridades de pesquisa em saúde. 2a ed., 3a reimpr. Brasília(DF): Editora do Ministério da Saúde; 2011. 68 p. (Série B. Textos Básicos em Saúde).

12. Gross CC, Scain SF, Scheffel R, Gross JL, Hutz CS. Brazilian version of the problem areas in diabetes scale (B-PAID): validation and identification of individuals at high risk for emotional distress. Diabetes Res Clin Pract. 2007; 76(3):455-9.

13. Sociedade Brasileira de Diabetes. Diretrizes da Sociedade Brasileira de Diabetes: 2014-2015. [organização José Egidio Paulo de Oliveira, Sérgio Vencio]. São Paulo: AC Farmacêutica; 2015.

14. Sociedade Brasileira de Cardiologia/Sociedade Brasileira de Hipertensão/Sociedade Brasileira de Nefrologia. VI Diretrizes Brasileiras de Hipertensão. Arq Bras Cardiol. 2010; 95(1 Supl.1):1-51.

15. Fleck MP, Louzada S, Xavier M, Chachamovich E, Vieira G, Santos L, et al. Aplicação da versão em português do instrumento abreviado de avaliação da qualidade de vida "WHOQOL-bref". Rev Saúde Pública. 2000; 34(2):178-83.

16. Rodrigues FF, Santos MA, Teixeira CRS, Gonela JT, Zanetti ML. Relação entre conhecimento, atitude, escolaridade e tempo de doença em indivíduos com diabetes *mellitus*. Acta Paul Enferm. 2012; 25(2): 284-90.

17. Torres HC, Hortale VA, Schall VT. Validação dos questionários de conhecimento (DKN-A) e atitude (ATT-19) de Diabetes *Melittus*. Rev Saúde Pública. 2005; 39(6):906-11.

18. International Diabetes Center. Type 2 diabetes BASICS patient book. Park Nicollet, 2009. Minneapolis: idcpublishing; 2009.

19. International Diabetes Center. "Type 2 diabetes *curriculum* Guide". Park Nicollet, 2011-2012. Minneapolis: idcpublishing; 2012.

20. Ajzen I, Fishbein M. Understanding attitudes and predicting social behavior. New Jersey: Prentice-Hall. 1998.

21. Monteiro LZ, Fiani CRV, Freitas MCF, Zanetti ML, Foss MC. Redução da pressão arterial, do IMC e da glicose após treinamento aeróbico em idosas com diabetes tipo 2. Arq Bras Cardiol. 2010; 95(5): 563-70.

22. Torres HC, Souza ER, Lima MH, Bodstein RC. Intervenção educativa para o autocuidado de indivíduos com diabetes *mellitus*. Acta Paul Enferm. 2011; 24(4):514-9.

23. Batista JM, Becker TAC, Zanetti ML, Teixeira CRS. O ensino em grupo do processo de aplicação de insulina. Rev Eletron Enf. 2013; 15(1):71-9.

24. Carvalho FS, Netto AP, Zach P, Sachs A, Zanella. Importância da orientação nutricional e do teor de fibras da dieta no controle glicêmico de pacientes diabéticos tipo 2 sob intervenção educacional intensiva. Arq Bras Endocrinol Metab. 2012; 56(2): 110-9.

25. Gandra FP, Silva KC, Castro CF, Esteves EA, Nobre LN. Efeito de um programa de educação no nível de conhecimento e nas atitudes sobre o diabetes *mellitus*. Rev Bras Promoç Saúde. 2011; 24(4):322-31.

26. Seramin CM , Danze L, Oliveira KC de. Conhecimento e atitude: componentes para a educação em diabetes *mellitus* nas unidades básicas de saúde de Bebedouro, SP. Rev Fafibe On-Line. 2013; 6(6):130-9.

27. Niroomand M, Ghasemi SN, Karimi-Sari H, Kazempour-Ardebili S, Amiri P, Khosravi MH. Diabetes knowledge, attitude and practice (KAP) study among Iranian in-patients with type-2 diabetes: A cross-sectional study. Diabetes Metab Syndr. 2016 Jan-Mar; 10(1 Suppl 1):S114-9.

28. Péres DS, Santos MA, Zanetti ML, Ferronato AA. Dificuldades dos pacientes diabéticos para o controle da doença: sentimentos e comportamentos. Rev Lat-Am Enfermagem. 2007; 15(6):1105-12.