DOI: 10.12957/demetra.2016.24936

The changes in food intake between obese people after 3 months of nutritional intervention

Mudanças na ingestão de alimentos entre obesas após três meses de intervenção nutricional

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Final term paper by the student A.E.S. SANTOS, without financial support.

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Abstract

This study aims to evaluate the changes in food intake between obese people after 3 months of nutritional intervention. Twenty obese were invited to participate of 6 biweekly meetings of 2 hours / each, totaling three months of follow-up. Each meeting was created using Brazilian Food intake Guideline, document from actions and politics in food and nutrition of the Brazilian government. Before and after intervention, the anthropometric measures were evaluated (weight, height and waist circumference), food intake by 24h recall and comparing with the Brazilian Food intake Guideline. Only eight obese patients completed the study and a significant reduction of abdominal circumference was observed between the initial (126 ±9,1cm) and the final (119,7± 8,0cm) moments. There was a significant reduction of sodium (1726,9 ± 963,1 for 1092,4 ± 492,1mg) and trans fat (3,3 ± 2,07 for 1, ±1,5g/day) and the increase of niacin intake (13,5 ± 6,7 mg/day for 1,3 ± 4,5 mg/day) from the 24h recall method. Comparing this with the recommendations of the Brazilian Food intake Guideline, it was observed, at the end of study, that all obese patients had an appropriate consumption of soft drink, oil, salt, fruits, greens, vegetables, water and diet fractionation. It was concluded that there were an abdominal circumference reduction and an improvement in food intake, using nutritional intervention in a group.

Keywords: Eating. Obesity. Food and Nutrition Education.

Resumo

Avaliar mudanças da ingestão de alimentos entre obesas após 3 meses de intervenção nutricional em grupo. Vinte obesas foram convidadas para participar de 6 encontros quinzenais de 2 horas/cada. totalizando três meses de acompanhamento. Cada encontro foi elaborado baseado no Guia Alimentar para População Brasileira, documento proveniente da Política e ações em alimentação e nutrição do governo brasileiro. Antes e depois da intervenção foram avaliadas medidas antropométricas (peso, altura e circunferência da cintura), ingestão de alimentos pelo recordatório de 24h e comparando com diretrizes do *Guia Alimentar para População Brasileira*. Apenas oito obesas finalizaram o estudo, e foi observada redução significativa da circunferência abdominal entre momento inicial (126 ±9,1cm) e final (119,7± 8,0cm). Houve redução significativa de sódio (1726,9 ± 963,1 para 1092,4 ± 492,1mg) e gordura trans (3,3 ± 2,07 para 1,6 ± 1,5g/dia) e aumento na ingestão de niacina (13,5 ± 6,7 mg/dia para 1,3 ± 4,5 mg/dia) a partir do método do recordatório de 24h. E comparando com as recomendações do Ministério da Saúde, observou-se que todas as obesas ao final do programa relataram adequação da ingestão de refrigerantes, óleo, sal, frutas, verduras, legumes, água e fracionamento da dieta. Conclui-se que houve redução da circunferência abdominal e melhora da ingestão de alimentos utilizando intervenção nutricional em grupo.

Palavras-chave: Ingestão de alimentos. Obesidade. Educação alimentar e nutricional.

Introduction

Obesity is a public health problem and considered today a priority for intervention either individually or collectively.[1] Obesity can simply be defined as a condition of abnormal or excessive accumulation of fat in the body, which may compromise health.[1] Excessive fat levels and its distribution are associated with severe health damages, and actions to prevent and treat obesity are vital because those affected by this condition are at increased risk of morbidity and mortality.[1]

Obesity became an epidemic in developed countries and has grown in developing countries, being considered an important public health problem at all socioeconomic levels.[2,3] In 2008, overweight and obesity in Brazil hit around half of men and women, exceeding 28 times the frequency of weight problems in the male case and 13 times in the female case.[4]

According to the Brazilian Consensus for Treatment of Metabolic Syndrome, the adoption of a balanced diet should consider socioeconomic and cultural characteristics, and a 5% to 10% weight loss is already associated with improved blood pressure levels, metabolic control and even a decrease of diabetes mellitus-related mortality.[5]

Group nutrition intervention has been used to improve dietary habits of diverse population groups without the need to build customized menus. Group intervention aims to a collective construction of knowledge, valuing everyone's participation and not only transmitting knowledge but also leading everyone to have their own critical vision for food choices, thus empowering them.[6] Literature brings several results of studies on group nutrition intervention. An outpatient study carried out to evaluate the nutrition intervention strategy for a group of 40 obese individuals concluded that there was an improvement, with a 5% reduction of the body weight and waist circumference and calorie intake after meetings held every two weeks during six months, addressing topics such as weight loss and healthy lifestyles.[7] Another study with the same objective and using participative methodology compared individual consultations (total of three appointments) with collective consultations (total of six meetings). There were 33 participants, and the main difficulties reported for losing weight were associated with social events and eating outside the house. The study did not have significant effects on improving foods intake.[8]

The present study aimed to assess the effectiveness of a group nutrition intervention during three months to change the eating habits of obese women.

Methods

This is a longitudinal study approved by the Research Ethics Committee, process number 21847513.3.0000.5495. All participants signed the Free and Informed Consent Term (FICF) prior to the beginning of the research.

The sample was intentional, and the participants were called to participate by the University Nutrition Clinic located in Franca, state of Estado de São Paulo (Brazil), which serves the population free of charge. The researcher used the clinic' s waiting list to select the participants. Following the list, the researcher called the women and explained the research, and after agreement to participate, date and time were scheduled for a first meeting to sign the FICF, explain details of the study and application of the initial protocol. Eligibility criteria included: women aged 18 to 60 years, with obesity grade I, II or III. Illegibility criteria were: obese women who were attending another nutrition education program, had undergone obesity surgery or used continuous medication for weight loss.

Twenty-five obese women were invited to participate in the study; however, only 20 began the nutrition intervention. The reason of the five women's refusal was schedule unavailability. Of the 20, only eight women completed 100% of attendance in the six meetings, whereas 12 quit between the second and third meetings because of schedule unavailability and transport difficulties. In December, all eight obese women returned for a re-assessment.

The nutrition intervention began with the group of 20 obese women and was carried out from May to July 2013. The meetings were held biweekly during three months, i.e., a total of six biweekly meetings with a duration of two hours each, totaling 12 hours of intervention. All topics addressed followed the Brazilian guidelines of food and nutrition policies published by the Ministry of Health, especially the Dietary Guidelines for the Brazilian Population (*Guia Alimentar para População Brasileira)*,[9] nutrition labels, composition of a healthy meal, fad diets, and presentation of a documentary about obesity (Far Beyond Weight, in Portuguese language *Muito Além do Peso*).[10] It was always used a roundtable panel format and focused on participative methodology, posters and practical examples such as, for instance, nutrition facts. A film was displayed using an overhead projector to optimize visualization by all participants.

Anthropometric data (body weight, height and waist circumference) were measured in the first day (initial time), three months after intervention (final time) and four months after completion of intervention (re-assessment). To determine the body weight, the individual was asked to remove excess clothing and shoes and keep the arms along the sides of the body. A digital scale (Filizola brand) with 100g precision and a capacity for up to 200 kg was used. To measure the body height, the individual was instructed to stand with the feet together and hands along the body sides, barefoot and without head adornments, knees together and looking directly ahead, using a vertical wall stadiometer (Sanny®). The nutritional status was determined by the BMI, as proposed by WHO (1998). Finally, the waist circumference (WC) was measured at the point of the umbilical scar. The waist circumference is considered at risk when it measures 88cm in women and 102 cm in men.[5]

Another data collected at three different times of the study was foods intake, based on the 24-h dietary recall. This method aims to quantify all foods and beverage consumed in the period prior to the interview, which can be 24 hours. The Brazilian table of foods composition was used and the nutritional calculation was performed by the Diet Pro® software, resulting in values of calories, macronutrients and micronutrients.

To compare the foods intake with the recommendations of the Dietary Guidelines for the Brazilian Population, the "Ten Steps to a Heathy Diet" (Chart 1) were used. Data about the frequencies of foods consumption were collected, for example: the frequency of vegetables and fruits eaten in the week, which were then compared with the guidelines, which describes in Step 3 that an adequate consumption would be 3 times/day of fruits and 3 times/day of vegetables. Data were obtained through notes or simple questions that allowed direct answers about each of the items.

Chart 1. "Ten Steps to Healthy Eating "

1	Eat at least three meals (breakfast, lunch and dinner) and two healthy snacks per day. Do not skip meals.
2	Include in your daily meals six portions of the cereals group (rice, corn, wheat, bread and pasta), tubers such as potatoes, and roots such as manioc/cassava. Give preference to whole grains and natural foods.
3	Eat at least three portions of vegetables per day as part of the meals and three portions or more of fruits as dessert and snacks.
4	Eat rice and beans every day or at least five days a week. This Brazilian dish is a complete combination of proteins and is good to health.
5	Eat three portions of milk and dairy products and one portion of red meat, poultry, fish or eggs. Remove apparent fat from meat and the chicken skin before cooking to make these foods healthier.
6	Eat one portion per day maximum of vegetable oils, butter or margarine. Read the nutrition facts carefully and choose those with fewer contents of trans fat.
7	Avoid sodas and processed juices, cakes, sweets and stuffed cookies, dessert, candies and other sweetmeats as a dietary rule.
8	Reduce the amount of salt in the food and remove the salt shaker from the table. Avoid eating salty (sodium) processed foods such as hamburger, beef jerky, hot dog, sausage, ham, snacks, vegetables in brine, soups, and ready-to-use sauces and seasoning mixes.
9	Drink at least two liters (six to eight glasses) of water a day, preferably during the meals intervals.
10	Make your life healthier. Practice at least 30 minutes of physical activity a day and avoid alcoholic beverages and smoking. Keep your body weight within healthy limits.

The statistical analysis refers to the presentation of results in a descriptive way, and data are qualitative when presented in frequencies and percentages, whereas quantitative data refers to means and standard deviations. To compare between the initial and final assessments of the nutrition intervention, the Wilcoxon test was applied for paired samples because they are nonparametric data. It was used 5% as the significance level for the statistical test.

Results

With respect to the anthropometric data, it was possible to observe that a participant with obesity grade III passed to grade II at the end of the study. All participants were at high risk for cardiovascular diseases according to the WC; however, when comparing the absolute values (Wilcoxon test for paired samples) before and after the intervention, a significant reduction was observed (Table 1).

Table 1. Anthropometric evaluation of obese women participating in the nutrition intervention groups for three months. Franca-SP, 2013.

Indicators	Initial	Final
Weight (kg)	103.1 ± 21	100.9 ±21
Height (m)	1.58± 0.09	1.58± 0.09
BMI (kg/m2)	40.41± 5.27	39.98 ±5.45
Obesity grade I (n)	1	1
Obesity grade II (n)	2	3
Obesity grade III (n)	5	4
Waist circumference (cm)	126.5±9.1*	121.2±8.6*
High risk (>90cm)	8/8	8/8

*$p < 0.05$

The macronutrients and calories intake based on the analysis of nutrients composition according to the 24-h dietary recall was not different in the two assessment times (Table 2), although some numeric reduction of energy intake was observed.

Table 3 describes the results related to the amount of fats, also based on the 24-h dietary recall, which indicate that there was a reduction in trans fat intake.

Finally, regarding micronutrients, Table 4 indicates that the obese women had an increased niacin intake and reduced sodium intake after the group intervention.

Table 2. Assessment of energy and macronutrients intake by obese women participating in the nutrition intervention groups for three months. Franca-SP, 2013.

Food intake		Initial	Final	p-value
Energy (kcal)		1543.2± 440.2	1332.4 ±515.4	0.26
Carbohydrate (g)		195.9± 51.8	184.0± 124.4	0.57
	(%)	52.3± 16.6	50.8± 17.3	0.89
Lipid (g)		48.0± 30.4	29.6± 16.9	0.09
	(%)	25.4± 10.9	21.1± 12.04	0.40
Protein (g)		79.8± 43.2	82.2± 27.8	0.89
	(%)	19.8± 9.06	26.1± 9.3	0.26

Table 3. Assessed fats intake by obese women participating in the nutrition intervention groups for three months and re-assessment after four months. Franca-SP, 2013.

Fat		Initial	Final	p-value
Saturate (g)		14.5 ±12.2	13.1 ± 9.02	0.78
	(%)	7.5 ± 4.4	9.4 ± 7.2	0.26
Monounsaturated (g)		13.4 ± 8.2	11.8 ± 8.7	0.12
	(%)	7.1 ± 2.8	8.3 ± 5.7	0.67
Polyunsaturated (g)		8.2 ± 5.3	4.1 ± 3.1	0.07
	(%)	4.5± 2.5	2.6± 1.4	0.57
Trans (g)		3.3 ± 2.07	1.1± 1.2	0.03
W6/W3 ratio (g)		13.4 ± 3.4	17.4 ± 8.04	0.48
W3 (g)		6.6 ± 4.6	7.2 ± 5.2	0.12
W6 (g)		7.6 ± 4.9	3.8 ± 2.8	0.40

Table 4. Assessment of micronutrients of obese women participating in the nutrition intervention in groups for three months. Franca-SP, 2013.

	Initial	Final	p-value
Calcium (mg)	230.9 ± 153.8	364.9± 282.6	0.40
Magnesium (mg)	154.7± 47.5	170.4± 60.2	0.48
Manganese (mg)	1.6± 7.4	1.3± 8.1	0.26
Phosphorus (mg)	897.3± 396.7	947.5± 375.05	0.78
Iron (mg)	7.8± 3.9	6.9± 3.2	0.67
Sodium (mg)	1726.9± 963.1	816.7± 555.9	0.01
Potassium (mg)	1518.9± 588.1	2046.6± 655.6	0.12
Copper (mg)	5.7± 7.2	6.8± 8.3	0.78
Zinc (mg)	10.6± 9.4	8.8± 4.02	1.00
Retinol (mg)	140.7± 187.08	61.8± 86.5	0.07
Thiamine (mg)	1.1± 1.6	1.7± 2.6	0.78
Riboflavin (mg)	1.1± 1.6	1.1± 2.7	0.67
Pyridoxine (mg)	1.5± 2.7	2.1± 3.9	0.20
Niacin (mg)	13.5± 6.7	30.2± 21.8	0.05
Vitamin C (mg)	31.3± 23.4	97.2± 91.3	0.07
Fibers (mg)	11.06±2.8	16.2±11.7	0.16

When comparing the reported data on foods consumption frequencies with the recommendations of the Dietary Guidelines for the Brazilian Population, it was possible to observe more changes in foods intake compared to the 24-h dietary recall. The number of meals and consumption of oil, sodas, salt, water, fruits and vegetables after the intervention, as reported by the participants, were adequate for almost all obese women. The researcher visited the obese women four months after completion of the intervention and found that there was even an improvement, in which all women were with an adequate intake of the items assessed.

Table 5. Comparison of foods intake according to the Dietary Guidelines for the Brazilian Population. Franca-SP, 2013.

Adequacy	Initial	Final
Meals splitting up	6/8 (75%)	6/8(75%)
Vegetables and fruits consumption	6/8(75%)	7/8(87.5%)
Monthly oil intake	5/8(62.5%)	7/8(87.5%)
Consumption of soft drinks	5/8 (62.5%)	6/8 (75%)
Monthly salt consumption	5/8 (62.5%)	8/8 (100%)

Discussion

This study highlights a lower intake of trans fat after the nutrition intervention. Corrêa[11] evaluated the consumption of trans fat acids in some countries and their effects on diets and found that processed foods have the highest contents of trans fats. The same study compared the consumption of trans fat between countries, and the results showed an estimated daily intake of 7g per person in the USA and Argentina, and 5g in Brazil.[11] The Brazilian values are a little higher than those found in the present study. It is worth noting that after the group intervention the values dropped to 1g/day, which emphasizes the importance of nutritional education to avoid consumption of processed foods, which are largely found in the marketplace.

It was found that most of the obese women had few meals a day, and after the intervention all of them began eating five meals as recommended. Blundell et al.[12] show that splitting the meals up into more meals or snacks during the day helps diminish hunger and avoid an overcompensation in the next meals. Farshchi et al.[13] showed that a group of lean women who had irregular meal times had a higher incidence of postprandial insulin insensitivity and higher levels of total cholesterol and LDL than a group of women who ate at regular meal times.

With respect to fruits and vegetables intake, it is worth noting that although there was no significant improvement in dietary fibers intake, according to the women's reports, all of them had an intake frequency as proposed by the Ministry of Health. Other study[14] found similar results after a nutrition intervention with 80 families living in two neighborhoods in the Grajaú district, São Paulo city, in 2004. The intervention group attended three meetings in their community during successive weeks, each one with an approximate duration of two hours. The control group did not attend these meetings and were invited to fill in questionnaires about food purchases in the months prior and after the intervention.[14] At the beginning and end of the intervention, the amount of

fruits and vegetables in the family's diets was determined by the percentage of calories provided by these foods in the total calories purchased for the family's consumption in one month. At the end of the intervention, there was an increase in the average consumption of fruits and vegetables, +1.63% and +0.41%, respectively, in the intervention group, differently from the control group, which had a reduction of -0,01%.[14]

An improved intake of nutrients after the nutrition intervention has also been described in the current literature. Vargas et al.[15] examined the effects of an obesity prevention program on the dietary habits of adolescents from public schools. The intervention was with 331 students aged 11 to 17 years of the 5th and 6th grades of two public schools in Niterói, RJ, in 2005. The two schools comprised one intervention school and one control school for comparison. Dietary habits were the topic of self-reported questionnaires before and after the intervention period: consumption of fast foods and sodas, replacement of meals with snacks, consumption of fruits and vegetables, and the kind of food eaten in recess breaks.[15] At the baseline, 185 schoolchildren participated in the intervention school (82.2% of eligible children), and 146 children in the control school (70.5% of eligible children). At the post-intervention phase, there was a loss of 10.3% of adolescents of the intervention school and 27.4% of the control school. There were no significant changes in the dietary practices in the control school group, while in the intervention school there was an increased number of students who reported not eating foods sold by street vendors (from 36.7% to 50.6%; $p = 0.02$) and the students who reported not replacing lunch with snack (from 44.5% to 65.2%; $p < 0,01$) or dinner (from 38.4% to 54.3%; $p < 0.01$). The main favorable change was a reduction in the frequency of consumption of fast foods in the intervention school compared to the control school (72.7% vs 54.4%; $p = 0.001$). Favorable changes were found in the adolescents' eating habits, encouraging the development of programs of this nature; however, long-time interventions should be implemented and its effectiveness assessed.[15]

This study brings positive results in the reduction of waist circumference, and according to the 24-h dietary recall, there was a significant reduction of sodium and trans fat intake and an increased consumption of niacin. Comparing with the recommendations of the Dietary Guidelines for the Brazilian Population, there was an appropriate intake of sodas, oils, salt, fruits, vegetables, and water, and meals broken up into more meals and snacks.

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Received: August 02, 2016
Accepted: September18, 2016