21 - EFFECT OF MUSCULAR THERAPY IN A PATIENT WHO UNDERWENT BARIATRIC SURGERY: A CASE STUDY

FRANCIELE DE MENECK,
CELEIDE PINTO AGUIAR PERES
Universidade Estadual do Oeste do Paraná, Cascavel, Paraná, Brasil

1. INTRODUCTION

Obesity is a chronic disease characterized by excessive accumulation of fat in the body (Segal, FANDIÑO, 2002). It is an epidemic affecting more than 300 million people around the world. In Brazil, it is estimated that there are 15% of obese people, those between 1% and 2% severely obese and about 10% of public health expenditures are related to obesity (FOUNDATION IBGE, 2004). The World Health Organization (WHO) classifies obesity based on Body Mass Index (BMI), ie weight (kg) / height ² (m²) and the risk of mortality. Thus, it is considered obese when BMI is above 30 kg / m². The gravity, the WHO defines obesity grade I when the BMI is between 30 and 34.9 kg / m², obesity class II when the BMI is between 35 and 39.9 kg / m² and, finally, class III obesity when BMI is greater than or equal to 40 kg / m².

The consequences to health due to obesity include heart disease, diabetes, hypertension, hyperlipidemia, osteoarthritis and sleep apnea. (Maggard et. al., 2005). The conventional treatment for class III obesity continues to produce unsatisfactory results, with 95% of patients regaining their weight within two years. (Segal, Fadini, 2002). Bariatric surgery is the most effective treatment available for morbid obesity and can result in improvement or complete resolution of comorbidities of obesity. (Buchwald, 2004). The criteria for indication of bariatric surgery are: BMI greater than 40kg / m² or BMI greater than or equal to 35kg / m² associated with comorbidities (Poulose et. al., 2005).There is strong empirical support for the inclusion of physical activity (PA) into programs designed to promote weight loss and maintaining weight loss long term (Evans et. al, 2007). According to Hauser, Benetti, Rebelo (2004) AF stimulates increased activity of the SNS (sympathetic nervous system), which allows you to control the flow of energy substrate. The increase in energy expenditure in response to increased activity of SNS may cause a reduction in appetite, increased metabolic rate (BMR), increased muscle mass and greater action in the oxidation of fats. Several studies confirm that exercise can contribute to better results in weight loss after bariatric surgery, while preserving lean body mass, supporting the maintenance of the TMR and addressing the changes in energy metabolism (FLANCBAUM, 2003, Metcalf et. al. 2005; GALTIER et. al., 2006). The Strength to therapy than sedentary individuals to obtain a profile of thenar muscle functional aspect and its main function is to stimulate metabolism, with emphasis on not allowing very sharp falls in resting metabolic rate, unchanged by the loss of lean body mass (LUCAS, 2003).

The aim of this study was to assess the effectiveness of therapy in individual Bodybuilding after bariatric surgery, and body composition by BMI, total body weight, percentage of lean body mass, body fat percentage and metabolic rate (BMR) by a case study.

2. METHODOLOGY

2.1 Material

Participated in this research an individual volunteer that underwent bariatric surgery (within 3 months after surgery), female, with 30 years of age. Inclusion criteria: sedentary, aged between 30 and 45 years, with time available for training Bodybuilding Therapeutics. The individual would be excluded if it obtained two consecutive absences from treatment sessions or waiver thereof. The Ethics Committee for Research on Human UNIOESTE, protocol 175/2009, previously approved the volunteer before the first assessment signed the Informed Consent and this project. To ensure that the volunteer had no contraindications to exercise were asked a medical certificate before the intervention.

2.2 Methods

The activity program consisted of: an initial assessment before the intervention of bodybuilding therapy, consisting of: 1) measures of body composition (weight, height, bioelectrical impedance analysis) 2) final evaluation after 3 months of Bodybuilding therapy, consisting of the same measures taken at the beginning. The same appraiser performed evaluations. Body mass (weight) was obtained through a platform scale Filizola ®, with maximum load of 150kg and an accuracy of 100g. The height measurement was recorded in the balance of measurement of body weight, using a metal rod inflexible in cm / cm to a height of 2m, positioning the subject barefoot, touching heels, hips, shoulder blade and the occipital skull surface tract. With data on weight and height, BMI was calculated corresponding to the relation between body mass in kilograms (kg) and the square of height in meters: weight (kg) / height ² (m²). And for the classification criteria used in the table below:

Classification	*BMI (kg/m²)*
Low Weight	18.6 < 19.9 kg/m^2
Normal	20 < 24.9kg/m^2
OverWeight	25 < 29.9 kg/m^2
Obese Grade I	30 < 34.9 kg/m^2
Obese Grade II	35 < 39.9 kg/m^2

Table 1. Table of comparisons: Adapted from Pollock & Wilmore, 1993 and OMS

For the evaluation of body composition was performed bioelectrical impedance analysis (by device Maltron BF 906), the participant was asked to fast from 24 hours a day before physical exercise immediately before the test and the day before, do not drink alcohol. The bioelectrical impedance analysis provided the following parameters: percentage of lean body mass, body fat percentage, lean body mass (kg), body fat weight (kg) and resting metabolic rate (RMR).

2.3 Strength Therapeutics

The method STS (Strength Training Strategies) Bodybuilding therapy has the specificity, the application of movements against resistance and has 5 reasons: 1) execution of functional movements, 2) continuous control of heart rate, 3) verbal command, 4) stimulation by touch and 5) ocular-motor stimulation. The main feature of bodybuilding therapy is the continuous monitoring of the heart while the patient performs the functional patterns of exercise, not allowing that to be below or above the training range, where the lower limit is 60% of HRmax (heart rate maximum) and the upper limit is 85% of HRmax. The maximum heart rate is established through the equation of Tanaka (2001), represented as follows: HRmax = 208 - (0.7 x age). Bodybuilding therapy is composed of

sixteen patterns of movements (exercises). These patterns are not fixed, that is, the exercises are not equal, they can increase or decrease the degree of difficulty. There are patterns of mass and alternative patterns. The greater or lesser degree of difficulty is verified by the increase or decrease in heart rate was monitored by a frequency meter Polar ® FS1 model. Patterns of mass members to move together in alternating patterns and the members move alternately. The patterns are executed in a sequential and progressive, while the main feature of which is to match the rate of curve progression and recovery. Thus, the maximum heart rate achieved by subsequent standards should be higher than the previous ones, until they reach the standard peak. From this, the maximum heart rates should be regressive. The whole process of implementation of the method is recorded in a spreadsheet in Excel, (which generates a graph) for each day of session. In this worksheet, we seek to highlight the errors, or abnormal situations obtained in the session in red, in order to fix them in the subsequent session. For the session of the upper limbs, the heart rate peak occurs in the fourth movement pattern, and the session of the lower limbs and abdomen, occurs in the fifth standard.

2.3.1 Detailing the standards of upper

Biceps Standard 1 (B1): standard weight with free weights, flexion-extension movement of the elbow in pronation-supination.

Biceps Standard 2 (B2): alternating pattern, with free weights, flexion-extension movement of the elbow in pronation-supination.

Standard Deltoid 1 (D1): standard weight with free weights, drive shoulder abduction to 900 with lateral rotation.

Deltoid Standard 2 (D2): standard weight with free-weights, anterior flexion of the trunk, fixing blades, and drive shoulder abducted diagonal posterior superior model starting position.

Breastplate Pattern 1 (P1): standard weight with free weights, rotating shoulders abducted lateral movement yesterday.

Breastplate Pattern 2 (P2): alternating pattern, with free weights, rotating shoulders abducted lateral movement yesterday.

Standard Dip 1 (T1): standard weight with free weights, shoulder flexion to 900, elbows 900 and wrists neutral; drive extender arm.

Standard Dip 2 (T2): alternating pattern, with free weights, shoulder flexion to 900, elbow 900 and wrists neutral; drive extender arm.

2.3.2 Detailing the standards of the lower

The 04 (four) patterns with the lower abdominal are performed in the supine position, with the first two in the supine position, and the subsequent two in the prone position.

Quadriceps Standard 1 (Q1), standard mass, with leggings, elbows bent, forearms on the ground, bending hips and knees, dorsal-flexion of the foot, heel without supporting the soil, movement of knee extension. Quadriceps Standard 2 (Q2): alternating pattern, with leggings, elbows bent, forearms on the ground, bending hips and knees, dorsal-flexion of the foot, heel without supporting the soil, movement of knee extension. Standard hamstring 1 (IT1) pattern of mass abduction in the hips 450, knees without supporting the soil and extended dorsal-flexion of the foot, knee flexor drive up to 450. Standard hamstring 2 (IT2) alternating pattern, hip abduction to 450, without knee support on the ground and extended dorsal-flexion of the foot, knee flexor drive up to 450. Standard Gastrocnemius / Soleus (GS) held in bipedal posture standing or sitting. An average degree of difficulty is achieved with free weights on limbs, bipedal standing posture, feet spread shoulder-width apart, knees half-bent, moving gastrocnemius and soleus muscles with up and down the body, without supporting the heel on the ground. The last three patterns, which are standards-abdominal, not compete to the sequence of graphic line, because there are varying degrees of difficulty. But must have always: Abdominal 1 (ABD1) with standard Isometric Abdominal 2 (ABD2) pattern with component rotation and Abdominal 3 (ABD3) standard without rotating component. Statistical analysis was carried out using GraphPad Prism, version 3.0.

3. RESULTS

Figure 1 shows the data on body composition by bioelectrical impedance analysis in the pre and post Bodybuilding Therapeutics. For measures of body weight (kg) caused a reduction of 9.7 kg (10.50%) and increase in lean mass of 8.2 kg (17.12%) and decrease in body fat of 17.9 kilograms (40.22%).

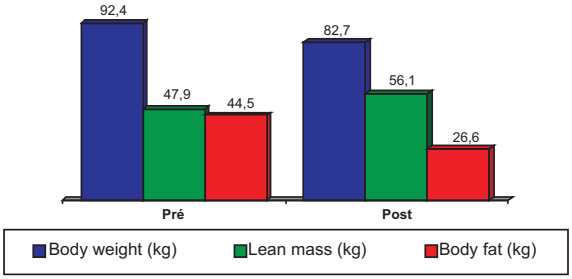

Figure 1 - Data of body composition before and after therapy Bodybuilding

The BMI (kg / m²), percentages of lean body mass, percentage of body fat and RMR in kilocalories (kcal) are shown in Table 1. The percentage of lean body mass and body fat percentage before and after therapy Bodybuilding, coincidentally, there was a 16% increase in lean body mass and a decrease of 16% body fat.

Based on BMI was observed that the individual increased from 35.6 kg / m², classified as obese grade II, to 31.9 kg / m², Obese Grade I For TMR increased by 7.40% (105kcal).

	Pré	Pós
BMI(Kg/m²)	35,60	31,90
% Lean body	51,80	67,80
% Body Fat	48,20	32,20
BMR (kcal)	1.418	1.523

Table 1 - BMI,% lean body mass,% body fat and BMR before and after therapy Bodybuilding

The mean HRmax in Bodybuilding therapy sessions was 66% of MHR, 123 beats per minute. The average time in minutes (min) of the sessions was 55min/sessão, and the patients exercised three times a week, reaching a total of 165min of Bodybuilding therapy a week.

4. DISCUSSION

Bariatric surgery is the most effective treatment available for morbid obesity and can result in improvement or complete

resolution of comorbidities of obesity. (Buchwald, 2004).

The restrictive nature of the surgery and subsequent reduction of food intake (1200kcals / d) have been shown to reduce body mass and change the energy metabolism (FLANCBAUM, 2003). The decrease in lean body mass will negatively affect metabolic rate (BMR), as the metabolic demand of lean body mass is a major determinant of RMR (FLANCBAUM, 2003; GALTIER et. al., 2006, Evans et. al., 2007). Bobbioni-Harsch et. al. (2000) evaluated the RMR and various metabolic indices at 3, 6 and 12 months after surgery, and reductions in lean body mass and BMR in each period, noted a decrease in fat oxidation. Although exercise does not change the percentage of total body weight loss after bariatric surgery, it changes body composition by increasing lean body mass and decreasing body fat (Metcalf et. al. 2005). The main purpose of this study was to assess the effectiveness of therapy in individual Bodybuilding after bariatric surgery in relation to body composition, using the following parameters: body weight (kg), lean body mass (kg), body fat (kg), percentage of body lean body fat percentage and BMR. Metcalf et. al. (2005) studied changes in body composition by bioelectrical impedance analysis in 100 patients undergoing bariatric surgery were divided into two groups: exercised and not exercised and the impedance was evaluated for the following periods: pre-operatively and 0.75, 1.5, 3 , 6, 9, 12 and 18 months postoperatively. They observed greater gains in lean mass and decreased body fat in the exercise group, although the percentage of weight loss was not different between the two groups. In our study, with respect to the data of body composition in kg, a decrease of 9.7 kg in total body weight of 8.2 kg increase in lean body mass and decreased from 17.9 kg in body fat. When body composition is expressed as a percentage, coincidentally, showed an increased percentage of lean body mass (16%) and decreased body fat percentage (16%). The increase in lean body mass, even in the absence of weight loss, could sustain the long-term maintenance of weight loss due to the positive effect on the TMR. In our study we observed an increase of 7.40% in the TMR. In addition, the training exercise has been shown to increase the capacity of fat oxidation in skeletal muscle and fat utilization during AF (MARTIN, 1996). The level of AF in candidates for bariatric surgery may contribute to the variability in weight loss and changes in body composition after bariatric surgery. King et. al. (2008) studied the different levels of AF by an accelerometer in 757 patients after bariatric surgery, these 20% were sedentary (<5000 steps / day), 34% low activity (5000-7499 steps / day), 27% were little active (7500-9999 steps / day), 14% active (10.000-12.499 steps / day), and 6% highly active ($\geq$12,500 steps / day). BMI was inversely related to the average number of daily steps.

In 2001, the American College of Sports Medicine (ACSM) reported that to achieve significant health benefits should be made at least 150 minutes per week of moderate intensity exercise (Jakicic, 2001). Evans et. al (2007) compared the weight loss at 3 (n = 178), 6 (n = 128), and 12 months (n = 209) after surgery between patients who underwent recommendation 150min/semana AF intensity moderate or higher and those who did not follow the recommendation. They found that patients who underwent the requirements of AF had significantly greater weight loss and change in BMI at 6 and 12 months after surgery. In our study, the participants held an average of 165min/semana Bodybuilding therapy with average 66% of HRmax for three months and there was a reduction in BMI of 10.40% (pre 35.6 kilograms / meters and post 31.9 kilograms / m²), ie, the patient went from Obese Obese Grade II to Grade I.

5. CONCLUSION

We conclude that contributed positively Bodybuilding therapy on body composition in the postoperative period of the individual analysis demonstrated changes in the variables and through the energy metabolism during the weight loss, including increased lean body mass, maintenance of resting metabolic rate and increased oxidation of fat.

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fdemeneck@hotmail.com (Franciele de Meneck) Rua Santos Dumont, 547 - Região do Lago 1
Cascavel – PR – Brasil – cep. 85812-300 Fone: (45) 9911-9474
cperes@certto.com.br (Celeide Pinto Aguiar Peres) Rua São Paulo, 769. ap 901 – Centro – Edifício Geminni
Cascavel – PR – Brasil - cep. 85.801.020 - Fone: (45) 3220-3157

EFFECT OF MUSCULAR THERAPY IN A PATIENT WHO UNDERWENT BARIATRIC SURGERY: A CASE STUDY

ABSTRACT

INTRODUCTION: Bariatric surgery is the most effective treatment available for morbid obesity. Physical activity can contribute to better results in weight loss after bariatric surgery, while preserving lean body mass and decreasing changes in energy metabolism. One method to offset the negative effects on body composition due to sudden weight loss may be the Bodybuilding therapy, that is composed of sixteen patterns of movements (exercises), divided into sections of the upper part and lower limbs and abdomen. The range of heart rate during training should be between 60% to 85% of maximum heart rate (MHR), established by the Tanaka equation. Objective: To verify the effectiveness of therapy in individual Bodybuilding after bariatric surgery, and body composition by mass index (BMI), total body weight, percentage of lean body mass, body fat percentage and metabolic rate (BMR) through a case study. Methods: this research involved an individual volunteer who underwent bariatric surgery, women with 30 years of age, sedentary. Was carried out in the pre and post therapy Bodybuilding, anthropometrical and body composition. The subject performed three sessions of Bodybuilding therapy a week for three months. Results: When comparing the periods before and after therapy were observed Bodybuilding decrease in total body weight, body fat and BMI, and there was an increase in lean body mass and RMR. Conclusion: Our data suggest that the positive contribution Bodybuilding therapy on body composition in post-bariatric surgery, demonstrated by an increase in lean body mass, maintenance of resting metabolic rate, and decreased body fat.

KEYWORDS: surgery, physical activity, Fitness Therapy, body composition

RÉSUMÉ

Introduction: La chirurgie bariatrique est le traitement le plus efficace possible pour l'obésité morbide. L'activité physique peut contribuer à de meilleurs résultats dans la perte de poids après la chirurgie bariatrique, tout en préservant la masse maigre et en diminuant les changements dans le métabolisme énergétique. Une méthode pour compenser les effets négatifs sur la composition corporelle due à la perte de poids soudaine mai être la thérapie Bodybuilding, qui est composée de modèles de seize mouvements (exercices), subdivisée en sections de la partie supérieure et des membres inférieurs et l'abdomen. La gamme de fréquence cardiaque pendant l'entraînement doit être comprise entre 60% à 85% de la fréquence cardiaque maximale (MHR), établie par l'équation de Tanaka. Objectif: vérifier l'efficacité de la thérapie dans le culturisme individuelle après la chirurgie bariatrique, et la composition corporelle par l'indice de masse corporelle (IMC), le poids corporel total, le pourcentage de la masse maigre, le pourcentage de graisse corporelle et le taux métabolique (BMR) à travers une étude de cas. Méthodes: Cette recherche a impliqué un bénévole individu qui a subi une chirurgie bariatrique, les femmes ayant 30 ans d'âge, sédentaire. A été réalisée en pré et post traitement Bodybuilding, anthropométriques et la composition corporelle. Le sujet a effectué trois sessions de thérapie Bodybuilding par semaine pendant trois mois. Résultats: Lorsque l'on compare les périodes avant et après le traitement ont été observés Bodybuilding diminution du poids corporel total, la masse grasse corporelle et l'IMC, et il ya eu une augmentation de la masse corporelle maigre et de RMR. Conclusion: Nos données suggèrent que la thérapie contribution positive Bodybuilding sur la composition corporelle en post-chirurgie bariatrique, démontrée par une augmentation de la masse corporelle maigre, le maintien de taux métabolique au repos, et une diminution de la graisse corporelle.

MOTS-CLÉS: chirurgie, l'activité physique, de remise en forme de thérapie, la composition corporelle

RESUMEN

INTRODUCCIÓN: La cirugía bariátrica es el tratamiento más eficaz disponible para la obesidad mórbida. La actividad física puede contribuir a mejores resultados en la pérdida de peso después de la cirugía bariátrica, preservando la masa corporal magra y la disminución de los cambios en el metabolismo de la energía. Un método para compensar los efectos negativos sobre la composición corporal debido a la pérdida súbita de peso puede ser la terapia de musculación, que se compone de dieciséis de los patrones de movimientos (ejercicios), dividido en secciones de la parte superior y las extremidades inferiores y abdomen. El rango de la frecuencia cardiaca durante el entrenamiento debe estar entre 60% y el 85% de la frecuencia cardiaca máxima (FCM), establecida por la ecuación de Tanaka. Objetivo: Verificar la eficacia de la terapia en Fisicoculturismo individual después de la cirugía bariátrica, y la composición corporal mediante el índice de masa corporal (IMC), el peso corporal total, el porcentaje de masa magra corporal, porcentaje de grasa corporal y el ritmo metabólico (BMR) a través de un estudio de caso. Métodos: La investigación involucró un voluntarios individuales que se sometieron a cirugía bariátrica, las mujeres con 30 años de edad, sedentario. Se llevó a cabo en el pre y post tratamiento Bodybuilding, antropometría y composición corporal. El sujeto realizó tres sesiones de terapia de culturismo por semana durante tres meses. Resultados: Al comparar los períodos antes y después del tratamiento se observaron Bodybuilding disminución del peso corporal total, la grasa corporal y el IMC, y se produjo un aumento de la masa corporal magra y RMR. Conclusión: Nuestros datos sugieren que la positiva contribución de la terapia de culturismo en la composición corporal en el postoperatorio de cirugía bariátrica, demostrado por un aumento en la masa corporal magra, el mantenimiento del metabolismo de reposo, y disminución de la grasa corporal.

PALABRAS CLAVE: cirugía, actividad física, Terapia Fitness, composición corporal

EFEITO DA MUSCULAÇÃO TERAPÊUTICA EM PACIENTE SUBMETIDA À CIRURGIA BARIÁTRICA: ESTUDO DE CASO

RESUMO:

Introdução: A cirurgia bariátrica é o tratamento mais eficaz disponível para obesidade mórbida. A atividade física pode contribuir para a melhora dos resultados na perda de peso após cirurgia bariátrica, preservando a massa magra e diminuindo as alterações no metabolismo energético. Um método para compensar os efeitos negativos na composição corporal devido a perda de peso repentina pode ser a Musculação Terapêutica, essa é composta por dezesseis padrões de movimentos (exercícios), divididos em sessões de membros superiores e sessões de membros inferiores e abdominais. A faixa de freqüência cardíaca durante o treinamento deve ficar entre 60% a 85% da freqüência cardíaca máxima (FCmáx), estabelecida pela Equação de Tanaka. Objetivo: verificar a eficácia da Musculação Terapêutica em indivíduo pós-cirurgia bariátrica, quanto à composição corporal, através do índice de massa corporal (IMC), peso corporal total, percentual de massa magra, percentual de gordura corporal e a taxa metabólica de repouso (TMR) através de um estudo de caso. Métodos: participou dessa pesquisa um indivíduo voluntário submetido à cirurgia bariátrica, do sexo feminino, com 30 anos de idade, sedentário. Foi realizada, no período pré e pós Musculação Terapêutica, avaliação antropométrica e da composição corporal. O voluntário realizou três sessões de Musculação Terapêutica por semana, durante três meses. Resultados: quando comparados os períodos pré e pós Musculação Terapêutica foram observadas diminuição no peso corporal total, na gordura corporal e no IMC; e houve aumento da massa magra e na TMR. Conclusão: Os dados sugerem que a Musculação Terapêutica contribui positivamente na composição corporal no pós-operatório de cirurgia bariátrica, demonstrado pelo aumento de massa magra, manutenção da taxa metabólica de repouso, e diminuição da gordura corporal.

PALAVRAS-CHAVE: cirurgia bariátrica, atividade física, Musculação Terapêutica, composição corporal

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