

Educational intervention in men with diabetes *mellitus*: effects on behavior and anthropometric profile

Intervenção educativa em homens com diabetes *mellitus*: efeitos sobre comportamentos e perfil antropométrico

Intervención educativa en hombres con diabetes *mellitus*: efectos sobre el comportamiento y perfil antropométrico

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Descritores

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Abstract

Objective: To analyze the effectiveness of self-care based on health behaviors and anthropometric data of men with type 2 diabetes mellitus.

Methods: Cluster randomized clinical trial in a municipality in southern Brazil with 73 men aged 40 to 70 years, recruited from ten Basic Health Units. The intervention consisted of two meetings and was based on the principles of Supported Self-Care and operated by Behavior Change Protocol. Statistical analysis included association and comparison tests between the variables studied.

Results: Increased weekly frequency of consumption of cereals and derivatives ($p=0.033$), meat and sausages ($p=0.003$), decreased consumption of roots and tubers ($p=0.044$). Discreet and non-significant decrease in Waist Circumference, Hip Circumference and Waist-Hip Ratio was found, in addition to a non-significant increase in weight, Body Fat Percentage and Body Mass Index.

Conclusion: Intervention based on supported self-care has produced important positive effects, but should be considered a partially effective strategy to change health behaviors and anthropometric profile of adult men with type 2 diabetes *mellitus*.

Resumo

Objetivo: Analisar a efetividade do autocuidado apoiado nos comportamentos em saúde e os dados antropométricos de homens com Diabetes *Mellitus* tipo 2.

Métodos: Ensaio clínico randomizado por *clusters*, em município do Sul do Brasil, junto a 73 homens com idade entre 40 e 70 anos, recrutados em dez Unidades Básicas de Saúde. A intervenção consistiu de dois encontros e foi pautada em princípios do Autocuidado Apoiado e operacionalizada por meio do Protocolo de Mudança de Comportamento. A análise estatística contemplou testes de associação e de comparação entre as variáveis estudadas.

Resultados: Observou-se aumento da frequência semanal do consumo de cereais e derivados ($p=0,033$), carnes e embutidos ($p=0,003$), diminuição do consumo de raízes e tubérculos ($p=0,044$). Constatou-se diminuição discreta e não significativa da Circunferência da Cintura, Circunferência do Quadril e Relação Cintura-Quadril, além do aumento não significativo do peso, Porcentagem de Gordura Corporal e do Índice de Massa Corporal.

Conclusão: A intervenção baseada no autocuidado apoiado produziu efeitos positivos importantes, porém, deve ser considerada estratégia parcialmente efetiva na mudança dos comportamentos em saúde e do perfil antropométrico de homens adultos com diabetes *mellitus* tipo 2.

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Conflicts of interest: nothing to declare.

Resumen

Objetivo: Analizar la efectividad del autocuidado con apoyo en los comportamientos en la salud y los datos antropométricos de hombres con diabetes *mellitus* tipo 2.

Métodos: Ensayo clínico aleatorizado por *clusters*, en municipio del sur de Brasil, con 73 hombres entre 40 y 70 años de edad, reclutados en diez Unidades Básicas de Salud. La intervención consistió en dos encuentros y fue realizada de acuerdo con principios del Autocuidado con Apoyo y llevada a cabo por medio del Protocolo de Cambio de Comportamiento. El análisis estadístico contempló pruebas de asociación y de comparación entre las variables estudiadas.

Resultados: Se observó aumento en la frecuencia semanal de consumo de cereales y derivados ($p=0,033$), carnes y embutidos ($p=0,003$), reducción del consumo de raíces y tubérculos ($p=0,044$). Se constató reducción discreta y no significativa de la Circunferencia de la Cintura, Circunferencia de la Cadera y Relación Cintura-Cadera, además del aumento no significativo de peso, Porcentaje de Grasa Corporal y del Índice de Masa Corporal.

Conclusión: La intervención basada en el autocuidado con apoyo produjo efectos positivos importantes; sin embargo, debe considerarse una estrategia parcialmente efectiva en el cambio de comportamientos en la salud y del perfil antropométrico de hombres adultos con diabetes *mellitus* tipo 2.

Introduction

Diabetes mellitus (DM) has increasing national prevalence, an estimated absolute number of 12.5 million people aged 20 to 79 years,⁽¹⁾ and 63,486 deaths from DM in the country in 2017.⁽²⁾ According to the 2017 World Diabetes Atlas, there is a worldwide prevalence of 8.8%, with an absolute frequency of 221 million men (9.1%) and 203.9 million women (8.4%) with DM.⁽¹⁾ At the national level, the Surveillance of Risk Factors and Protection for Chronic Diseases by Telephone Survey (Vigitel - *Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico*) showed a prevalence of 7.6% among people aged 18 or older, residing in the 27 Brazilian state capitals, 7.1% for men and 8.1% for women.⁽³⁾

However, such finding is still controversial in the national literature, especially when comparing self-reported data with data obtained from biochemical measurements, as in the ELSA-Brazil (*Estudo Longitudinal de Saúde do Adulto - Brazilian Longitudinal Study of Adult Health*) study conducted in six Brazilian state capitals, in which a 43% higher prevalence of DM was found among men.⁽⁴⁾

Important differences between the sexes are observed regarding health behaviors that impact on disease control. Regarding health risk behaviors, a study conducted with 421 men, aged between 20 and 59 years old and living in a municipality in southern Brazil, showed high prevalence of some behaviors. These include insufficient physical activity (86.2%), non-performance of periodic examinations (42.3%), inadequate diet (39.2%), non-performance of leisure activities (36,3%), alcohol abuse

(30.4%) and smoking (19.5%).⁽⁵⁾ The Vigitel study, conducted in 2017, showed that in the capital of the state of Paraná, Curitiba, 18.3% of men aged 18 or older were smokers, 27.8% had adequate food intake, 43.4% practiced activity. physical activity in free time and 27.1% abusively consumed alcohol.⁽³⁾

In addition to health behaviors, the anthropometric profile also has an important influence on DM control. Obesity may be associated with increased body fat, which may be considered a predictor of inadequate cardiometabolic control in individuals with type 2 diabetes mellitus (T2DM).⁽⁶⁾ Regarding the body adiposity index, it is clear from the literature that the prevalence of altered body adiposity was higher among men.⁽⁷⁾ In a study of 1,515 people with T2DM, 83.6% of men had no Body Mass Index with parameters considered normal.⁽⁷⁾

There are international notes that endorse the importance of attention in DM focused on health service users, so that better clinical results are achieved.^(8,9) The need for decision-making autonomy, behavioral changes and adaptations, access to a health system as support, the continuous process of care and the knowledge and habits of the individual in chronic condition justify the fundamental role of user-centered care, especially when it comes to people with DM.^(8,9) In the case of notes directed to men, it is emphasized the importance of promoting adequate conditions for the empowerment of the male population in order to engage more with decision-making about self-care.⁽⁹⁾

Supported self-care refers to a set of strategies that aim to create conditions for the preparation and empowerment of users of health services, so that they can self-manage their health. Focus, there-

fore, is on the protagonism of the user in self-care management.⁽¹⁰⁾ It is a technology that can be developed by health professionals in primary health care settings, and can cost-effectively and effectively change behavior among people living in chronic conditions.⁽¹⁰⁾

Integrative review addressing national and international studies found that the 5 As methodology used in the implementation of supported self-care is applied in a piecemeal manner.⁽¹⁰⁾ A study conducted in southern Brazil with people of both sexes and diagnosed with DM used self-care based on the implementation of the nursing consultation and obtained good results on glycemic control.⁽¹¹⁾ However, another review points out that, in empowerment interventions for self-care, benefits are evidenced for men, despite the lack of studies showing the specificities of the effects of interventions applied in Primary Health Care with the male population.⁽¹²⁾

A study of 46 men with T2DM shows that they often have weaknesses in self-care, with better adherence to drug therapy than to habits related to diet and physical activity, and reduced access to health services.⁽¹³⁾ Based on this information, the relevance of the present study is justified as a possibility of assessment and proposition of timely intervention for men with T2DM.

The question is: can supported self-care be effective as a strategy for changing health behaviors and anthropometric profile of adult men with T2DM? This study aimed to analyze the effectiveness of self-care based on health behaviors and anthropometric data of men with T2DM.

Methods

Cluster randomized clinical trial, conducted with men with T2DM, users of ten Basic Health Units (BHU), with Family Health Strategy (FHS) in a municipality of Northwest Paraná. It is a medium-sized municipality, with an estimated population of 417,010 inhabitants,⁽¹⁴⁾ with 35 BHU, 77 FHS teams, and nine Family Health Support Nucleus teams (NASF - *Núcleo de Apoio à Saúde da*

Família).⁽¹⁵⁾ The care provided to people with DM is mainly characterized by follow-up through medical and nursing consultations, educational groups and prescriptions, cardiovascular risk assessment and stratification, and referrals to specialized services, according to the identified risk.

For the selection of individuals, the following inclusion criteria were adopted: being male, having a diagnosis of T2DM, aged between 40 and 70 years, being registered and living in an area covered by one of the ten BHU.

Exclusion criteria were: medical record of target organ lesions (brain, kidneys and eyes) comorbidities/complications resulting from DM, recorded in medical records, such as chronic renal failure, or psychic disorders that could compromise the understanding of the study, not being available to participate in the intervention and not being able to answer the questions of the data collection tools. In addition, the following discontinuity criteria were considered: death, emergence of severe complication due to DM, change to area without coverage of the FHS or other municipality and manifestation of desire to interrupt participation in the study.

For the selection of participants, prior contacts were made with the FHS teams of the BHU in order to present the research project. The team was supported by the distribution of invitation letters prepared by the researchers, inviting the men to an awareness meeting. Those who attended the meeting and agreed to participate in the study were included in it. After the recruitment phase, which took place from April 2016 to January 2017, we proceeded to the randomization phase, which was guided by a statistical professional. Cluster randomization reduced the chances of contamination by contact of control users with the intervention group. The ten UBS were initially selected according to convenience criteria, considering the number of men with DM2 registered and then numbered from one to ten.

For sample calculation, $\alpha=0.05$ and $\beta=0.20$ (study power of 80%) were considered, with a confidence level of 95%, in addition to the value of the minimum detectable difference (1.0% of the value of glycated hemoglobin). In addition, for the sam-

ple calculation it was necessary to provide a standard deviation value of the mean glycosylated hemoglobin, which is 2.0%, adopted based on studies conducted with populations from different regions of Brazil.⁽¹⁶⁻¹⁸⁾ Thus, the minimum sample size of 128 men, randomized into Intervention Group (IG) and Control Group (CG), was estimated. However, 118 men participated in the study due to difficulties in recruiting the minimum number and too much time for the selection process.

After having the mean values of glycosylated hemoglobin in the last six months of the men who agreed to participate in the study, obtained from a computerized electronic medical record system used in the municipality, possible combinations of health units were formed until the homogenization of two groups was achieved. average glycosylated hemoglobin. Each sample group consisted of five BHU. Those men with no record of test results in the previous six months were not excluded from the study. This is because they are the minority (n=8), because of their interest in participating and also to include more participants, as they faced the resistance of the invited men to participate in the invitation meetings or to adhere to the protocol of the intervention.

The focus of the first meeting, held on recruitment with all study participants, was the importance of self-care for DM control, but questions about other DM-related topics were also resolved. Guidance on methodological and ethical aspects of the study was also addressed, and at the end of this meeting validated tools for the assessment of knowledge, self-care, self-efficacy and psychological adjustment were applied.

Two telephone contacts were made. The first was done about a month after the initial meeting, with the intention of maintaining the bond while the recruitment process was taking place at the BHU. The second was held one week before the intervention began and aimed to reinforce guidance about the intervention and to communicate the day, place and time of the next group meeting. When the group meeting was not possible, the availability to do so at home was verified individually (Figure 1).

After randomization, the men allocated in the IG were contacted to schedule the meetings of the

intervention based on Supported Self-Care and conducted through the Behavior Change Protocol, with actions represented by the 5 As: Assessment, Guidance, Agreement, Assistance and Follow-up.⁽¹⁰⁾ Figure 2 presents the periodization of the supported self-care strategy steps implemented. It is noteworthy that the follow-up stage is a continuous process, transversal in relation to the other supported self-care steps.

The individuals from the IG still participated in another meeting, in group or individually, in which the Behavior Change Protocol was applied, focusing on the construction stage of the Intelligent Care Plan and the establishment of self-care goals.

The Behavior Change Protocol consists of five steps: problem exploration, clarification of feelings and meanings, goal setting, commitment to action, and assessment of experience and plan. These steps lead the professional, but especially the user, to a participatory identification of the strategies necessary for the empowered self-care execution.^(19,20)

It is noteworthy that the Behavior Change Protocol can be worked on in groups, generating discussions based on the protocol issues. However, the final product is the elaboration of the Intelligent Care Plan, which⁽²⁰⁾ in the present study was individualized. In the meetings held during the intervention, visual resources were used to present content related to the importance of self-care, focusing on healthy eating habits, physical activity, use of oral medications and insulin, preventative foot care, glycemic follow-up and DM myths and truths.

The following Behavior Change Protocol questions were used: What is your greatest difficulty in taking care of your health? How do you feel about having to take care of your health? What do you want to do to improve your health? How can you change something in your life to feel better? What do you think might hinder the achievement of your goal? Is there anyone who can help you reach your goal? These issues were triggered in the "Agreement" stage and permeated the construction of the Intelligent Care Plan and the establishment of self-care goals (Figure 2).

The individuals who composed the CG participated in the invitation meeting and also received,

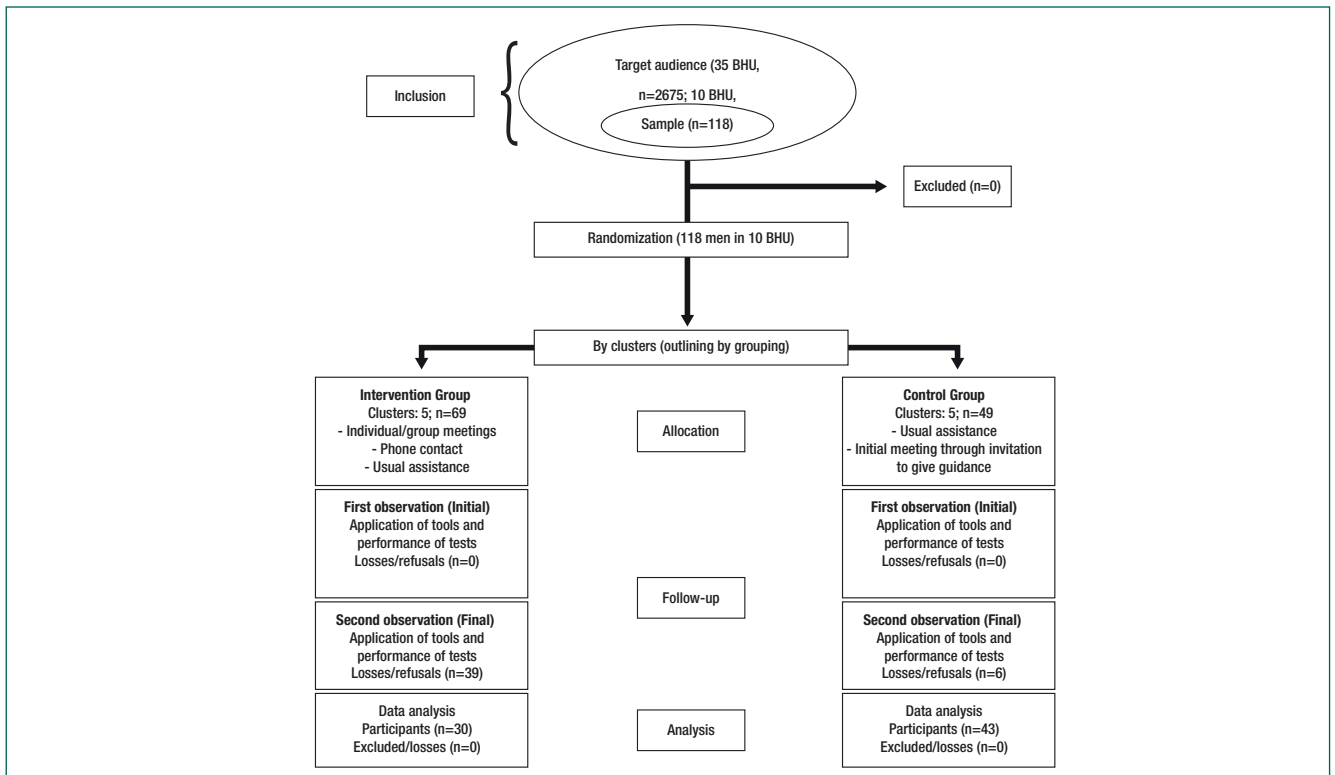


Figure 1. Diagram of inclusion, randomization and follow-up of the randomized trial, according to CONSORT 2010

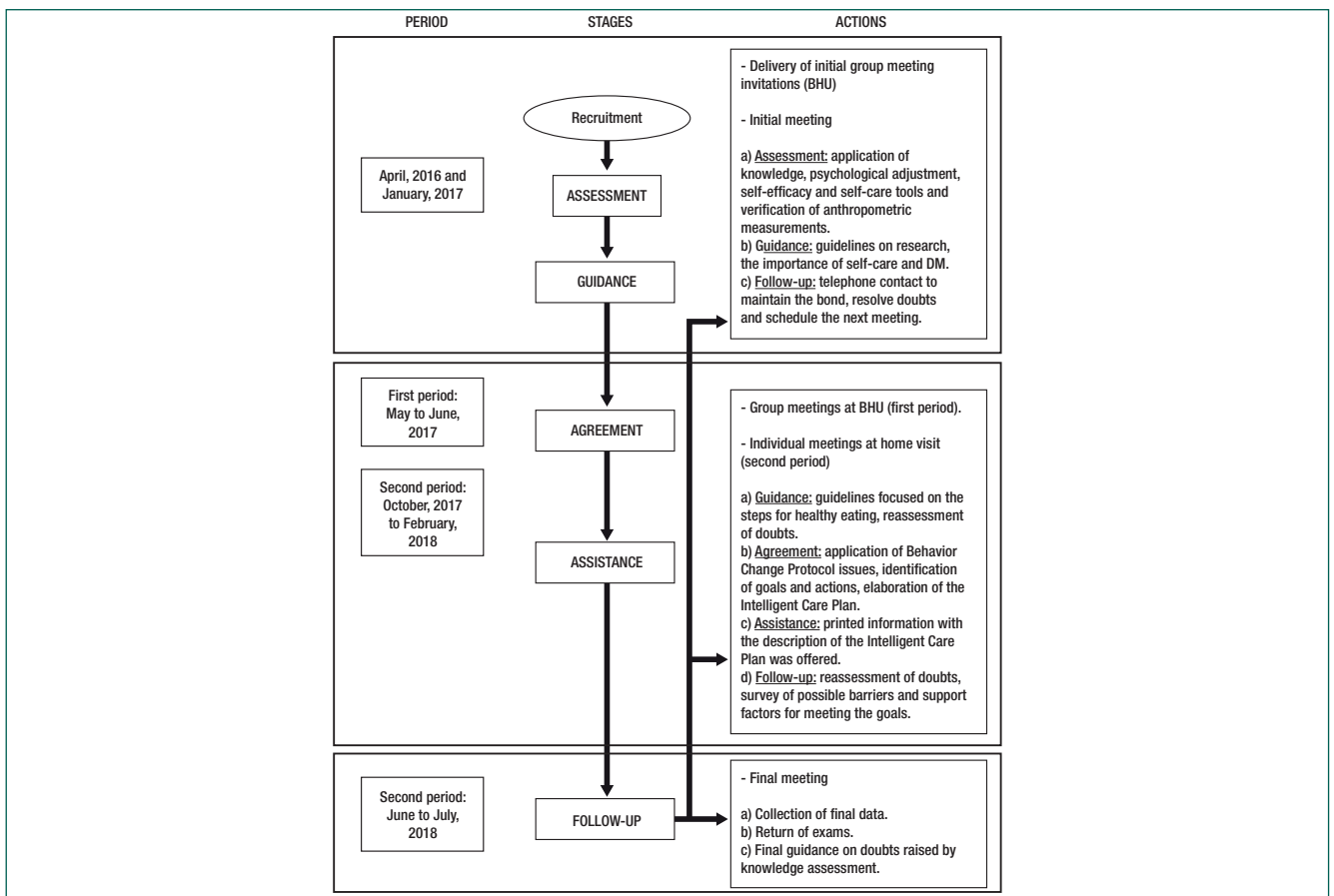


Figure 2. Flowchart of intervention protocol steps

at the end of the study and individually, guidance on DM, from the doubts that arose during the application of the knowledge assessment tools about the disease and treatment, about the results of laboratory tests (glycated hemoglobin, fasting plasma glucose, Total Cholesterol, HDL-cholesterol, LDL-cholesterol, Triglycerides and Creatinine) and anthropometric measurements.

The variables that make up this study are sociodemographic: age, marital status, having children (yes or no), number of children, education in years of schooling, occupational status, number of household residents and family income. The following health behavior variables were: physical activity, alcohol consumption, alcohol abuse, smoking and weekly food consumption frequency, which was subdivided according to food groups. Anthropometric variables Waist Circumference (WC), Hip Circumference (HC), Waist/Hip Ratio (WHR), Weight, Body Mass Index (BMI) and Body Fat Percentage (BFP) were also used.

At the first meeting, which took place at the BHU, lasting an average of 2 hours and 30 minutes, the principal researcher (nurse) and two properly trained assistant researchers collected the data through the application of tools and verification of anthropometric measurements. In the computerized electronic medical record system of the municipality, the main researcher collected the results of the following laboratory tests performed in the previous six months: fasting plasma glucose, Total Cholesterol, HDL-cholesterol, LDL-cholesterol, Triglycerides and Creatinine. At the second moment of data collection, performed between six and eight months after intervention, data were collected by pairs of researchers who did not participate in the previous steps.

To compare health behaviors - physical activity, smoking, alcohol consumption and alcohol abuse - at both times, the McNemar test (for paired nominal samples) was adopted. Comparing the groups, the chi-square test was used.

To compare the frequency of weekly food intake and the anthropometric measurement data (represented by means and medians), in each group, the paired Student *t* test and the Wilcoxon test were

adopted. To compare these data, between the two independent groups, at each observation moment, we used the *t*-Student test and the Mann Whitney U test.

The research project that originated the present study was submitted and approved by the Standing Committee of Ethics in Research with Human Beings of *Universidade Estadual de Maringá*, PR, Brazil (Opinion 1,407,296). The intervention protocol was registered on the international Clinical Trials platform, under the identification number NCT02974413, and in the Brazilian Clinical Trials Registry (*Registro Brasileiro de Ensaio Clínicos*), under the number RBR-46zk89.

Results

Of the 118 men who started the study, among losses, discontinuity and refusals, 45 (total loss of 38.1%), 39 were in the IG (loss of 56.6%) and six in the CG (loss of 12.2%). Among the 73 participants who remained until the end of the study, the average age was 62.5 years, with an average study time of 7.9 years, most were married, retired, with children and without health insurance.

The average time since diagnosis, according to men's self-report, was 10.1 at the beginning of the study and 14.0 at the end, and most of them reported a diagnosis time greater than ten years. They also said that they were more often treated for DM in their own BHU, had not been hospitalized as a result of DM, were exclusively using oral hypoglycemic drugs and other medicines for continuous use. In the last year prior to the interview (between 2016 and 2017), men on average went through about three appointments for DM follow-up, and those who were hospitalized on average went through two hospitalizations due to this disease.

Regarding the hospitalizations of IG individuals who started participating in the study, 13 were motivated by acute hyperglycemia and six by hypoglycemia. There were no significant differences regarding physical activity, alcohol consumption, smoking and alcohol abuse. However, it was observed that in IG there was an increase in the relative frequency

of those who reported physical activity and there was also a decrease in the frequency of alcohol consumption (Table 1).

Table 1. Comparison of health behaviors of men with type 2 diabetes mellitus at the time of the assessment

Health behaviors	Comparison of dependent samples				Comparison of independent samples	
	Intervention Group		Control Group		Initial	Final
	Initial n(%)	Final n(%)	Initial n(%)	Final n(%)		
Physical activity						
Yes	32(46.4)	16(53.3)	24(49.0)	22(51.2)	p=0.780	p=0.855
No	37(53.6)	14(46.7)	25(51.0)	21(48.8)		
	p = 0.727		p = 0.549			
Smoking						
Yes	7(10.1)	3(10.0)	4(8.2)	6(14.6)	p=0.715	p=0.654
No	62(89.9)	27(90.0)	45(91.8)	35(85.4)		
	p = 1.000		p = 1.000			
Alcohol consumption						
Yes	28(40.6)	10(33.3)	18(36.7)	10(24.4)	p=0.673	p=0.408
No	41(59.4)	20(66.6)	31(63.3)	31(75.6)		
	p = 0.219		p = 0.063			
Abusive alcohol consumption						
Yes	14(46.7)	5(50.0)	9(50.0)	3(30.0)	p=0.823	P=0.361
No	16(53.3)	5(50.0)	9(50.0)	7(70.0)		
	p = 1.000		p = 1.000			
Frequency (days) of weekly consumption of:						
Cereals and derivatives	7	7	7	7	p=0.884	p=0.747
	p = 0.033		p< 0.001			
Beans and legumes	7	7	7	7	p=0.705	p=0.633
	p = 0.348		p = 0.232			
Vegetables and greens	7	7	7	7	p=0.655	p=0.134
	p = 0.140		p = 0.887			
Roots and Tubers	3	2	2	1	p=0.333	p=0.960
	p = 0.044		p = 0.480			
Meat and sausages	6	7	7	7	p=0.304	p=0.534
	p = 0.003		p = 0.050			
Dairy	5	4	7	7	p=0.380	p=0.159
	p = 0.887		p = 0.624			
Sugar and soft drinks	2	1	1	1	p=0.935	p=0.647
	p = 0.596		p = 0.221			
Oil and fat	7	7	7	7	p=0.937	p=0.629
	p = 0.298		p = 0.192			
Lard	0	0	0	0	p=0.725	p=0.540
	p = 0.905		p = 0.301			
Bacon and Butter	0	0	2.5	1.5	p=0.998	p=0.928
	p = 0.326		p = 0.230			
Fruits and Juices	7	7	7	7	p=0.862	p=0.887
	p = 0.160		p = 0.092			
Eggs	2	1	2	3	p=0.447	p=0.781
	p = 0.577		p = 0.250			
Ready-made/processed meals	0	0	0	0	p=0.684	p=0.201
	p = 0.251		p = 0.891			

Regarding the frequency of weekly food intake (mean values), significant changes were identified in both groups (Table 1). In IG there was an increase in the days of consumption per week of cereals and derivatives, from 4.99 to 6.73, and meat and sausages, from 4.93 to 6.16, and a decrease in the consumption of roots and tubers. from 3.07 to 1.93. On the other hand, in the CG there was an increase in the days of consumption of cereals and derivatives from 4.8 to 6.65, and meat and sausages, from 5.27 to 5.95.

Regarding anthropometric data, no significant differences were observed. However, there was a reduction in parameters such as WC, HC and WHR for both IG and CG. In CG, weight and BMI were practically unchanged, but there was an increase of more than one percentage point, on average, in BFP, while in IG this increase was 0.4 percentage points (Table 2).

Table 2. Comparison of anthropometric data of men with type 2 diabetes mellitus at the beginning and end of the assessment

Anthropometric data	Comparison of dependent samples				Comparison of independent samples	
	Intervention Group		Control Group		Initial	Final
	Initial	Final	Initial	Final		
WC	103.0	102.4	105.0	103.6	p=0.942	p=0.719
	p=0.660		p=0.180			
HC	101.9	100.5	101.8	100.7	p=0.936	p=0.920
	p=0.143		p=0.200			
WHR	1.0	1.0	1.0	1.0	p=0.510	p<0.716
	p = 0.202		p=0.964			
Weight	81.5	82.8	82.2	82.2	p=0.556	p=0.861
	p=0.222		p=0.953			
BMI	28.1	28.9	29.0	29.2	p=0.499	p=0.864
	p=0.081		p=0.763			
BFP	28.6	29.0	27.0	28.2	p=0.303	p=0.687
	p=0.679		p=0.103			

WC – Waist Circumference; HC - Hip Circumference; WHR - Waist/Hip Ratio; BMI - Body Mass Index; BFP - Percentage and Body Fat

Discussion

The loss of participants in this study may be related to the lower valuation of self-care by them and their reduced willingness to attend intervention meetings among those individuals who claimed disinterest in considering themselves in good health or with DM under control. It is necessary to consider the limitations related to the intervention itself, such as the recruitment strategy, the number of meetings and the discontinuity in follow-up. Moreover, the

development of disabling complications and death are related to the clinical characteristics of the population studied, but they are conditions over which there was little control.

The results of the present study show that nurse-supported self-care can produce positive and significant effects on the dietary intake of men with DM and, at the same time, provoke positive changes in the anthropometric profile (WC, HC and WHR) that even not statistically significant, have clinical relevance. Supported self-care, therefore, appears as a possibility of a strategy to be implemented in the context of primary health care, provided that adaptation measures for the context of teamwork and with a greater focus on group activities and longitudinality are adopted. Supported self-care can help the male population to engage in decision-making and perform actions that contribute to self-care and DM control.

In terms of education, the data identified coincide with results presented by the 2013 National Health Survey, which show that in people with DM, those with incomplete primary education are frequent.⁽²¹⁾ In addition, these individuals and those residing in the southern region had more access to health services, i.e., this portion of the population (with incomplete primary education) is more often present in health services. It is believed to be associated with the predominance of men with this level of education in the present study.⁽²¹⁾

Regarding the assessment of the intervention, even though it was not statistically significant result, two men of IG started to practice physical activity over the period. In CG, two men stopped practicing physical activity. It is inferred that the implemented intervention caused men to start or resume the practice of physical activity, because its benefits in the treatment of DM were addressed in the intervention, especially as a factor that contributes to glycemic control and general well-being. Systematic review with meta-analysis showed that interventions with men, covering specific components of self-management in DM and focused on physical activity, produce greater effects, including on emotional aspects and quality of life.⁽²²⁾

In IG there was an increase in weekly consumption of cereals and derivatives, meat and sausages, and a decrease in the consumption of roots and tubers. It is noteworthy that IG men showed significant decrease and/or substitution in the consumption of roots and tubers such as potatoes, cassava and beet. Classification, according to the glycemic index of some common foods in the western diet, was presented to men in the intervention, which, in practice, allowed them to use this information as a criterion when choosing foods. Therefore, such results are considered important because the literature review reveals that men, compared to women, tend to show worse self-management in relation to diet.⁽²³⁾

In a controlled clinical trial conducted in a city in southeastern Brazil, it was observed that at the end of a year of intervention aimed at empowering self-care, there was no significant reduction in WC in both sample groups,⁽²⁰⁾ similar to that observed in the present study. It is noteworthy that this study was also based on the application of the Behavior Change Protocol. It is believed that the discreet finding observed on WC in the present study is linked to the small proportional increase in physical activity among men, considering that being physically active may accelerate the reduction of anthropometric measurements.

A study conducted in a municipality in the northern region of Paraná, with 134 individuals of both sexes, showed a significant reduction in WC of those who participated in nursing consultations based on the principles of supported self-care and a significant increase in individuals in the CG. This differs from the results observed in the present study. However, it can be inferred that the improvement or maintenance of a more appropriate anthropometric profile may be impaired in the absence of empowerment interventions for self-care.⁽¹¹⁾

In Canada, a study that assessed the effect of a lifestyle-focused intervention on lifestyle found that careful dietary intake had positive effects on glycosylated hemoglobin and reduced BMI among individuals with DM.⁽²⁴⁾ In the same vein, an educational intervention by an endocrinologist with 52 people of

both sexes showed significant improvement in anthropometric parameters such as BMI and WC.⁽²⁵⁾

The literature points out that both educational strategies used (group and individual home visit) produce benefits for individuals with DM, regardless of gender.⁽²⁶⁾ Individual or group interventions may have distinct effects, as men who participated in the group had the opportunity to learn about others' experiences and discuss possibilities for self-care, and those who participated in the individual meeting were able to speak more openly about particular difficulties. In the case of the present study, it was necessary to provide both strategies, as several men expressed the difficulty to participate in the groups during the BHU service hours or the preference to receive the home visit.

In a systematic review and meta-analysis study of research focused on interventions supporting self-management of chronic conditions, it is pointed out based mainly on 20 randomized controlled trials that men can derive significant benefits from their quality of life.⁽¹¹⁾ Intervention studies with men are important in order to promote greater autonomy for self-care and to prevent DM complications and high levels of dependence.⁽²⁷⁾

Conclusion

The intervention based on self-care supported and developed by nurses with men with T2DM produced statistically significant effects on the weekly frequency of food consumption, in relation to food groups such as cereals and derivatives, meat and sausages and roots and tubers. It also caused positive, however, discrete and non-significant effects on WC, HC and BFP. It is believed that better results can be achieved with intensive follow-up by participants.

Collaborations

Arruda GO, Marcon SS, Peruzzo HE, Ruiz AGB, Back IR, Nass EMA, Batista VC and Lino IGT contributed to the conception, design, analysis and

interpretation of the data, writing of the article or relevant critical review of the intellectual content and final approval of the version to be published.

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