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Original Article

Educational intervention in quality of life and knowledge of metabolic syndrome

Intervenção educativa na qualidade de vida e conhecimento da síndrome metabólica

Intervención educativa en la calidad de vida y conocimientos del síndrome metabólico

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Abstract

Objective: To assess the effectiveness of an educational health promotion program in improving quality of life and knowledge domains of metabolic syndrome.

Methods: This is a non-randomized clinical trial including 61 adults with metabolic syndrome (49±7.6 years). Participants were intentionally divided into two groups: intervention (n=31) and control (n=30). The primary outcome was the change in knowledge about metabolic syndrome and its risk factors, and the secondary, the improvement in quality of life (SF-36) assessed in two moments, at baseline and at the end of intervention (six months). Mann Whitney and Wilcoxon U tests were used, adopting a significance level of 5%.

Results: The educational program improved the body ache domain of quality of life in the intervention group (p=0.01), although with no statistical difference between the groups. Knowledge about hypertension and diabetes (p=0.02), metabolic syndrome (p<0.001) and general knowledge (p<0.001) showed a significant increase in the intervention group at six months, which did not occur in the control group.

Conclusion: The educational program can be an effective strategy to improve quality of life, highlighting the domain of body ache and increasing knowledge of metabolic syndrome in adults with the syndrome.

Resumo

Objetivo: Avaliar a efetividade de um programa educativo de promoção à saúde na melhora dos domínios da qualidade de vida e no conhecimento da síndrome metabólica.

Métodos: Ensaio clínico não-randomizado incluindo 61 adultos com síndrome metabólica (49±7,6 anos). Os participantes foram intencionalmente alocados em dois grupos: intervenção (n=31) e controle (n=30). O desfecho primário foi a mudança do conhecimento sobre síndrome metabólica e seus fatores de risco, e o secundário, a melhora da qualidade de vida (SF-36) avaliados em dois momentos, na condição basal e ao final da intervenção (seis meses). Foram utilizados os testes U de Mann Whitney e Wilcoxon, adotando-se nível de significância de 5%.

Resultados: O programa educativo melhorou o domínio de dor corporal da qualidade de vida no grupo intervenção (p=0,01), embora sem diferença estatística entre os grupos. O conhecimento sobre hipertensão e diabetes (p=0,02), síndrome metabólica (p<0,001) e conhecimento geral (p<0,001) apresentaram aumento significativo no grupo intervenção aos seis meses, o que não ocorreu no grupo controle.

Conclusão: O programa educativo pode ser uma estratégia efetiva para melhorar a qualidade de vida com destaque para o domínio de dor corporal e aumentar o conhecimento da síndrome metabólica em adultos com a síndrome.

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Conflicts of interest: nothing to declare.

Resumen

Objetivo: Evaluar la efectividad de un programa educativo de promoción de la salud en la mejora de los dominios de calidad de vida y en los conocimientos del síndrome metabólico.

Métodos: Ensayo clínico no aleatorizado, que incluyó 61 adultos con síndrome metabólico (49±7,6 años). Los participantes fueron intencionalmente separados en dos grupos: experimental (n=31) y de control (n=30). El criterio principal de valoración fue el cambio de conocimientos sobre síndrome metabólico y sus factores de riesgo, y el secundario, la mejora de la calidad de vida (SF-36), evaluados en dos momentos: en condición basal y al final de la intervención (seis meses). Se utilizaron las pruebas U de Mann-Whitney y de Wilcoxon y se adoptó un nivel de significación de 5 %.

Resultados: El programa educativo mejoró el dominio de dolor corporal de la calidad de vida en el grupo experimental (p=0,01), aunque no hubo diferencia estadística entre los grupos. Los conocimientos sobre hipertensión y diabetes (p=0,02), síndrome metabólico (p<0,001) y conocimientos generales (p<0,001) presentaron aumento significativo en el grupo experimental a los seis meses, lo que no ocurrió en el grupo de control.

Conclusión: El programa educativo puede ser una estrategia efectiva para mejorar la calidad de vida, con énfasis en el dominio de dolor corporal, y aumentar los conocimientos sobre el síndrome metabólico en adultos con el síndrome.

Brazilian Clinical Trial Registry (REBEC): RBR-43K52N

Introduction

Metabolic syndrome (MS) is triggered by the aggregation of cardiovascular risk markers involving a multifactorial etiology. MS diagnosis is based on an individual with at least three of the following risk factors: increased waist circumference, increased blood pressure, fasting vascular glucose, triglycerides and/or low levels of high-density lipoprotein cholesterol (HDL-c).[1,2]

In addition to the risk factors that define MS, other factors can contribute to trigger the syndrome, such as maintenance of an unhealthy lifestyle and lack of knowledge. It is also known that people with MS have consequently compromised quality of life and are at increased risk of morbidity and mortality related to cardiovascular diseases and type 2 diabetes mellitus.[1,3] Data from a cross-sectional study, from population base, found a prevalence of 38.4% of MS in the adult Brazilian population, also showed that the lower the level of education, the higher the prevalence of MS components.[4]

Lifestyle modification has been recommended as a therapeutic measure for individuals with MS. This is a comprehensive approach based on exercise, nutrition, health education and pharmacotherapy.[5] Studies have reported significant effects of lifestyle modification programs on the quality of life domains of people with MS.[5,7] However, most interventions especially address exercise and diet in an isolated, intensive and/or restrictive manner.[8,9] Moreover, little is known about the effects on increasing knowledge in relation to metabolic and cardiovascular parameters in the context of MS, as the results are mainly demonstrated in the physiological markers of MS.[5,10] Therefore, a multidisciplinary educational program for health promotion was developed, led by nurses, with encouragement for changes in the lifestyle of people with MS through the understanding of cause-effect relationships.

This study aimed to assess the effectiveness of an educational health promotion program in improving quality of life and knowledge domains of MS.

Methods

This was a non-randomized, controlled, open, two-arm clinical trial. It was carried out in a primary care health center in the urban area of the city of Jequié, BA, Brazil.

The study included men and women between 18 and 59 years of age, with three or more clinical components for MS, according to criteria of the Third Report of the National Cholesterol Education Program Expert Panelon Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (NCEP-ATP III)[2]: waist circumference measurement >88 cm for women and >102 cm for men; systolic blood pressure ≥130 mmHg, diastolic blood pressure ≥85 mmHg; fasting blood glucose ≥100 mg/dl; triglycerides ≥150 mg/dl; HDL-c <40 mg/dl for men and <50 mg/dl for women; and/or fasting blood glucose ≥100 mg/dl. Individuals who presented any of the following situations were

excluded: adults diagnosed with type I diabetes; pregnant women; cognitive impairment; and present a number of more than 50% of absences in the workshops.

The sample size was 80 volunteers, considering an effect size of 0.25, alpha error of 5%, statistical power of 80% and sample loss of 20%. Recruitment followed a standardized screening protocol by the research team, with individuals who attended the health center and met the eligibility criteria being invited to participate in the study.

Among the volunteers (n=108), 80 individuals from the healthcare center were considered eligible (74.1%). After initial screening, participants were intentionally divided into two groups of 40 individuals: intervention (Caring for Educating in Metabolic Syndrome, CEMS-G), which participated in the health promotion educational program, and control (Control-G), which maintained care habitual. In the CEMS-G, nine participants were excluded: one for becoming pregnant and eight for having low attendance at the workshops. In the control-G, ten participants were excluded: two moved to another city and eight were not interested in continuing the study. The study participant distribution flowchart is shown in Figure 1.

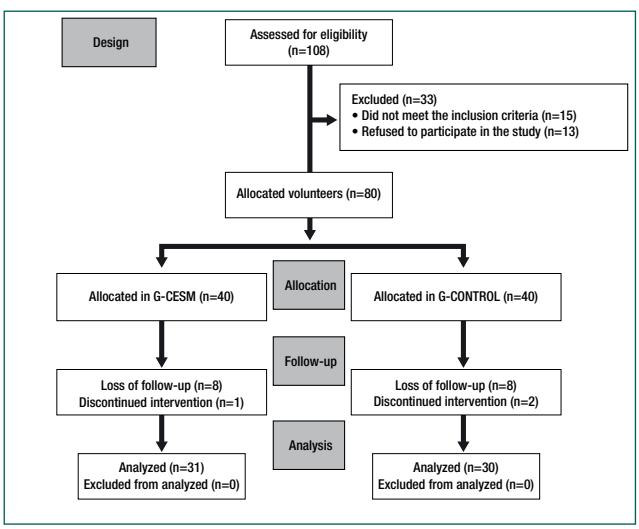

Figure 1. Flowchart of participant distribution

The CEMS-G participated in the health promotion program that consisted of seven monthly group workshops planned and based on the Pedagogy of Autonomy[11] for health promotion, with the possibility of changes in knowledge and lifestyle. The program content was developed based on the clinical guidelines for people with MS[12-14] and in cooperation with the interests of the group. Each one lasted from 90 to 120 minutes, led by nurses and structured in two moments. In the first moment, the project project nurses addressed the programmed content and, in the second moment, an invited health professional talked to participants about issues of interest to the group, which were defined at the end of each workshop. Therefore, participants were welcomed, and then the approach to the content programming began, covering MS and its risk factors (concept, diagnosis, treatment and complications), healthy eating, sedentary behavior, pain, stress and anxiety, ergonomics, integrative activities, metabolic, and cardiovascular disorders. The invited professionals were as follows: physical educator, nurse, physiotherapist, pharmacist, cardiologist, nutritionist and psychologist. The program was conducted and carried out by three nurses from the Health and Quality of Life Research Group (UESB), who established cordial relationships with the group participants and received the same instructions and training to collaborate in carrying out the intervention.

The control-G did not participate in the educational program and, like the CEMS-G, maintained usual care at the healthcare center, with monthly appointments. They received a monthly phone call to confirm participation in the study, attending the health center for the appointment. In addition to the scheduled measurements, there was no other type of personal contact between the researchers and the control group during the study.

The groups were assessed at baseline (pre-intervention) and six months after the intervention period (post-intervention). The meetings for data collection were previously scheduled by telephone and carried out by a team of researchers trained, by the main researcher, to ensure quality of data production, without bias. Participants' assessments were carried out separately in a private room at the healthcare center, to avoid that the answers of some influence those of others.

Sociodemographic data were collected at baseline through individual interviews, using a

questionnaire structured in three general fields, namely: personal identification (gender, age, color, marital status, education and income); general aspects of health (diabetes and hypertension); lifestyle (smoking habit, alcohol use and physical activity).

Anthropometric variables of weight (kg) and height (cm) were measured in pre-intervention and post-intervention moments, only once by the same researcher. Weight was measured with participants barefoot and wearing light clothing, on a portable digital scale (Wiso®, model W801) with a capacity of 0-180 kg and accuracy of 100g. Height was measured with a portable metal stadiometer (Sanny, capriche model), with a resolution of 0.1mm. After measuring the two measurements, body mass index was calculated (BMI = weight (kg)/height x height (m^2)). Individuals with BMI values between 18.5 and 24.9 kg/m^2, overweight between 25.0 and 29.9 kg/m^2 were considered eutrophic; and with obesity, those with BMI ≥ 30 kg/m^2.[15]

Quality of life was assessed in the pre-intervention and post-intervention moments using the SF-36 Quality of Life Questionnaire, which consists of a questionnaire consisting of 36 items divided into eight domains: functional capacity; limitation due to physical aspects; body ache; general health status; vitality; social aspects; limitation due to emotional aspects; and mental health. The final score ranges from 0 to 100 for each domain (obtained by calculating the Raw Scale), the highest scores indicate better quality of life.[16]

The assessment of knowledge about MS and its risk factors was verified in the pre-intervention and post-intervention moments through a structured questionnaire, prepared for the study, consisting of 36 questions distributed in eight thematic groups: diabetes and hypertension (7 items); smoking and alcohol (3 items); stress (3 items); sedentary lifestyle (3 items); medications (2 items); food (9 items); MS (9 items) and general knowledge (the sum of all items). For each question answered correctly, the value of one point was attributed, adding a maximum total of 36 general knowledge points. Comparisons to verify the increase in knowledge were made between groups and over time.

Statistical treatment was performed using the Statistical Package for the Social Sciences (SPSS, version 21.0). Categorical data were described as relative and absolute frequency, while continuous data were expressed as median and interquartile range (IQ). The absence of data normality was verified by the Kolmogorov-Smirnov test and analysis of variance homogeneity was performed by the Levene test. Therefore, the Mann Whitney U test was used to compare continuous data between the groups (CEMS-G and control-G), and the Wilcoxon test was applied for intragroup analysis in the pre- and post-intervention moments. For all analyses, a significance level of 5% was considered.

The project was submitted and approved by the Institutional Review Board of the *Universidade Estadual do Sudoeste da Bahia* (UESB, CAAE (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 92352818.9.0000.0055, Opinion 2,850,239), and registered in the Brazilian Clinical Trial Registry (REBEC, number RBR-43K52N).

Results

A total of 61 participants who completed the study were analyzed, aged 49±7.6 years, ranging from 30 to 59 years old, distributed in two groups CEMS-G (n=31) and control-G (n=30), for six months. In general, there was a predominance of females (91.8%), non-whites (80.3%), with a partner (68.9%), education equal to or less than eight years (64.5%), earning a minimum wage or more (63.9%), non-smoker (80.3%), without the habit of drinking (54.1%) and did not practice physical activity (60.7%). Most participants were overweight (63.9%), had diabetes (70.5%) and hypertension (88.5%). Both groups had similar characteristics, with no significant difference between them (Table 1).

Regarding the impact of the educational program on participants' quality of life, no significant difference was identified for the domains in the analysis between groups (Table 2). However, it was observed that only the functional capacity domain

showed a reduction in the CEMS-G score after the intervention, while all other domains had higher scores when compared to the baseline condition of the study. Furthermore, there was a statistical difference for the domain of body ache in the CEMS-G after the intervention period (p=0.01).

From the assessment of knowledge about MS and its risk factors, the effect of the implemented educational program can be noted, asince there was an increase in three of the variables tested (hypertension and diabetes, p=0.02; metabolic syndrome, p<0.001; general knowledge, p<0.001) for the CEMS-G, after six months of intervention with seven workshops themes, which was not observed in the control-G (Table 3). Although without statistical difference between groups.

Table 1. Sample characteristics in intervention and control groups

Characteristics	Control-G (n=30) n(%)	CEMS-G (n=31) n(%)
Sex		
Male	1(3.3)	4(12.9)
Female	29(96.7)	27(87.1)
Color		
White	8(26.7)	4(12.9)
Non-white	22(73.3)	27(87.1)
Marital status		
With a partner	24(80.0)	18(58.1)
Without a partner	6(20.0)	13(41.9)
Education		
< 8 years of study	19(63.3)	20(64.5)
> 8 years of study	11(36.7)	11(35.5)
Income		
< 1 minimum wage	12(40.0)	9(29.0)
> 1 minimum wage	18(60.0)	22(71.0)
Smoking habit		
No	24(80.0)	25(80.6)
Smoke or used to smoke	6(20.0)	6(19.4)
Use of alcohol		
No	16(53.1)	17(54.8)
Drink or used to drink	14(45.2)	14(46.7)
Physical activity		
No	18(60.0)	19(61.3)
Yes	12(40.0)	12(38.7)
BMI(kg/m²)		
Eutrophic	3(10.0)	3(9.7)
Overweight	21(70.1)	18(58.1)
Obesity	6(20.0)	10(32.2)
Diabetes		
No	7(23.3)	11(35.5)
Yes	23(76.7)	20(64.5)
Hypertension		
No	2(6.7)	5(16.1)
Yes	28(93.3)	26(83.9)

n(%) - relative and absolute frequency; control-G - control group; CEMS-G - care group educating on metabolic syndrome; BMI - body mass index.

Discussion

This study assessed the effectiveness of an educational intervention program to change knowledge about MD and its risk factors, as well as verifying effects on improving the quality of life of adults with MS after six months of intervention. The intervention program was well received by participants, who had complete follow-up, represented by a substantial percentage of adherence (76.3%). Most participants were obese or overweight, diabetic, hypertensive and did not practice physical activity.

The program's workshops had a multidisciplinary approach to health promotion for adults with MS, including nursing guidance and leadership as a novelty. The results suggest that the CEMS-G showed improvement for most of domains of participants' quality of life, with a significant increase in the body ache score. Another important contribution of this study was that it demonstrated effects

Table 2. Comparisons of quality of life domains in the control-G and CEMS-G in the pre- and post-intervention moments

Variables	Control-G (n=30)		CEMS-G (n=31)		p-value*	p-value#
	Pre	Post	Pre	Post		
SF-36						
Functional capacity	60 (45-75)	70 (50-90)	75 (55-85)	65 (55-90)	0.27	0.64
Physical aspects	12 (0-100)	0 (0-100)	75 (0-100)	100 (25-100)	0.96	0.31
Body ache	46 (22-72)	46.5 (22-72)	42 (22-72)	62 (42-100)	0.92	0.01#
Overall health status	52 (34-66)	47 (39-67)	57 (30-70)	60 (47-72)	0.79	0.32
Vitality	52 (35-60)	55 (45-65)	55 (40-65)	65 (50-70)	0.06	0.06
Social aspects	94 (50-100)	62 (38-100)	75 (50-100)	88 (62-100)	0.25	0.20
Emotional aspects	0 (0-100)	0 (0-100)	100 (0-100)	0 (0-100)	0.93	0.36
Mental health	58 (35-68)	58 (43-77)	76 (64-92)	80 (64-92)	0.38	0.90

Median and interquartile range; Mann-Whitney U test and Wilcoxon test; p* - statistical significance in relation to pre in the control-G; p#- statistical significance in relation to pre in CEMS-G; control-G - control group; CEMS-G - care group educating on metabolic syndrome; SF-36 - SF-36 Quality of Life Questionnaire.

Table 3. Assessment of correct answers in the MS knowledge questionnaire and its risk factors in the control-G and CEMS-G in the pre- and post-intervention moments

Variables	Control-G (n=30)		CEMS-G (n=31)		p-value*
	Pre	Post	Pre	Post	
Knowledge					
HP and diabetes (7 points)	7 (6-7)	7 (6-7)	6 (5-7)	7 (6-7)	0.02*
Smoking and alcohol(3 points)	1 (1-2)	1 (1-2)	1 (1-1)	1 (1-1.5)	0.19
Stress(3 points)	2 (2-2)	2 (2-2)	2 (2-2)	2 (2-2)	0.53
Sedentary lifestyle(3 points)	1 (1-2)	1 (1-2)	1 (1-2)	1 (1-1)	0.06
Medication(2 points)	1 (1-1)	1 (1-1)	1 (1-1)	1 (1-1)	0.41
Food(9 points)	7 (6-7)	7 (6-7)	7 (6-7)	7 (7-7)	0.17
Metabolic syndrome(9 points)	0 (0-1)	0 (0-0)	0 (0-1)	8 (8.5-9.0)	<0.01*
General knowledge(36 points)	20.5 (19-22)	20.5 (20-23)	20 (18.5-21)	28 (26-29)	<0.01*

Median and interquartile range; Mann-Whitney U test and Wilcoxon test; p* - statistical significance in relation to pre in the same group; control-G - control group; CEMS-G - care group educating on metabolic syndrome; HP - hypertension

on knowledge about hypertension, diabetes, MS and general knowledge of MS risk factors in adults with a low level of education (< 8 years) after the end of intervention.

Also, in relation to knowledge, the increase in significant points for MS in the CEMS-G is a finding that deserves attention, as it shows the importance of conducting group workshops as a health promotion technology in the care and screening of adults with MS assisted by the public health system, partially confirming the investigated hypothesis.

Studies investigating the effects of health promotion programs observed improvements in the quality of life domains in adults with MS.[5-8,17] For instance, a lifestyle intervention for women with MS (n=52; 62.7±9.0 years) at three community healthcare centers showed significant improvement for physical aspects, general health status, vitality and mental health of quality of life, at six months and maintained until 12 months after the intervention.[5] The body ache score in the intervention group increased after six months of intervention, compared to a decrease in the score in the control group over the same period, although with no significant difference.[5]

In the study[17] (n= 58; 48.6±5.8 years), a significant increase in body ache score was also verified after receiving intervention of cognitive behavioral therapy, with group discussion on eating habits, exercise, stress control and breathing. Another study (n=160; 44.2±10.0 years) found an improvement in the domain of body ache in the intervention group at three and six months after applying a website program for health promotion, which produced significant results in the adoption of healthy eating and physical activity habits. [18] These issues are consistent with those addressed in the program investigated in this study. It is believed that guidance, especially in groups, may have led participants to adopt recommended prevention and care behaviors during the treatment of MS, which may have helped to increase scores in most quality of life domains and cause significant improvement in body ache, which was also one of the subjects discussed in the workshops.

There is evidence that intervention programs aimed at encouraging the practice of physical activity and eating habits had an improvement in the MS quality of life domains.[10,19] The results of the programs become even more relevant because they show a decrease in body weight, waist circumference, BMI, blood pressure, HDL-c and triglycerides,[5,6,8 ,10,17,19] as they are considered indicators that can compromise quality of life and increase the risk of developing MS.[7]

The improvement in the domains of quality of life in the CEMS-G suggests a change in lifestyle behaviors towards the adoption of healthier habits, based on a multidisciplinary approach with the involvement of participants. Therefore, the investigated program provides an alternative to improve body ache quality of life in adults with MS, users of a healthcare center. It is recognized that healthcare centers within the scope of primary care are ideal environments for developing lifestyle interventions, such as the one tested in this study, because they favor an important combination of health care and social support.[20,21]

Maintaining healthy behavior over two years was associated with greater chances of not developing MS. Group interventions produce essential factors for adherence and maintenance of a healthy lifestyle, as they enable communication, emotional support, motivation and shared decision-making among participants and healthcare professionals. After participants acquire knowledge about MS, it will allow them to better manage their habits and maintain healthy behavior practices in their daily lives. It is at this point that continuous monitoring by healthcare professionals can ensure the continued promotion of well-being, as demonstrated by previous research.[6,22-24]

The improvement in knowledge is relevant, as the characteristics of participants contribute to the lack of knowledge about MS. As seen above, the low level of education and, mainly, because it is known that people with diabetes have impaired cognitive function and physical capacity, which worsens with advancing age (>55 years).[25] Moreover, overweight and obese individuals demonstrated ignorance of MS and its risk factors.[26,27] Therefore, it indicates the need for health education intervention for this group at risk.

Another cross-sectional study,[3] also identified a low level of knowledge about MS in adults (n= 113; 58.5±10.1 years), with cardiometabolic risk factors. And it showed interesting results, it was found that the variables with longer years of education (between 9 to 12 years or > 12 years), previous history of dyslipidemia and normal HDL-c level are predictive characteristics of knowledge about MS, most likely, due to the cause-effect relationship between increased knowledge of MS and better self-care management.[3]

Therefore, the finding of ignorance about MS at baseline in both groups agrees with findings from previous cross-sectional studies.[2,21] Satisfactorily, it was possible to improve the level of knowledge about MS and its risk factors after six months of intervention of an educational program for health promotion. Although there is currently little evidence of educational interventions in knowledge of MS, there has been a significant increase in knowledge about other chronic diseases such as hypertension and diabetes. Based on our findings, implementing health promotion programs with a focus on MS appears to improve adult behavior as per MS prevention and treatment recommendations.

The results of this study show that an educational health promotion program significantly improves body ache and quality of life in adults with MS. Although there was no statistical significance, the score of most quality of life domains in the CEMS-G increased throughout the study, which was not observed in the control-G. It also contributed to increase the general knowledge of MS risk factors, with increased knowledge about hypertension, diabetes and MS itself in relation to the baseline for the end of intervention. These changes may provide clinical benefits for adults with MS at community health centers.

Despite the satisfactory results of this intervention, this study has some limitations. A convenience sample was used, due to the specificity of the eligibility criteria. Furthermore, voluntary participation restricted to adults from a single healthcare center may have contributed to the small sample size. These conditions can limit the generalizability of results. Another fact is that all adults belong to the same community and, in this case, blinding the participants would not be possible. Despite this, the groups still show important differences in their results. The study investigated the short-term effects (six months). Long-term randomized studies that include more health centers are needed to verify whether these changes in quality of life and knowledge of MS are maintained. However, our program provided nursing follow-up with anthropometric assessment, cardiometabolic risk factors and specific knowledge of health promotion for MS, guided by specialists for six months.

This study suggests that an educational program led by nursing promotes health through lifestyle changes capable of improving quality of life, especially body ache and knowledge of risk factors for MS, in adults with MS. This result is clinically relevant, as it was achieved without the prescription of any type of restrictive diet or high-intensity physical activity. This program is considered to be economically viable and does not add a high work-

load to health professionals in primary care centers. Certainly, these factors were decisive for achieving satisfactory results from the investigated program.

Conclusion

The intervention of an educational group health promotion program, over a six-month period, improved the assessment of quality of life with a significant effect on the body ache score in adults with MS. There was also an improvement in the general knowledge of MS and its risk factors. The results confirmed that the investigated program can be an efficient and low-cost strategy for primary healthcare centers.

Collaborations

Santos ISC, Araújo WA, Damaceno TO, Souza AS, Boery RNSO and Fernandes JD contributed to the study design, data analysis and interpretation, article writing, relevant critical review of the intellectual content and approval of the final version to be published.

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