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A study regarding the effects of personalized and individualized nutritional intervention in the case of a patient suffering from morbid obesity

Studiu privind efectele intervenţiei nutriţionale individuale personalizate în cazul unui pacient cu obezitate morbidă

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Abstract

Background. Obesity and overweight are considered to be a real global epidemic, having a major contribution in increasing the incidence of certain pathologies representing the main causes of death around the world. Personalized and individualized nutritional intervention based on lifestyle changes (diet, behavior, physical activity) is the basic component in the management of overweight and obesity.

Aims. The aim of the present study was to evaluate the evolution of the anthropometrics measurements and the body composition of a patient suffering from morbid obesity, following an intervention determining lifestyle changes.

Methods. Anthropometrics and body composition measurements were performed at the beginning of the nutritional intervention, during each monitoring session (n=6) and at the end of the intervention, as well as after 12 months from the end of the intervention. The initial evaluation as well as the monitoring sessions took place under the supervision and coordination of a registered dietician.

Results. The present study highlighted clinically significant reduction in weight, body mass index (BMI), total fat mass, abdominal fat and waist circumference, after the applied nutritional intervention.

Conclusions. The present study demonstrated the fact that personalized and individualized nutritional intervention represented a useful strategy in the management of morbid obesity in the case of the patient included in the study.

Keywords: morbid obesity, personalized and individualized nutritional intervention, body composition.

Rezumat

Premize. Obezitatea şi supraponderea reprezintă o adevărată epidemie la nivel mondial, contribuind major la creşterea incidenţei unor patologii, care alcătuiesc principalele cauze de deces la nivel mondial. Intervenţia nutriţională individuală şi personalizată, bazată pe modificări ale stilului de viaţă (dietă, comportament, activitate fizică), reprezintă pilonii fundamentali în managementul supraponderii şi obezităţii.

Obiective. Prezentul studiu a avut ca scop urmărirea evoluţiei parametrilor antropometrici şi ai compoziţiei corporale la un pacient cu obezitate morbidă, în urma unei intervenţii de modificare a stilului de viaţă.

Metode. S-au realizat măsurători antropometrice şi ale compoziţiei corporale la începutul intervenţiei, pe parcursul fiecărei şedinţe de monitorizare (n=6), la finalul intervenţiei, precum şi la 12 luni de la finalizarea acesteia. Atât şedinţa de evaluare iniţială, cât şi şedinţele de monitorizare, au fost realizate sub îndrumarea unui nutriţionist-dietetician licenţiat.

Rezultate. Studiul a evidenţiat scăderi semnificative clinic ale greutăţii, indicelui de masă corporală (IMC), masei grase totale, masei grase abdominale şi circumferinţei abdominale în urma intervenţiei nutriţionale aplicate.

Concluzii. Studiul de faţă a evidenţiat faptul că intervenţia nutriţională individuală şi personalizată a reprezentat o strategie utilă în managementul obezităţii morbide în cazul pacientului inclus în studiu.

Cuvinte cheie: obezitate morbidă, intervenţie nutriţională personalizată şi individuală, compoziţie corporală.

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Introduction

Obesity and overweight are directly involved in the increase of morbidity, having a major impact on the evolution of certain chronic diseases such as: high blood pressure, dyslipidemia, diabetes mellitus type 2, coronary diseases, myocardial infarction, osteoarthritis, bladder diseases, sleep apnea, respiratory diseases and types of cancer (***, 2013). Also, being overweight may have important psychological and economic implications for the wellbeing and health of the population. In Romania, over 15 million people suffer from obesity and overweight (1).

Obesity is an excessive cumulation of adipose tissue in the body which can affect the health, defined by a body mass index (BMI) ≥ 30 kg / m^2 (2). Third degree obesity or morbid obesity is defined by a BMI ≥ 40 kg / m^2 (Hâncu et al., 2010).

BMI is a parameter easy to use in current practice, although it does not directly measure the distribution and quantity of adipose tissue and does not take into consideration other factors, such as the level of physical activity, gender or age.

Bioelectrical impedance is a non-invasive method used to determine the body composition (Lee & Gallagher, 2008). This method helps to calculate the total amount of water, the fat-free body mass and the fat. This method supposes the passing of an electric current through the body, and following this procedure the conductivity of water in the body varies in different compartments (Mahshid et al., 2008; Ayvaz & Cimen, 2011).

In the management of obesity, including morbid obesity, a reduction of 5-10% from the initial weight brings a lot of benefits for comorbidities (Karlsen et al., 2013). The therapeutic education achieved by an individualized and personalized nutritional intervention is a method of clinical management, which ensures the active implication of a person with obesity. The optimization of lifestyle, the induction of new information, attitudes and skills, the determination and maintenance of motivation can be done only by specific, systematic and continuous education (Hâncu et al., 2010). The modifications of lifestyle (diet, behavior, attitude, physical activity) are basic strategies in the intervention on obesity on a long term basis (Wadden et al., 2013).

Objectives

The aim of the present study was to evaluate the evolution of the anthropometric measurements and the body composition of a patient suffering from morbid obesity, following an intervention determining lifestyle changes.

Hypothesis

The approach of a patient suffering from morbid obesity through an individualized and personalized nutritional intervention together with a regulated physical activity can be a successful strategy in order to reduce weight and the abdominal circumference and to modify the body composition. Also, the nutritional education of the patient can help maintain these results for a long time.

Material and method

Research protocol

According to the Helsinki Declaration, the Amsterdam Protocol and Directive 86/609/EEC, we obtained the approval of the Ethical Commission of the "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca for this study. The informed consent of the patient who participated in this research was given.

a) *Period and place of the research*

The study took place in the period April 2013 – August 2014. The patient participated in nutritional intervention meetings, coordinated by a nutritionist – dietician, for a period of 18 weeks (every three weeks). In order to better evaluate the effects of the individualized and personalized nutritional intervention, the patient came back for measurements 12 months after the intervention was completed.

b) *Subjects and groups*

The evaluated patient in this study was a 34 years old male, coming from an urban area, suffering from morbid obesity (BMI=40.3 kg/m^2), who searched for the help of a dietician in order to lose weight.

The patient did not have a personal pathological history, and as to his family history, the patient declared that his mother suffered from type 2 diabetes and his father suffered from morbid obesity.

The patient denied consuming drugs and was not on medical treatment during the period of the study.

The initial parameters recorded: weight (G) = 124.8 kg, BMI = 40.3 kg/m^2, total fat = 44.7 kg (35.82%), abdominal fat = 23.5 kg, waist circumference = 130 cm, total water = 58.6 kg (47%), fat-free body mass = 80.1 kg (64.2%).

c) *Tests applied*

The initial evaluation supposed a 90-minute interview conducted by a nutritionist – dietician, which included the clinical and diet history, the anthropometric evaluation and the evaluation of body composition. The diet history additionally included a nutritional journal for 24 hours and a questionnaire regarding nutritional frequency.

Anthropometric and body composition measurements were carried out. Height was measured using a Tanita HR 001 stadiometer (Tanita Corporation, Tokyo, Japan) in order to calculate the BMI. The waist circumference was measured with a Seca ergonomic meter (Seca North America, USA).

The weight and body composition (total fat, fat-free body mass, total body water, abdominal fat) were measured using the Tanita 418 MA body composition analyzer (Tanita Corporation, Tokyo, Japan).

The measurements were performed at the beginning and at the end of the intervention, and also a year after the intervention was completed. The weight and body composition were measured on each monitoring meeting.

The measurements were made at the same moment of the day, in cozy clothes, without shoes, socks and metal objects.

The subject declared that he had not been exercising, had not consumed alcohol 24 hours before the evaluation and had not taken diuretic substances.

The intervention lasted for 18 weeks, with periodic monitoring meetings of 30 minutes every three weeks.

The method that we used was therapeutic education through individualized and personalized nutritional education, for learning and gradually implementing healthy nutritional principles and for the modification of nutritional habits. The educational nutrition themes discussed on each monitoring meeting are presented in Table I. Also, we used the person-centered therapy, which insists on individual

needs and involves the patient in the establishement of objectives and in decision making.

Table I
The educational nutrition themes discussed on each monitoring meeting.

Monitoring meeting	Educational theme
1	Macronutrients and micronutrients
2	Planning meals and introducing healthy snacks
3	Groups of foods
4	Combining foods during meals
5	The portion control
6	Reading food labels and making a shopping list

After the intervention period, the patient was instructed to monitor his food intake and his weight with the help of a nutritional journal.

d) *Statistical processing*

In order to analyze the data, we used frequency tables and graphic representations using Microsoft Excel 2010 (Microsoft Office 2010).

Results

The initial parameters and the parameters recorded during the intervention are presented in Table II.

After the individualized and personalized nutritional intervention was completed, we found a 16.7% weight loss compared to the initial value (20.9 kg), and the BMI was reduced from 40.3 kg/m^2 to 33.5 kg/m^2, corresponding to class 1 obesity. The evolution of weight during the intervention is presented in Figure 1, and the evolution of BMI in Figure 2.

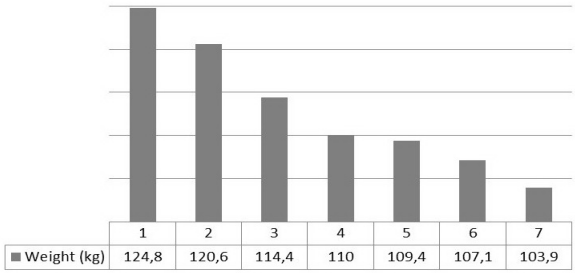

Fig. 1 – The evolution of weight during the intervention.

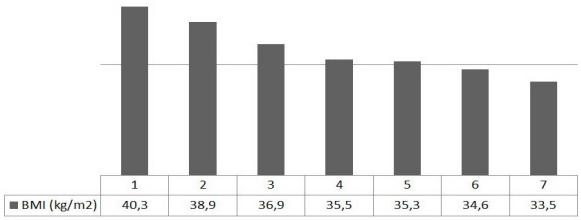

Fig. 2 – The evolution of BMI during the intervention.

Following the nutritional intervention, total fat decreased by 16.2 kg (77.5%), of which 39.5% was abdominal fat (6.4 kg). The evolution of fat mass during the intervention is presented in Figure 3, and the evolution of abdominal fat during the intervention is presented in Figure 4.

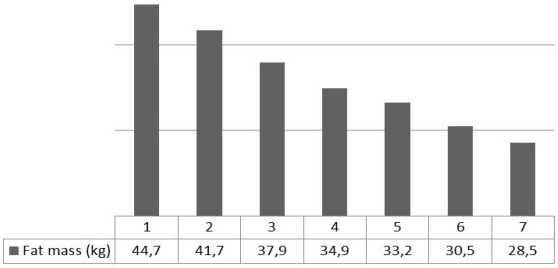

Fig. 3 – The evolution of fat mass during the intervention.

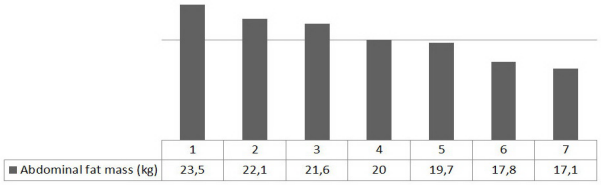

Fig. 4 – The evolution of abdominal fat during the intervention.

Also, the waist circumference decreased by 20 cm, from 130 cm to 110 cm.

Simultaneously with the nutritional and eating behavior changes, after the first meeting the patient began a moderate physical activity under the supervision of a personal trainer, in sessions of 60 minutes per day, 5 days per week.

The parameters at the beginning of the nutritional intervention, at the end of the 18 weeks and after a year are presented in Table III.

Table III
Parameters a year after the beginning of the intervention.

Parameter	Initial meeting	Final meeting (after 18 weeks)	Evaluation (after 12 months)
Weight (kg)	124.8	103.9	102.8
BMI (kg/m2)	40.3	33.5	33.2
Fat mass (kg)	44.7	28.5	29.4
Fat mass (%)	35.8	27.4	28.6
Abdominal fat mass (kg)	23.5	17.1	17.2
Fat-free body mass (kg)	80.1	75.4	73.4
Total body water (kg)	58.6	55.2	53.7
Waist circumference (cm)	130	120	122

Table II
Initial parameters and parameters recorded during each intervention.

Parameters	Initial meeting	Meeting 1	Meeting 2	Meeting 3	Meeting 4	Meeting 5	Meeting 6
Weight (kg)	124.8	120.6	114.4	110	109.4	107.1	103.9
BMI (kg/m2)	40.3	38.9	36.9	35.5	35.3	34.6	33.5
Fat mass (kg)	44.7	41.7	37.9	34.9	33.2	30.5	28.5
Fat mass (%)	35.8	34.5	33.1	31.7	30.5	28.4	27.4
Abdominal fat mass (kg)	23.5	22.1	21.6	20	19.7	17.8	17.1
Fat-free body mass (kg)	80.1	78.9	76.5	75.1	76.3	76.6	75.4
Total body water (kg)	58.6	57.8	56	55	55.9	56.1	55.2

Discussions

The individualized and personalized nutritional intervention applied in the case of this patient proved to be beneficial, leading to a significant decrease of the recorded clinical parameters.

As to weight and BMI evolution, there was a significant loss (from 124.8 kg to 103.9 kg; from 40.3 kg/m^2 to 33.5 kg/m^2). We also found an important reduction of total fat mass from 44.7 kg to 28.5 kg, and abdominal fat was reduced by 6.4 kg, influencing the reduction of waist circumference by 20 cm.

The interventions based on diet changes combined with physical activity proved to be more successful in the reduction of weight and BMI compared to the interventions based on only one of these components (Stephens et al., 2014).

Previous studies proved that changes of waist circumference are correlated with modifications of intra-abdominal fat. Slentz et al. (2005) demonstrated that a weight loss of 2 kg is associated with a 7% reduction of body fat.

Ross et al. (2004) reported that a loss of 6 kg by physical exercise resulted in a 6.5 cm reduction of the waist circumference and a 30% decrease of intra-abdominal fat.

The patient was taught to monitor his nutrition and weight. We consider that the adequate training of the patient regarding self-monitoring after nutritional intervention is extremely important in order to maintain the results obtained, which is shown by the studies performed in this field (***, 2013).

Individualized nutritional training supposes teaching the patient about the importance of nutrition, offering materials for each discussed subject, which will help remember the message and achieve the nutritional objective in the long term. Individualized and group nutritional education can contribute to a reduction in the health care costs for the patient and for society, and it is a method through which the patient learns methods of self-monitoring and self-care that can be applied in the long term (Splet & Myers, 2001).

The studies comparing individualized nutritional education versus group education in order to improve nutritional intake and nutritional status parameters (BMI, weight, body fat, waist circumference) found that individualized nutritional education can be a successful strategy for the improvement of diet quality in adults (Eyles & Mhurchu, 2009). This method was beneficial for weight loss and the reduction of fat tissue (Byrne et al., 2006).

General knowledge of nutrition influences nutritional habits (Tsigos et al., 2008), but the effectiveness of nutritional intervention depends on the relevance of this subject for each individual (Heimendinger et al., 2005).

Conclusions

1. The individualized and personalized nutritional intervention improved the anthropometric parameters and the body composition parameters for our patient, with real benefits for the clinical management of overweight and obese patients.

2. Regulated and personalized physical activity is an essential component of lifestyle which improves the results of individualized and personalized nutritional intervention.

3. The individualized nutritional intervention and the training of the patient for self-monitoring after the intervention is completed allow for the maintenance of results in the long term.

Conflicts of interests

There are no conflicts of interest.

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