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Problematization educational intervention to promote healthy habits in elderly people with diabetes: randomized clinical trial

Intervenção educativa problematizadora para promoção de hábitos saudáveis em idosos com diabetes: ensaio clínico randomizado

Intervención educativa problematizadora para promover hábitos saludables en personas ancianas con diabetes: ensayo clínico aleatorizado

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ABSTRACT

Objective: to assess the effects of a problematization educational intervention to promote healthy habits in elderly people with diabetes. **Methods:** a randomized clinical trial conducted with 202 individuals drawn for the intervention group and the control group. The intervention consisted of problematization educational activities on a monthly basis for over six months. The control group participated in conventional monitoring at the health unit. Data were collected through semi-structured interviews before and after the intervention, in addition to laboratory tests. **Results:** after the intervention, when compared to the control group, there was an increase in knowledge about the disease ($p<0.001$), positive attitude towards self-care ($p=0.011$), physical activity ($p=0.020$), diet variety ($p=0.002$), and lower consumption of oils and fats ($p<0.05$). **Conclusion:** the intervention performed has a beneficial effect to promote healthy habits.
Descriptors: Aged; Type 2 Diabetes Mellitus; Health Education; Healthy Lifestyle; Clinical Trial.

RESUMO

Objetivo: avaliar os efeitos de uma intervenção educativa problematizadora para a promoção de hábitos saudáveis em idosos com diabetes. **Métodos:** ensaio clínico randomizado, realizado com 202 indivíduos sorteados para dois grupos: intervenção e controle. A intervenção consistiu em atividades educativas grupais problematizadoras, mensalmente, ao longo de seis meses. O grupo controle participou do acompanhamento convencional na unidade de saúde. Os dados foram coletados mediante entrevistas semiestruturadas antes e após a intervenção, além da realização de exames laboratoriais. **Resultados:** após a intervenção, foi evidenciado aumento do conhecimento sobre a doença ($p<0,001$), atitude positiva para o autocuidado ($p=0,011$), prática de atividade física ($p=0,020$), variedade da dieta ($p=0,002$) e menor consumo de óleos e gorduras ($p<0,05$), quando comparado ao grupo controle. **Conclusão:** a intervenção realizada tem efeito benéfico para a promoção de hábitos saudáveis.
Descritores: Idoso; Diabetes Mellitus Tipo 2; Educação em Saúde; Estilo de Vida Saudável; Ensaio Clínico.

RESUMEN

Objetivo: evaluar los efectos de una intervención educativa problemática para la promoción de hábitos saludables en personas mayores con diabetes. **Métodos:** ensayo clínico aleatorizado, realizado con 202 individuos elegidos para dos grupos: intervención y control. La intervención consistió en problematizar las actividades educativas grupales, mensualmente, durante seis meses. El grupo de control participó en el monitoreo convencional en la unidad de salud. Los datos fueron recolectados a través de entrevistas semiestructuradas antes y después de la intervención, además de las pruebas de laboratorio. **Resultados:** después de la intervención, un aumento en el conocimiento sobre la enfermedad ($p<0.001$), una actitud positiva hacia el autocuidado ($p=0.011$), actividad física ($p=0.020$), variedad de dieta ($p=0.002$) y menor consumo de aceites y grasas ($p<0.05$), en comparación con el grupo de control. **Conclusión:** la intervención realizada tiene un efecto beneficioso para la promoción de hábitos saludables.
Descriptores: Ancianos; Diabetes Mellitus Tipo 2; Educación en Salud; Estilo de vida Saludable; Ensayo Clínico.

INTRODUCTION

Type 2 diabetes mellitus (DM2) is a serious public health problem that has non-modifiable risk factors, such as age and family history, and modifiable factors, such as changes in lifestyle, prevention, and control[1]. Lifestyle is a set of behaviors built by each person and, therefore, individually modifiable[2]. These behaviors include physical activity, food consumption, smoking, and alcohol consumption[3].

Physical activity and a balanced diet are two pillars of lifestyle recognized in diabetes mellitus (DM) treatment to prevent acute and chronic complications[1,4]. However, strategies to promote behavioral change represent a gap, as they are still relatively underused, mainly by specific groups. Bibliographic research to assess the social and economic impact of educational interventions to modify lifestyles in DM identified an increase in life expectancy and a reduction in cardiovascular complications in individuals older than 60 years[5].

Education is one of the components of DM treatment[1], and it involves a complex learning process that requires adaptation according to the needs of individuals and their context of life[6]. Thus, to promote DM autonomy and management, among educational approaches, problematization methodology stands out, guided by perception of reality, leadership, and group work[7]. A systematic review on the impact of group intervention, compared to individual education, or conventional treatment in DM2, found, in six months, decreased glycated hemoglobin, improved knowledge about the disease, a positive attitude towards self-care, and empowerment/self- efficiency[8].

In the field of public health, educational intervention through operative groups, which values the autonomy of individuals with DM and promotes conscious decision-making, is one of the devices proposed in the Model for Attention to Chronic Conditions (MACC). However, its use is still incipient in Primary Health Care, with a view to changing lifestyle[9]. Therefore, this study seeks to answer the following research question: what are the effects of a problematization educational intervention to promote healthy habits in elderly people with DM, when compared to conventional monitoring at the health unit? The answer to this question can help health professionals to choose a different teaching method from the conventional to be adopted in the routine of services to promote healthy habits in old age.

OBJECTIVE

To assess the effects of a problematization educational intervention to promote healthy habits in elderly people with DM.

METHOD

Ethical aspects

All ethical recommendations regarding research with human beings have been adopted. This project was approved by the Human Research Ethics Committee of *Universidade Federal de Pernambuco* and by the Brazilian Registry of Clinical Trials (RBR (*Registro Brasileiro de Ensaios Clínicos*)-7g5vph).

Design, place of study, and period

This is a randomized clinical trial guided by the Consolidated Standards of Reporting Trials (CONSORT) and which followed the methodological rigor necessary for this type of study[10]. This study is part of the research entitled "*Promoção de hábitos saudáveis com idosos diabéticos: avaliação de grupos operativos como intervenção terapêutica*". It was developed from August 2014 to August 2015 at eight Family Health Units (FHUs) that make up a health microregion in the Western region of the city of Recife, Pernambuco, northeastern Brazil.

Assistance to people with DM at these FHUs consists of medical consultation (usually scheduled), distribution of medications (glibenclamide, metformin, and insulin) and supplies for insulin application (syringes and needles), apparatus for monitoring blood glucose (only for insulin-dependent individuals) and occasional lectures addressing hypertension and diabetes.

Population and sample

The study population comprised 360 individuals aged 60 years and older, of both sexes, registered at the FHUs and with diagnosis of DM2 recorded in the health record. Elderly people diagnosed with DM2 and assisted by such FHUs were included. In contrast, elderly people with DM, institutionalized or wheelchair users, with impaired communication and/or cognition, chronic complications of DM in advanced stages recorded in the health record and mobility difficulties were excluded. Considering these criteria, 127 individuals were excluded and 31 refused to participate, totaling 158 exclusions.

The sample size was calculated considering an alpha error of (*u*) and a beta error of 20% (*v*). The standard deviation (SD) of the distribution of glycated hemoglobin (A1C) levels, in both groups (SD_1 and SD_2), was 1.9 g/dL. SD was obtained by a pilot study with 30 medical records of elderly people with DM assisted at such FHUs. The difference between the A1C means (μ) between groups ($\mu_1 - \mu_2$) was 0.85 g/dL. The minimum sample size per group was 79 elderly people with DM. In order to correct occasional dropouts, 10% were added, totaling 87 participants in each study group. However, in the initial sample, 101 participants were assigned to the experimental group (EG) and 101 to the control group (CG).

Of the 202 elderly people with DM who started the study (T0), 178 (88.1%) participated for up to three months (T3) and 164 (81.2%) for six months (T6); 83 (50, 6%) were from EG and 81 (49.4%) were from CG.

The total loss after six months was 18.8%; 47.4% from EG and 52.6% from CG. Among the problems presented, most refer to the difficulty of reconciling with work, daily activities, change of city, residence and serious complications in their state of health. Losses did not affect the study randomness ($p > 0.05$).

Study protocol

Participation in the research resulted from telephone contact or invitation from the FHU's Community Health Agent. Participants were allocated by a nurse participating in the research, in a proportional and stratified manner, according to the age

groups of 10-10 years in both groups, using a table of random numbers from Epi Info 6.04.

After assigning participants to the groups, individual interviews were carried out by a previously trained team, involving application of instruments, collection of clinical variables and participation in educational groups for EG. Outcome variables were investigated at three times: baseline (T0), three months after the first (T3) and six months after the first (T6). Variables were placed into three groups: knowledge about DM and attitude towards self-care (investigated in T0 and T6), lifestyle (investigated in T0 and T6), and clinical conditions (investigated in T0, T3, and T6).

For data collection, we used the following instruments: questionnaire with sociodemographic data (sex, age, and education); the Diabetes Knowledge Scale (DKN-A), to assess knowledge about DM through 15 items of multiple-choice responses. A score equal to or greater than eight is indicative of sufficient knowledge about DM. Internal consistency showed that the Kappa coefficient ranged from 0.56 to 0.69, with most coefficients above 0.56[11]. The Diabetes Attitudes Questionnaire (ATT-19) was also used, with 19 items, which analyze emotional responses about DM. A score greater than or equal to 70 points indicates a positive attitude towards DM. Internal consistency showed that the Kappa coefficient ranged from 0.45 to 0.60, with most coefficients above 0.45 and only three coefficients below 0.40[11].

Lifestyle variables included food consumption, assessed by two 24-hour recalls, on non-consecutive days, one referring to consumption on a Sunday. Calculation of nutrients was performed using Nutwin, version 1.5. The Healthy Eating Index adapted for the elderly[12] was applied, classifying the diet as "good quality" (over 100 points), "need for improvement" (71-100 points), and "poor quality" (less than 71 points). Physical activity was investigated by the International Physical Activity Questionnaire (IPAQ), long version, adapted for elderly people, which allows estimating the weekly time in physical activity of moderate and vigorous intensity in different contexts of life (work, housework, transport, and leisure). IPAQ classifies the elderly who practice at least 150 minutes a week of moderate activity as active. Internal consistency showed that the Kappa coefficients were 0.35 for men and 0.37 for women[13]. Smoking was assessed through cigarette use, considering all elderly people who smoke, regardless of frequency and intensity. Alcoholic beverage consumption was assessed by alcohol abuse frequency, when ingesting four or more doses, for women, and five or more doses, for men, on the same occasion, in the last 30 days[14].

Clinical variables included anthropometry and glycemic control. In anthropometric assessment, double weight, height and waist circumference (WC) measurements were performed. When the difference between assessments exceeded 100 g for weight, 5 mm for height and 1 mm for WC, measurement was repeated and two measurements were recorded with closer values, using their average for recording.

Weight (in kilos) was obtained with individuals being barefoot, without adornments on the head, using light clothes, erect position, feet together and arms positioned along the body, with the palm facing the leg[15]. A portable digital electronic scale, Tanita® brand, with a capacity of 150 kg and sensitivity of 100 g, was used.

Height (in centimeters) was measured by an anthropometer, Balmak® brand, with a maximum height of 2.20 m and a 1 mm accuracy, due to joint stiffness. Measurement was taken with the elderly sitting, left leg bent at a 90º angle with the knee, with the anthropometer base positioned on the left foot heel and the cursor extended parallel to the tibia to patella upper edge, and reading was performed in the nearest millimeter. Height estimated (E) by knee height was obtained, according to sex, by the following equations[16]: men=[64.19 - (0.04 x age) + (2.02 x knee height in cm)] and women=[84.88 - (0.24 x age) + (1.83 x knee height in cm)].

To measure Body Mass Index (BMI), we used the equation BMI=weight/height^2. Elderly people with BMI <22 kg/m^2 were classified as underweight; elderly with BMI between 22 kg/m^2 and 27 kg/m^2 were classified as eutrophic; and elderly with BMI> 27 kg/m^2[17] were classified as overweight. WC (in centimeters) was measured with them standing, erect, relaxed abdomen (at the end of exhalation), arms extended along the body and legs closed, with the aid of an inelastic measuring tape, Cescorf® brand, with 2 m long and 1 mm accuracy, at the midpoint between the last rib and the iliac crest, with no clothing in the region. Accumulation of fat around the waist was classified[15] as high risk between 80.0 and 87.9 cm for women, and between 94.0 and 101.9 cm for men; very high risk, greater than or equal to 88.0 cm and 102.0 cm for women and men.

Glycemic control was assessed by measuring A1C, by collecting approximately 10 ml of blood by venipuncture, in a cubital fossa, in health units or community associations, being referred for laboratory analysis. A1C values below 7% were adopted as a good glycemic control for healthy elderly[1].

After collecting the variables of interest, the educational intervention was initiated for EG, with scheduling for participation in the groups according to participant availability. EG participated in the conventional service provided at FHU and six educational meetings, with an average of 12 to 15 participants, with monthly frequency and an average duration of two hours.

The educational intervention was based on problematization pedagogical methodology. This methodology which consists of demand analysis (survey of prior knowledge on the subject); preanalysis of the context and group issues (planning); survey of the generating themes and focus (execution); assessment definition through verbalization of solutions applicable to the participants' reality[7]. Planning and organizing the educational activity was based on a survey on elderly people with DM.

In the first stage, in an attempt to standardize the themes discussed in educational meetings, a pilot group was organized with 12 elderly people with DM from FHUs and randomized to EG. These elderly people were drawn at random in an attempt to obtain a representation of the study population. Observation and listening took place through Culture Circles to identify previous knowledge about DM, learning needs about healthy eating and physical activity as well as group work strategies, valuing demands, interests, and cultural aspects. The material obtained through recording was fully transcribed and interpreted, and the central themes stood out.

To organize the educational activities, a teaching plan was developed for the central themes and group work strategies: understanding DM and its complications (educational video, educational game *Simulation Roulette*, problem situation/stage

play); choice of healthy foods within the food groups (Food Pyramid poster, figure of regional foods and fruits, household measures, problem situation/theatrical staging, educational game *Traffic Light Labelling*); physical activity and self-care with food and feet (colorful balloons, music, activities with movement, dialogues, posters, educational game "*Right" or "Wrong"* to promote self-care with food and feet, making the Daily Watch); diet, light, zero-calory food and labels (educational video, figures of food labels, dialogued exhibition, problem situation/theatrical staging); consumption of healthy foods (verbal expressions of significant experiences, food figures, problem situation/theatrical staging with the context of a self-service for healthy dish assembly); preparation and preservation of food (glitter balloons, newspaper clippings, dialogue exhibition, figures, problem situation/theatrical staging).

Teaching plans included dynamics of sensitization, problematization, theoretical foundation, theoretical-practical reflection, collective elaboration of responses, synthesis of what was experienced, and assessment[7]. All themes were discussed by a nurse and a nutritionist as mediator and observer of the educational process, through the Ministry of Health, the Brazilian Diabetes Society and the American Diabetes Association theoretical frameworks[1]. The aim was to adopt healthy lifestyles for better glycemic control. Educational groups took place in community spaces close to FHUs.

CG was followed up in conventional care at FHU, with consultations every three months. Both groups were followed up for six months.

After three months, clinical aspects were measured again; and, at six months, outcome variables, for both groups. Primary outcomes were food consumption, physical activity, and A1C levels. Secondary outcomes were knowledge about DM, attitude towards self-care, smoking, alcohol consumption, weight, BMI, and WC. In the final analysis for EG, elderly people who attended at least five educational meetings were included.

At the end, an educational booklet was developed with the subjects covered during the process, being delivered to the participating FHUs as feedback from the research within the coverage area.

Analysis of results, and statistics

The data were double-entered in an electronic spreadsheet of Excel for Windows®, verified with Validate, module of Epi Info, version 6.04, to verify consistency and validation. The Statistical Package for the Social Sciences (SPSS) for Windows®, version 13.1, was used for statistical analysis.

Initially, GE and CG were compared using Pearson's chi-square test to verify homogeneity in relation to the variables under analysis, which did not point out significant differences, allowing comparisons.

Continuous variables were tested for normal distribution using the Kolmogorov-Smirnoff test. In intergroup analysis, Student's t-test, or Mann-Whitney U test was used for unpaired data. For intra-group comparison, Student's t-test, or Wilcoxon test was used for paired data. Assessment of the effect of time on each variable was performed using Generalized Linear Models (GLM), with the Bonferroni test for multiple comparisons. Pearson's chi-square test and Fisher's exact test were used to analyze comparisons of proportions. In all tests, level of significance was established when $p \leq 0.05$.

RESULTS

Of the 202 participants at baseline (T0), the predominant age group was young elderly, with up to 8 years of study and a median of 9 years of DM diagnosis. They had insufficient knowledge about the disease, a negative attitude towards self-care, poor diet quality, were physically active, overweight, had a high risk for cardiovascular diseases, and good glycemic control. There were no differences in participant characterization, i.e., groups are homogeneous according to the variables investigated (Table 1).

In intra and intergroup comparison, follow-up confirms the positive effect of the problematization intervention on knowledge and attitude towards self-care (Table 2). Concerning lifestyle, there were positive implications for problematization group activity in physical activity in intergroup analysis. However, no differences were found regarding quality of the diet, tobacco, and alcohol use among EG and CG participants, at intra and intergroup assessment (Table 2).

Table 1 - Baseline characteristics of elderly people with diabetes mellitus in the pre-intervention moment for the Experimental and Control Groups. Recife, Pernambuco, Brazil, 2014-2015

Variables	Experimental Group (n=101)*	Control Group (n=101)*	*p* value
Sex (women)†	67.3	79.2	0.056‡
Age (years)§	66.0	66.0	0.958‖
Education (≤ 8 years)†	77.2	83.2	0.289‡
Diagnostic time (months)§	108.0	108.0	0.939‖
A1C (%)¶§	5.8	5.9	0.810‖
Quality of the diet**	77.2	75.8	0.395††
Physical activity (min/week)§	450.0	430.0	0.739‖
Knowledge about diabetes**	5.9	5.6	0.420††
Attitude for self-care **	59.9	58.1	0.147††
Smoke†	5.9	8.9	0.421‡
Alcohol consumption†	23.5	30.8	0.698‡‡
Weight (kg)**	71.8	68.2	0.064††
Height (m)**	1.6	1.6	0.169††
BMI (kg/m2)§§	27.5	26.9	0.301‖
WC (cm)**‖‖	100.7	99.5	0.498††

*Note: *Elderly people with diabetes who started the study (n=202); †Variables of proportion; ‡Pearson's chi-square test; §Variables with non-normal distribution; ‖Mann-Whitney U test; ¶A1C - glycated hemoglobin; **Variables with normal distribution; ††Student's t-test for unpaired samples; ‡‡Fisher's exact test; §§BMI - Body Mass Index; ‖‖WC - waist circumference.*

Table 2 - Intra and intergroup comparison of levels of knowledge about diabetes mellitus, self-care attitude, and lifestyle of elderly people with diabetes mellitus between pre and post-intervention periods for the Experimental and Control Groups, Recife, Pernambuco, Brazil, 2014-2015

Variables	Experimental Group (n=83)*			Control Group (n=81)*			Independent sample comparison
	T0†	T6‡	*p* value	T0†	T6‡	*p* value	T6‡ (Valor de *p*)
Knowledge about diabetes§	6.2	9.6	**<0.001**‖	5.5	6.7	**<0.001**‖	0.000¶
Attitude for self-care§	59.9	63.4	**<0.001**‖	57.9	59.4	0.104‖	0.011¶
Quality of the diet§	77.2	77.5	0.873‖	76.9	76.2	0.652‖	0.506¶
Physical activity**	465.0	535.0	0.236††	470.0	390.0	0.115††	0.020‡‡
Smoking§§	4.8	4.8	1.000‖‖	7.4	7.4	1.000¶¶	0.532‖‖
Alcohol consumption§§	20.0	45.5	0.111¶¶	22.2	33.3	1.000‖‖	0.696‖‖

*Note: *Elderly people with diabetes who completed six months of follow-up in the study (n=164); †T0 - Beginning of the study; ‡T6 - Six months after the study began; §Variables with normal distribution; ‖Paired Student's t-test; ¶Student's t-test for unpaired samples; **Variables with non-normal distribution; ††Wilcoxon test; ‡‡Mann-Whitney U test; §§Variables of proportion; ‖‖Fisher's exact test; ¶¶Pearson's chi-square test.*

Table 3 - Intra and intergroup comparison of the components of a healthy diet for the elderly with diabetes mellitus between the pre and post-intervention periods for the Experimental and Control Groups, Recife, Pernambuco, Brazil, 2014-2015

Variables	Experimental Group (n=83)*			Control Group (n=81)*			Independent sample comparison
	T0†	T6‡	*p* value	T0†	T6‡	*p* value	T6‡ (*p* value)
Cereals	4.0§	3.4§	0.026‖	3.5§	3.2§	0.189‖	0.439¶
Fruit	2.2§	2.3§	0.660‖	1.3**	1.7**	0.708††	0.186‡‡
Legumes	2.0**	1.2**	0.043††	1.8§	1.51§	0.144‖	0.473‡‡
Milk and dairy products	0.6**	0.5**	0.102††	0.6**	0.6**	0.936††	0.895‡‡
Meat and eggs	1.3§	1.0§	0.004‖	1.1**	0.7**	0.035††	0.542‡‡
Oil and fat	0.2**	0.2**	0.624††	0.6**	0.6**	0.245††	0.004‡‡
Total fat (%)	20.0§	20.1§	0.955‖	20.5§	22.8§	0.068‖	0.036¶
Saturated fat (%)	5.5§	5.2§	0.353‖	5.8§	6.1§	0.497‖	0.039¶
Diet variety	12.7§	14.0§	0.008‖	12.0**	11.0**	0.670††	0.002‡‡

*Note: *Elderly people with diabetes who completed the six-month follow-up in the study (n=164); †T0 - Beginning of the study; ‡T6 - Six months after the study began; §Mean; ‖Paired Student's t-test; Student's t-test for unpaired samples; **Median; ††Wilcoxon test; ‡‡Mann-Whitney U test.*

Table 4 - Intra and intergroup comparison of the clinical aspects of elderly people with diabetes mellitus between periods T0, T3 and T6 for the Experimental and Control Groups, Recife, Pernambuco, Brazil, 2014-2015

Variables	Experimental Group (n=83)*				Control Group (n=81)*				Independent sample comparison		
	T0†	T3‡	T6§	*p*	T0†	T3‡	T6§	*p*	T0† *p*	T3‡ *p*	T6§ *p*
Weight (kg)	72.6	71.6‖	72.3¶	**<0.001****	67.7	67.7	68.0	0.177**	0.030††	0.081††	0.052††
BMI (kg/m²)‡‡	28.0	27.7‖	28.1¶	0.001**	27.8	27.0	27.2	0.078**	0.792††	0.367††	0.265††
WC (cm)§§	101.3	98.0‖	100.7¶	**<0.001****	99.4	96.4‖	98.5¶	**<0.001****	0.329††	0.383††	0.235††
A1C (%)‖‖	6.1	6.2	6.3	0.327**	6.3	6.7‖	6.6	0.037**	0.993¶¶	0.013¶¶	0.101¶¶

*Note: *Elderly people with diabetes who completed the six-month follow-up in the study (n=164); †T0 - Beginning of the study; ‡T3 - Three months after the study began; §T6 - Six months after the study began; ‖Significant difference in relation to T0; ¶Significant difference in relation to T3; **Generalized Linear Model with Bonferroni Test for multiple comparisons; ††Student's t-test for unpaired samples; ‡‡BMI - Body Mass Index; §§WC - waist circumference; ‖‖A1C - glycated hemoglobin; Mann-Whitney U test.*

As for food groups, the intragroup analysis found a significant reduction in cereal and legume consumption in EG and meat and eggs in EG and in CG. At follow-up, the effect of problematization intervention on oil, total and saturated fat consumption among groups was observed. Diet variety showed a statistically significant increase only in EG and in intergroup follow-up (Table 3).

Weight and BMI decreased from T0 to T3, and increased from T3 to T6 only in EG. WC showed a decrease in both groups, with a greater reduction from T0 to T3 and a greater increase from T3 to T6 in EG, when compared to CG. A1C increased only in CG, from T0 to T3, a difference sustained in intergroup analysis. However, when comparing the moment T0 to T6, no statistical difference was observed in clinical variables (Table 4).

DISCUSSION

The problematization group intervention, when compared to conventional treatment at FHUs, had a positive effect on the consumption of some food groups that make up healthy eating, physical activity, knowledge about DM and self-care attitude among elderly people with DM. Thus, they point to the possibility of using a constructivist methodology as an adjunct in disease treatment, when considering the low cost and the possibility of promoting autonomy, well-being, and quality of life. In a complementary way, a primary study also points out the effectiveness of a problematization group intervention to promote training for self-care and attitudes that generate changes in elderly people with arterial hypertension[18].

The group is considered a technology of high therapeutic value for people with DM. It constitutes a space that allows exchanging knowledge and experiences, and, based on situations of living with DM, instrumentalizes participants to adopt healthy lifestyles through developing and acquiring attitude towards self-care[1,19].

The problematizing educational intervention's positive effect on knowledge about DM and attitude towards self-care supports primary studies and meta-analysis. Such studies prove the effectiveness of person-centered group activities for improving

knowledge about DM and awaken psychological aspects related to attitude towards self-care and metabolic control[8,19].

Increased physical activity, observed among study participants in the intergroup follow-up, is in accordance with the literature, which attests to the contribution of this activity to reducing A1C levels[4], in addition to preventing sarcopenia, obesity and improving insulin sensitivity[1]. In this regard, studies prove the effectiveness of association between interventions for behavioral change, composed of physical activity, diet, and education as reducing glycemic levels, mortality from all causes and cardiovascular diseases in DM2[19-21].

Using problematization methodology through real problem situations did not interfere with food consumption, and the elderly investigated continued to need improvements in food. Unfamiliarity with food groups can be one of the explanatory factors. Many of participants had their first contact with the definition of food groups through educational intervention.

Associated with little knowledge about food groups, the belief that only a certain food increases glucose levels may have contributed to a reduction in energetic and constructive food consumption among EG elderly people, despite educational device use that make it possible to dialogic model and reflection from real problem situations.

Low consumption of cereals, legumes and proteins is concerning, especially in the elderly population with chronic disease. It is at this stage of life that the risk of muscle strength loss increases and there is a higher rate of disability due to less protein intake, absorption of nutrients and vitamins essential for the body to function[22]. A cohort study proves the combined effect of protein intake, energy and physical activity for maintaining muscle strength among elderly men with DM[23]. Therefore, nutritional education actions, with a combination of strategies, are needed to clarify the role of macronutrients and enable elderly people to make healthy choices adapted to personal and cultural preferences[1].

Lower consumption of oils and fats in EG shows a direct effect of group activity. A similar result was found in a prospective study in individuals with DM2[24]. However, reduced food intake in this group can contribute to an increase in the consumption of other food groups, especially carbohydrates, which can raise blood glucose levels.

Diet variety is one of the components of healthy eating that directly contributes to glycemic control[1]. Increased food variety only in EG and in intergroups may be associated with the knowledge re (built) in the group activities regarding replacement of food in food groups, according to collection time, and lower glycemic index, especially of those with high carbohydrate content.

Group intervention led to a reduction in weight, BMI and WC in the first three months, a fact that corroborates the findings of other studies[4,19]. However, this effect was not sustained in follow-up, which may be associated with the short intervention period. The fact that the study was developed during the period of common cultural festivities in northeastern Brazil, which is characterized by consumption of foods rich in carbohydrates and fats, may explain increased A1C levels in the first three months of follow-up. To maintain glycemic control, but without excluding elderly people from cultural festivities, EG participants were instructed to exchange ingredients with a high glycemic index and to consume a smaller food portion. This may have contributed to the absence of difference in glycated hemoglobin levels during follow-up and greater effect of group activity in the first three months, when compared to EG and CG.

Good glycemic control by participants at the beginning of the study may also have contributed to the low impact of the educational intervention on A1C levels.

Study limitations

There was difficulty in confidential allocation and blinding of participants, as it was a group intervention with elderly people from the same community. Other difficulties were: not matching the participants to the A1C levels; absence of neurocognitive assessment using validated instruments, being performed only by consulting the health record; and taking indirect measures to assess primary outcomes.

Contributions to nursing, health, and public policies

The results found point to reflections on all educational methodologies used within primary health care, with a focus on dialogic model and autonomy for behavioral change. Non-adherence impacts on glycemic control and leads to the onset and/or worsening of DM complications. From the perspective of elderly people, these complications can compromise their autonomy and functional capacity, which interferes with quality of life. Therefore, it is necessary to invest in professional training in order to improve care and qualify the work of nurses.

CONCLUSION

The problematic group intervention is a potential strategy to promote physical activity, less consumption of oils and fats, greater variety of diet, increased knowledge about DM and positive attitude towards self-care. However, it is necessary to develop studies with longer follow-up and shorter intervals between educational meetings to better investigate its impact on anthropometric and glycemic parameters in elderly people with DM.

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REFERENCES

1. American Diabetes Association. Standards of medical care in diabetes – 2019. Diabetes Care[Internet]. 2019 [cited 2019 Jul 01];42(suppl1):S1-S193. Available from: https://care.diabetesjournals.org/content/42/Supplement_1
2. Madeira FB, Filgueira DA, Bosi MLM, Nogueira JAD. Lifestyle, habitus, and health promotion: some approaches. Saude Soc[Internet]. 2018 [cited 2019 Jul 01];27(1):106-15. Available from: http://www.scielo.br/pdf/sausoc/v27n1/en_1984-0470-sausoc-27-01-106.pdf

3. Ferrari TK, Cesar CLG, Alves MCGP, Barros MBA, Goldbaum M, Fisberg RM. Estilo de vida saudável em São Paulo, Brasil. Cad Saúde Pública [Internet]. 2017 [cited 2018 Apr 06];33(1):e00188015. Available from: http://www.scielo.br/pdf/csp/v33n1/1678-4464-csp-33-01-e00188015.pdf

4. Olson EA, McAuley E. Impact of a brief intervention on self-regulation, self-efficacy and physical activity in older adults with type 2 diabetes. J Behav Med [Internet]. 2015 [cited 2016 Oct 18];38(6):886-98. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4628895/pdf/nihms707375.pdf

5. Jacobs-van der Bruggen MA, Van Baal PH, Hoogenveen RT, Feenstra TL, Briggs AH, Lawson K et al. Cost-effectiveness of lifestyle modification in diabetic patients. Diabetes Care [Internet]. 2009 [cited 2016 May 20];305(17):1790-99. Available from: http://care.diabetesjournals.org/content/32/8/1453.full-text.pdf

6. Grillo MFF, Neumann CR, Scain SF, Rozeno RF, Gross JL, Leitão CB. Effect of different types of self-management education in patients with diabetes. Rev Assoc Med Bras[Internet]. 2013 [cited 2018 Apr 02];59(4):400-5. Available from: http://www.scielo.br/pdf/ramb/v59n4/en_v59n4a21.pdf

7. Monteiro EMLM, Vieira NFC. Educação em saúde a partir de círculos de cultura. Rev Bras Enferm[Internet]. 2010 [cited 2017 Dec 18];63(3):397-403. Available from: http://www.scielo.br/pdf/reben/v63n3/a08v63n3.pdf

8. Odgers-Jewell K, Ball LE, Kelly JT, Isenring EA, Reidlinger DP, Thomas R. Effectiveness of group-based self-management education for individuals with Type2 diabetes: a systematic review with meta-analyses and meta-regression. Diabetes Med[Internet]. 2017 [cited 2019 Sep 02];34(8):1027-39. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/dme.13340

9. Lima GCBB, Guimarães AMAN, Silva JRS, Otero LM, Gois CFL. Health education and methodological devices applied in the care of Diabetes Mellitus. Saúde Debate [Internet]. 2019 [cited 2020 Jun 03];43(120):150-8. Available from: https://www.scielo.br/pdf/sdeb/v43n120/en_0103-1104-sdeb-43-120-0150.pdf

10. Moher D, Schulz KF, Altman DG. The CONSORT Statement: revised recommendations for improving the quality of reports of parallel-group randomized trials. Lancet [Internet]. 2001[cited 2014 May 12];357(9263):1191-4. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC32201/

11. Torres HC, Hortale VA, Schall VT. Validação dos questionários de conhecimento (DKN-A) e atitude (ATT-19). Rev Saude Publica [Internet]. 2005 [cited 2014 Apr1 3];39(6):906-11. Available from: http://www.scielo.br/pdf/rsp/v39n6/26984.pdf

12. Malta MB, Papini SJ, Corrente JE. Avaliação da alimentação de idosos de município paulista - aplicação do Índice de Alimentação Saudável. Ciên Saúde Coletiva[Internet]. 2013 [cited 2014 May 30];18(2):377-8. Available from: http://www.scielo.br/pdf/csc/v18n2/09.pdf

13. Mazo GZ, Benedetti TRB. Adaptação do questionário internacional de atividade física para idosos. Rev Bras Cineantropom Desempenho Hum [Internet]. 2010 [cited 2014 May 20];12(6):480-4. Available from: http://www.scielo.br/pdf/rbcdh/v12n6/v12n6a13.pdf

14. Damiani TF, Pereira LP, Ferreira MG. Consumo de frutas, legumes e verduras na Região Centro-Oeste do Brasil: prevalência e fatores associados. Ciên Saúde Coletiva [Internet]. 2017 [cited 2017 Dec 19];22(2):369-82. Available from: http://www.scielo.br/pdf/csc/v22n2/1413-8123-csc-22-02-0369.pdf

15. Mota JF, Rinaldi AEM, Pereira AF, Orsatti FL, Burini RC. Indicadores antropométricos como marcadores de risco para anormalidades metabólicas. Ciên Saúde Coletiva [Internet]. 2011 [cited 2017 Dec 18];16(9):3901-8. Available from: http://www.scielo.br/pdf/csc/v16n9/a26v16n9.pdf

16. Silva APN, Oliveira CC, Silva GC, Santos GA. Estimated body weight and height in older adults: agreement between Methods. Geriatr Gerontol Aging [Internet]. 2018 [cited 2019 May 17];12(2):74-80. Available from:http://ggaging.com/details/465/en-US/estimated-body-weight-and-height-in-older-adults--agreement-between-methods

17. Lipschitz DA. Screening for nutritional status in the elderly. Prim Care[Internet].1994 [cited 2014 May 20];21(1):55-67. Available from: https://www.ncbi.nlm.nih.gov/pubmed/8197257

18. Machado ALG, Borges FM, Silva AZ, Jesus ACP, Moreira TMM, Cunha NF. Culture circle in hypertensive elderly health promotion: experience report. Cienc Cuid Saude [Internet]. 2017 [cited 2018 Mar 26];16(1):1-6. Available from: http://www.periodicos.uem.br/ojs/index.php/CiencCuidSaude/article/view/33551/pdf_1

19. Cortez DN, Macedo MML, Souza DAS, Santos JC; Afonso GS, Reis IA, Torres HC. Evaluating the effectiveness of an empowerment program for self-care in type 2 diabetes: a cluster randomized trial. BMC Public Health [Internet]. 2017 [cited 2019 May 23];17(1):41. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-3937-5

20. Wong CK, Wong WC, Wan YF, Chan AK, Chung KL, Chan FW, Lam CL. Patient Empowerment Programme in primary care reduced all-cause mortality and cardiovascular diseases in patients with type 2 diabetes mellitus: a population-based propensity-matched cohort study. Diabetes Obes Metab. [Internet]. 2015 [cited 2017 May 23];17(2):128-35. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25251664

21. Chen L, Pei JH, Kuang J, Chen HM, Chen Z, Li ZW et al. Effect of lifestyle intervention in patients with type 2 diabetes: a meta-analysis. Metabolism [Internet]. 2015 [cited 2016 Oct 20];64(2):338-47. Available from: 10.1016/j.metabol.2014.10.018

22. Campbell AP, Rains TM. Dietary protein is important in the practical management of prediabetes and type 2 diabetes. J Nutr[Internet]. 2015 [cited 2016 Nov 23];145(1):164S-169S. Available from: http://jn.nutrition.org/content/early/2014/12/03/jn.114.194878.full.pdf

23. Rahi B, Morais JA, Dionne IJ, Gaudreau P, Payette H, Shatenstein B. The combined effects of diet quality and physical activity on maintenance of muscle strength among diabetic older adults from the NuAgecohort. Exp Gerontol [Internet]. 2014 [cited 2016 Sep 23];49:40-46. Available from: https://www.sciencedirect.com/science/article/pii/S0531556513003318?via%3Dihub

24. Miller CK, Kristeller JL, Headings A, Nagaraja H, Miser WF. Comparative effectiveness of a mindful eating intervention to a diabetes self-management intervention among adults with type 2 diabetes: a pilot study. J Acad Nutr Diet [Internet]. 2012 [cited 2016 Oct 28];112(11):1835–42. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3485681/pdf/nihms409871.pdf