Original Article

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Effectiveness of a dietary re-education and physical activity program on obesity

Eficácia de um programa de reeducação alimentar e prática de exercício físico na obesidade

Eficacia de un programa de reeducación alimenticia y práctica de ejercicio físico en la obesidad

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ABSTRACT

Objective: To evaluate the effects on obesity of a weight loss method that associates dietary re-education and physical activity.

Method: A retrospective, cross-sectional, and quantitative study using secondary data from individual follow-up forms of a weight loss clinic located in a municipality in northwestern Paraná, Brazil. Data collection took place in August 2018 through a checklist of anthropometric parameters, being stored in Excel spreadsheets and analyzed by descriptive statistics using the SPSS program.

Results: The mean weight loss was 15.22 kg, and the weight loss method was associated with beneficial results in relation to the following variables: weight, body mass index, body and visceral fat, muscle mass, basal metabolism rate, waist circumference, and hip circumference.

Conclusion: The association of dietary re-education with regular physical exercise has a positive impact on obesity.

Keywords: Exercise. Risk factors. Obesity.

RESUMO

Objetivo: Avaliar os efeitos na obesidade, de um método de emagrecimento que associa reeducação alimentar à prática de exercício físico.

Método: Estudo retrospectivo, transversal, quantitativo, realizado por meio de dados secundários retirados de ficha de acompanhamento individual de uma clínica especializada em emagrecimento de um município do noroeste do Paraná. A coleta de dados ocorreu no mês de agosto de 2018 por meio de um *checklist* de parâmetros antropométricos, sendo armazenados em planilhas do Excel e analisados por meio de estatística descritiva utilizando o programa SPSS.

Resultados: A média de peso perdido foi de 15,22 kg e o método de emagrecimento esteve associado à resultados benéficos em relação às variáveis: peso, índice de massa corporal, gordura corporal e visceral, massa muscular, metabolismo basal e circunferência de cintura e quadril.

Conclusão: A associação da reeducação alimentar com a prática de exercícios físicos regularmente tem impacto positivo na obesidade.

Palavras-chave: Exercício físico. Fatores de risco. Obesidade.

RESUMEN

Objetivo: Evaluar los efectos en la obesidad de un método de adelgazamiento que asocia reeducación alimentaria a la práctica de ejercicio físico.

Método: Estudio retrospectivo, transversal y cuantitativo, realizado por medio de datos secundarios retirados de fichas de seguimiento individuales de una clínica especializada en adelgazamiento de un municipio del noroeste de Paraná. La recolección de datos tuvo lugar en el mes de agosto de 2018 por medio de una lista de verificación de parámetros antropométricos, que se almacenaron en hojas de Excel y se analizaron por medio de estadística descriptiva utilizando el programa SPSS.

Resultados: El promedio de peso perdido fue de 15,22 kg y el método de adelgazamiento estuvo asociado a resultados benéficos en relación a las siguientes variables: peso, índice de masa corporal, grasa corporal y visceral, masa muscular, metabolismo basal y circunferencia de cintura y cadera.

Conclusión: La asociación de la reeducación alimentaria con la práctica de ejercicios físicos regularmente tiene un efecto positivo sobre la obesidad.

Palabras clave: Ejercicio físico. Factores de riesgo. Obesidad.

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INTRODUCTION

The high prevalence of chronic diseases has had a direct impact on the profile of population morbidity and mortality. One of the most important risk factors for these diseases is obesity, which results from the excessive accumulation of fat in the organism and is associated with health risks, due to its relationship with several metabolic complications. Furthermore, obesity is considered a multi-factorial condition, because its causes are related to biological, historical, ecological, economic, social, cultural, and political issues[1].

It is noteworthy that obesity is a worldwide public health problem. In Brazil, more than half of the population is estimated to be overweight or obese[1]. The Global Burden of Disease (GBD) Brazil study[2] showed increased rates of obesity, fasting glucose, and use of alcohol, corroborating with data from most of the countries in the world. Data from the GBD 2015 indicate that the number of obese people increased to 604 million adults and 112 million children worldwide; additionally, its prevalence doubled from 1980 to 2015 in more than 70 countries analyzed in the GBD study[2].

Obesity has a direct relationship with the highest blood pressure, like hypercholesterolemia, hypertriglyceridemia, and diabetes. This condition is caused by excessive intake of inadequate foods throughout life, and the maintenance of these bad eating habits leads to progressive weight gain[1,3].

Prevention and treatment of obesity are characterized by a multi-professional and transdisciplinary approach, since it is considered a multi-factorial, recurrent, and often silent disease that has a devastating impact both on the individual's life and on the economy of the country if not prevented and treated correctly[1,4-5].

It is worth highlighting the importance of the health care professionals addressing the risk behaviors, with the purpose of reducing obesity-related complications. Furthermore, nutritional therapy, pharmacological and psychological treatment, physical exercise, and sometimes surgical treatment, stand out as the best treatment approaches. However, lifestyle changes are known to be the best strategy to combat obesity, together with the practice of physical activity, giving priority to healthy food, and seeking to reduce everyday stress, because these are the main factors directly associated with obesity[4-5].

In this aspect, physical exercise is considered as a substantial contributor to improve several bodily factors, such as cardiorespiratory fitness, body composition, reduction in body fat, and psychological well-being. Physical exercise has been shown to be an important tool to face obesity, because it provides positive results in terms of body composition and reduced mortality associated with overweight[6].

Considering the above assumptions, physical exercise stands out as one of the main strategies to reduce obesity, overweight and body fat, and this effect is even greater when physical activity is associated with a healthy diet[7].

In this sense, it is important to note that, in 2018, only 33.9% of the Brazilian adults consumed fruits and vegetables regularly, whereas the national indicator for consumption of industrialized juices and soft drinks was 14.4% in the same period[8].

In most countries, there is a remarkable evolution in the occurrence of chronic diseases such as obesity, hypertension, cardiovascular diseases, and certain types of cancer, related to excessive caloric intake and to the unbalanced offer of nutrients in the diet. Initially described as diseases typical of older adults, many of these problems currently affect young adults and even adolescents and children[7].

The following question arises in this context: What is the effect of a program of dietary re-education and physical exercise on obesity? The present study aimed to analyze the effects of a program associating dietary re-education and physical exercise on obesity, in order to support this process of permanent education.

METHOD

This is a retrospective, cross-sectional, and quantitative study using secondary data from follow-up forms of individuals who participated in a weight loss program at a specialized clinic located in a municipality of northwestern Paraná, Brazil. The inclusion criterion for analyzing the service record in the study was the following: having participated in the weight loss method from January to April 2018; the records of all those who missed more than two consecutive program activities or did not follow the routine proposed by the method were separated and discarded. The records of all the other participants who were committed to the process were analyzed, totaling 23.

Data collection took place by means of a checklist in August 2018, and included the following data: Body Mass Index (BMI), Body Age, % Muscle Mass, % Body Fat, Waist Circumference (WC), Hip Circumference (HC), and Basal Metabolic Rate (BMR), all of which were compared before and after participation in the weight loss method.

The individuals were classified according to the following BMI values: from 25.0 to 29.9, overweight; from 30.0 to 34.9, obesity class I, from 35.0 to 39.9, obesity class II; above 40.0, morbid obesity[7].

The weight loss method includes 3 treatment cycles and lasts for 3 months. The first cycle, considered that of weight loss, lasts for 1 month and is aimed to reduce the levels

of hypothalamic inflammation, to accelerate metabolism, to promote metabolic detoxification, and to reduce body measures. The second, defined as the maintenance phase, also lasts for 30 days, and aims to not recovering the lost weight, to continue with the weight loss process, to learn how to control emotions, to reduce the levels of hypothalamic inflammation, and to prevent new inflammations. The third and last cycle, known as re-education, lasts for 30 days and aims to control cholesterol and glucose, to maintain weight, to improve physical and mental performance, to control stress, and to gain muscle mass. This re-education phase prepares the individual to complete the method and to maintain weight controlled in the long term, teaches strategies of moderation, healthy eating, and practice of physical activity for everyday life.

Before starting the intervention with the weight loss method, the participants had been assessed for by a process to verify the following factors: weight and height; body age; muscle mass; body fat, and BMR, all of which were collected with an Omron bioimpedance scale with Body Analyzer. The waist circumference and hip circumference data were collected using a simple measuring tape. These data were obtained on a weekly basis in order to verify the participant's evolution during the 3-month program.

At the beginning of the weight loss method, the participants received face-to-face nutritional guidelines on a weekly basis and had their anthropometric parameters measured; they were also monitored daily by a group on the WhatsApp messaging application, where they posted their daily weight and shared pictures of all their meals. In parallel with dietary re-education, the participants practiced physical exercises for 30 minutes twice a week, under the supervision and guidance of a personal trainer. In these training sessions, a sequence of exercises was systematically designed and assessed, including aerobic activities, such as walking, jogging, jump, step, and vibration platform, and anaerobic activities by means of strength exercises with dumbbells and ankle weights. A different series of exercises was used each week, always based on aerobic and weight training exercises, which aimed to increase energy expenditure and help burn fat[9]. It is known that this type of exercise, in addition to increasing energy expenditure, improves the functioning of the cardiorespiratory system, as it promotes strengthening of the muscles involved, improves muscle tone, increases muscle resistance, and increases lean muscle mass, which reflects in bone strength and density, in addition to accelerating metabolism[4-5,9]. The intensity and the sequence of the exercises were similar for all the participants, but some changes were made according to restrictions related to weight and to muscle and bone problems.

The data were stored in spreadsheets so as to allow relating the variables of interest, and were analyzed by means of descriptive statistics using the SPSS program. To this end, a non-parametric statistical analysis (Wilcoxon test, $p < 0.05$) was conducted, considering the small sample size, and the data were presented in table format.

For conducting the study, prior approval was requested from the Directors of the clinic to access the follow-up records. Furthermore, the project was approved by the Research Ethics Committee of the State University of Maringá (CAEE 92178818.0.0000.0104), with opinion No. 2,792,476 of July 31st, 2018.

RESULTS

A total of 23 records were analyzed, and the participants' mean age was 40 years old (minimum 24 and maximum 75). Among the participants, 10 were married, 21 were women, and 16 (66.6%) reported not practicing any physical activity at the beginning of the weight loss method. For the measures of body weight, the mean weight loss after participation in the program was 15.22 kg.

The results were compared separately, that is, the evolution of the final value in relation to the initial, and the data related to the analyzed variables in the pre- and post-program phases are shown in Table 1.

The method had a considerably positive effect on the BMI, leading to a statistically significant reduction ($p = 0.001$) in the post-program values compared to the initial values in each group. A significant reduction was verified in the participants' body fat final values in relation to the initial values, as shown in Table 1 ($p = <0.000$). However, the same effect was not observed for waist and hip.

At the end of the method, it was possible to verify a very significant improvement, since the number of adequate weight and overweight individuals increased from two to nine and from seven to twelve, respectively, whereas the number of participants classified as obesity class I decreased from ten to two. No individual was classified or stayed as obesity class II at end of the program. These findings demonstrate the positive impact of dietary re-education and physical activity on the Body Mass Index.

It is worth nothing that, at the beginning of data collection, there were 2 individuals with WC < 80 cm, two with WC from 80 cm to 88 cm, and 19 with WC ≥ 88 cm while, at the end of the follow-up, it was observed that 10 individuals reached the WC goal of ≤ 80 cm, that six individuals had a WC value from 80 cm to 88 cm, and that only seven individuals continued to be classified as risk class II, with WC ≥ 88. Therefore, it is possible to verify the significant improvement

among the research participants, since none of them was still classified as obesity class II at the end of the study.

The weight loss method was associated with beneficial results for the following variables: weight, body mass index, body and visceral fat, muscle mass, basal metabolism, waist circumference, and hip circumference. The body age variable was not significantly associated with the weight loss method under study, being 56.73 at the beginning and 45.26 at the end of the program, with a p-value = 0.77.

DISCUSSION

The incidence of overweight and obesity is increasing in each successive generation of young adults. A study demonstrated that the associated comorbidities will emerge at an earlier age unless weight gain is prevented. It is also worth noting that young adults (aged from 18 to 35 years old) from lower socioeconomic classes and ethnically diverse backgrounds have a higher risk for overweight or obesity, and that the obesity management and control actions are not still clearly defined[9].

The participants of the present study belonged to an older age group, which can be associated with gaps in the health education process about the risks of overweight and obesity for quality of life in this collective, leading them to a delayed search for health care.

The simultaneous effect of diet and physical activity on obesity prevention and treatment has been the focus of several studies[5,10]. In this sense, the importance of actions is reinforced, especially in Primary Health Care (PHC), which promote the acquisition of healthy habits and which develop the individuals' autonomy for healthy choices.

In the present study, the effect of the method was considerably positive in relation to body fat (from 44.2 to 35.1), which reflected in a significant weight loss and in increased muscle mass (from 24.1 to°28.1), an indicator that knowingly leads to positive quality of life outcomes. It is worth noting that these variables change from one person to another, and that, in some studies, the divergences found in the results in relation to the effect of diet and physical activity on body mass, body composition, and BMR of obese individuals can be attributed to several factors, such as exercise intensity, magnitude of the caloric restriction, initial amount and distribution of body fat, and varied combinations of diet and physical activity using different protocols[11-12].

It also worth stressing that obese people are not required to engage in high-intensity exercise, especially to encourage those who are physically inactive, since low-to-moderate intensity exercise is considered to be sufficient to provide active moments, promoting the prevention and control of diseases caused by high visceral fat levels[13-14]. In this way, the development of operationalized actions by means of groups that involve moderate intensity exercise can constitute an important alternative in the promotion and prevention actions developed by the PHC team.

In this study, a reduction in the participants' mean weight (from 83.6 to 68.51) was observed and, consequently, a

Table 1 – Comparison of the values of the bioimpedance variables before and after the method, Brazil, 2018

Variable	Mean before the method (n=23)	Mean after the method (n=23)	p
Weight	83.6	68.51	0,003
BMI	31.3	26.1	0.001
Body fat	44.2	35.1	<0.000
Muscle mass	24.1	28.1	<0.000
Visceral fat	9.3	6.7	0.002
Body age	56.73	45.26	0.77
Basal metabolism rate	1,546.3	1,409.7	0.003
Hip circumference	112.26	101.13	0.005
Waist circumference	99.21	84.9	<0.000

Source: Research data, 2018.

significant reduction in the BMI (from 31.3 to 26.1). It is known that the diagnosis of overweight/obesity has been made using the BMI, which is calculated by diving body mass by height squared and was initially designed for use in adults, due to its association with morbidity and mortality risk, reiterating that obesity is a risk factor especially for chronic non-communicable diseases[7].

It was also verified that a great number of individuals had an initial BMI above adequate levels, with only two participants showing an adequate BMI at the beginning of the method, 07 classified as overweight, 10 classified as obesity class I, and four as obesity class II.

In addition to the BMI, which is regarded as one of the best indicators for detecting overall obesity, waist circumference, the waist-to-hip ratio, and the waist-to-height ratio are considered excellent indicators for abdominal obesity. Although the anthropometric indicators are not the most accurate methods for assessing body composition, they have good reliability, are the most economical ones, and can be applied on a large scale[10,15].

The pattern of body fat distribution is a more significant risk factor in morbid processes than overall obesity, which is characterized by body fat accumulation in the central and peripheral areas of the body. Within this perspective, the accumulation of adipose tissue in the abdominal region, where fat deposits are concentrated in this area, is associated with an exponential increase in morbidity and mortality[16]. The present study identified a reduction in the Hip Circumference (HC)variable (from 112.26 to 101.13 - $p = 0.005$), but this reduction did not show to be as significant as that observed in the Waist Circumference (WC) variable (from 99.21 to 84.9).

Continuing with the analysis of the risk factors for the health of the study participants, another variable that had a great impact on the pre- and post- method indexes was visceral fat, with a significant reduction from 9.3 to 6.7. The accumulation of visceral fat is considered the main risk factor for metabolic and cardiovascular diseases[17]. Abdominal obesity has been pointed out as a significant risk coefficient for the development of cardiovascular diseases (CVDs), diabetes, dyslipidemia, metabolic syndrome, and some type of cancer[18].

Therefore, associated with a healthy diet, physical exercise increases lean body mass, eventually leading to a reduction in the body fat percentage. Therefore, there is a decrease in fat accumulation in the visceral adipose tissue, resulting in an improvement in the profile of risk factors and of body fat distribution[19].

It is known that body fat accumulation also has an influence on the BMR; the present research study found a reduction in that rate (from 1,546.3 to 1,409.7) after a 3-month follow-up. It is worth noting that the BMR can vary from one individual to another, according to each person's fat and muscle percentage; factors like gender, weight, height, and age, and genetic factors, and even the type of physical activity that each individual performs in their everyday life can influence the values of this rate[19].

A study states that the BMR can decrease according to age, due to the reduction in lean mass and to the increase in fat mass in the body; mood changes or stress; hormone changes; absence of physical activity; and genetic factors[19]. BMR control is considered important because its increase is knowingly related to fat mass gain in the body, has a negative influence on sleep, and results in lack of energy to perform physical activity or even everyday activities[19]. It is to be noted that a data collection period was set forth in which all the participants had completed the three-month period, required for the efficacy of the method used in the clinic, which is considered a limitation of the study, as it resulted in a lower number of participants in this study.

CONCLUSION

There was a significant improvement in most of the anthropometric parameters analyzed after the individuals participated in the weight loss method, and it was possible to observe that, combined with dietary education, practicing physical activity has a positive impact on people's health.

The improvement in the patients' anthropometric parameters was only possible because of dietary re-education, which relied on the participants' commitment to comply with the guidelines applied according to each phase of the method, together with the understanding that physical exercise must be interpreted as a pleasant and relaxing moment that promotes social inclusion in the life of the individual.

It is possible to assert that healthy habits must be taught from a very early age because, when people start to enjoy practicing physical activities at least twice a week and keep a healthy diet, there is a visible positive impact on their health.

It is considered that a physically active lifestyle, in combination with a healthy diet, can prevent and control obesity, and that Physical Education professionals, especially Physical Education teachers, can and must act directly in the process of training human beings so that the practice of physical activity is seen not only as a treatment approach for diseases and obesity, but especially as a more guaranteed way of preventing these conditions and of promoting health and quality of life.

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