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\*Marta Jastrzebska-Mierzyńska<sup>1</sup>, Lucyna Ostrowska<sup>1</sup>, Emilia Duchnowska<sup>2</sup>, Hady Razak Hady<sup>3</sup>

## Dietetic preparation of obese patient to bariatric treatment

### Przygotowanie dietetyczne pacjenta otyłego do operacji bariatrycznej

<sup>1</sup>Department of Dietetics and Clinical Nutrition, Medical University of Białystok, Poland<sup>2</sup>Department of Emergency Medicine, Medical University of Białystok, Poland<sup>3</sup>1<sup>st</sup> Department of General and Endocrinological Surgery, Medical University of Białystok, Poland

#### Keywords

bariatric surgery, dietetic preparation, nutritional recommendations, diet

#### Słowa kluczowe

chirurgia bariatryczna, przygotowanie dietetyczne, zalecenia żywieniowe, dieta

#### Conflict of interest

##### Konflikt interesów

None

Brak konfliktu interesów

#### Summary

Obesity is a chronic disease that predisposes to the development of many diseases. The incidence of its occurrence is constantly increasing. It is estimated that worldwide in 2016 650 million adults were obese (1). Attempts of conservative treatment of morbid obesity often do not bring the desired results, therefore, patients are referred for surgical treatment. It has been proven that bariatric surgery is the most effective method of therapy for obese patients, however, it is subject to a number of complications. Specialistic treatment in pre-operative care may reduce the risk. Dietetic preparation seems to be particularly important. Its main purpose is to change previous eating habits, reduce body mass, compensate nutritional deficiencies and nutritional education in terms of required changes in the diet after bariatric surgery.

The PubMed and Medline database were searched (manuscripts published from 2000 to 2018). The keyword used in the electronic search included: "bariatric surgery", "nutrition", "diet", "dietary recommendations", "nutritional status", "preoperative low calorie diet".

Adequate nutritional preparation of the patient affects the course and effectiveness of surgical treatment.

#### Streszczenie

Otyłość jest chorobą przewlekłą, predysponującą do rozwoju wielu schorzeń. Częstość jej występowania stale wzrasta. Szacuje się, że na świecie w 2016 roku otyłych było 650 milionów osób dorosłych (1). Próby leczenia zachowawczego otyłości olbrzymiej często nie przynoszą pożądanego rezultatu, w związku z tym chorzy poddawani są leczeniu zabiegowemu. Udowodniono, że chirurgia bariatryczna jest najskuteczniejszą metodą terapii pacjentów otyłych, jednak obarczona jest szeregiem powikłań. Objęcie chorego specjalistyczną opieką w okresie przedoperacyjnym może to ryzyko obniżyć. Szczególnie istotne wydaje się być przygotowanie dietetyczne. Ma na celu przede wszystkim: zmianę dotychczasowych nawyków żywieniowych, redukcję masy ciała, wyrównanie niedoborów pokarmowych oraz edukację żywieniową w zakresie wymaganych zmian w sposobie żywienia po operacji bariatrycznej.

Przeszukano bazy PubMed i Medline (manuskrypty opublikowane w latach 2000-2018). Słowa kluczowe użyte podczas wyszukiwania w przeglądarce elektronicznej to: „chirurgia bariatryczna”, „żywienie”, „dieta”, „zalecenia żywieniowe”, „stan odżywienia”, „przedoperacyjna dieta niskokaloryczna”.

Odpowiednie przygotowanie żywieniowe pacjenta wpływa na przebieg i skuteczność leczenia operacyjnego.

#### Address/adres:

\*Marta Jastrzebska-Mierzyńska  
Zakład Dietetyki i Żywności Klinicznego  
Uniwersytet Medyczny w Białymstoku  
ul. Mieszka I 4B, 15-054 Białystok  
tel.: +48 (85) 173-82-44  
marta.jastrzebska@umb.edu.pl

#### INTRODUCTION

Obesity is considered a civilization disease of the 21<sup>st</sup> century which brings a threat to the health and life of highly developed societies. Currently, it is one of the main public health problems in the world, due

to the health effects, range and rapid increase in its frequency (1-3).

Attempts to treat obesity conservatively by using low calorie diets, increased physical activity or pharmacotherapy are insufficient in some patients to achieve

significant, permanent weight reduction. More frequently, among patients previously treated conservatively without an effect, surgical treatment is applied, which results in greater loss of body weight, durability of the effect and a more significant improvement in the treatment of obesity-related diseases (4). Adequate nutritional preparation of the patient in the pre-operative period is one of the factors determining the effectiveness of surgical treatment of obesity.

## REVIEW

According to international and Polish recommendations in the field of bariatric and metabolic surgery, the best results of surgical treatment of obesity are obtained if the time of preparation of the patient for the procedure lasts at least 3 months, and optimally 6-12 months. At this time, it is recommended to have at least 3 visits to the doctor coordinating bariatric treatment (surgeon) or other specialists who are part of a multidisciplinary team (5, 6). Proper preparation of the patient allows optimization of treatment of diseases resulting from obesity and comorbidities, and thus, reduces the risk of untoward events in the perioperative period (5, 7-9). In addition, it allows assessment of the patient's motivation and willingness to cooperate and participate in long-term post-operative control. An essential element of effective surgical treatment of obesity is the patient's cooperation with a dietitian not only in the postoperative period, but also at the pre-operative assessment stage and preparation for surgery (10-12).

Pre-treatment dietary proceedings should include a detailed assessment of the current diet, assessment of nutritional status, determination of the weight reduction plan, nutritional education, as well as constant control of the effects of the process of losing weight (11, 12).

The assessment of the diet is aimed at learning about the current eating habits of the obese patient, including the number and frequency of meals consumed, the size and composition of individual meals, the frequency of consumption of various groups of food, its dietary preferences, culinary techniques used during the preparation of meals. In addition, all weight reduction attempts and their effects should be discussed with the patient. A precise analysis of the diet allows the dietitian to identify and correct the nutritional mistakes made by the patient, which significantly influenced the increase in body weight or were the cause of failure during attempts to lose weight.

The results of own study and other authors, indicate that the diet of obese people, despite high energy value, is characterized by low nutritional density, which results in food deficiencies (13-15). Numerous studies provide evidence that latent food deficiencies, especially vitamin D<sub>3</sub>, calcium, iron or folic acid, are very common in people with obesity (16-18). In connection with the above, the patient's preparation for

the surgical procedure should also include the diagnosis of the nutritional status of the patient. In addition to the basic anthropometric measurements (body weight, waist circumference, hip circumference), the body composition and blood biochemistry tests should be performed to identify nutritional deficiencies, properly compose the patient's diet, and select the appropriate supplementation (if required). The results of the body composition analysis will also serve as a reference in assessing the effectiveness of the patient's diet both in the pre-operative and post-operative period.

The role of a dietician is to develop a plan to reduce body weight and to define a measurable goal (loss of 5-10% of the initial body weight) that the patient should achieve. It is beneficial to designate a few small goals for the patient, the achievement of which will allow them to develop and consolidate new, healthy eating habits. The change of the current way of nutrition should start with learning how to regulate the consumption of food. During the day, the patient should eat 5 regular meals, at intervals of 3-3.5 hours. Especially important in daily nutrition is the consumption of breakfast for an hour after waking up. Supper should be eaten about 2 hours before bedtime. Regular consumption of food with low energy density accelerates metabolism, prevents fluctuations in blood glucose concentration, and thus prevents hunger attacks and the desire to eat something sweet between meals (19). It was shown that people who aim at losing weight regularly consuming breakfast had lower body mass in comparison with people who did not eat breakfast.

In addition, the consumption of a breakfast containing higher amounts of protein and dietary fiber helps increase the feeling of satiety and reduce the number of kilocalories and contributes to lowering the energy value of the all-day diet (20-22). It should also be recommended for patients to reduce the portions of meals, do not eat between meals, avoid eating at night. It should be made clear to the patient that meals should be consumed without haste for at least 20 minutes, and each bite should be masticated (20-30 times). In addition, the patient should avoid additional sugar, eating candy, sweet drinks, as well as fast food. The current way of preparing meals should also be modified. Dishes should be prepared using such cooking techniques as: boiling, steaming, grilling, baking in a foil or sleeve.

Each patient qualified for surgical treatment of obesity should use a diet prepared by a dietitian, nutritionally balanced low-energy diet for a period of at least 3 months before the planned surgery (optimally for 6 months) (6). Properly composed diet provides particular nutrients in amounts covering the patient's needs, which is a necessary condition for compensating food deficiencies, common in obese patients. The energy value of the diet should be selected individually for each patient in such a way as

to reduce the energy supply by 500-1000 kcal in relation to the total energy demand (7). According to the assumptions of a low-energy diet, protein intake should amount to 1 g/kg of body weight. High-quality biological protein (skim milk, lean meat, fish, poultry, cottage cheese, eggs, and lean chicken meat) should be in three main meals. Fats should cover 25% of the energy value of the diet.

It should be remembered that a significant part of the fat in the daily food ration comes from protein products and the same amount of fat added in the form of fat products (vegetable oils, optionally soft gob-margarines) should not exceed 25 g. Diet should exclude food containing large amounts of saturated fat and cholesterol (butter, bacon, lard, fatty meat, such as cork, pork shoulder). Carbohydrates should supplement the energy value of the daily food ration. It should be emphasized that it is particularly important to eat food that provide complex carbohydrates, such as groats, wholemeal bread, brown rice, wheat bran, oatmeal or other cereal flakes. The products which are the source of simple sugars (sugar, sweets, high-sweetened jams, sweetened fruit juices) are absolutely contraindicated.

The diet of people aiming at losing weight should also contain legume seeds, large amounts of vegetables (at least 500 g) and slightly fewer fruits (200-250 g). They are a great source of vitamins and minerals, as well as dietary fiber. The recommended daily intake of fiber is 30-35 g (22). The salt consumption should be limited to 5 g/day (1 flat teaspoon), especially for people with hypertension. The amount of intaken liquids (preferably still mineral water) should be at the level of 1500-2000 ml/day, however, it should be remembered that in the case of patients with hypertension and edema, the supply of fluids should be limited.

It should be emphasized that the effectiveness of dietetic treatment of obesity depends on the reduction of the energy value of the diet, and not on the mutual proportions of particular macronutrients (22, 23).

Patients qualified for surgical treatment of obesity very often have an enlarged and fatty liver, which complicates the technical aspects of surgery, thus, extending the time of surgery and increasing the risk of complications (24). The incidence of non-alcoholic steatohepatitis (NASH) in this group of patients is 35-88.6% (25-27). If NASH was diagnosed at the pre-operative stage of the patient's health assessment, then it may be beneficial to introduce a low-energy diet (LCD) or a very low-energy diet (VLCD) before the bariatric procedure to reduce the liver volume and, thus, reduce the risk of postoperative complications. The analysis of the available data shows that the duration (2-12 weeks) and energy value of the diet (456-1100 kcal) varied depending on the preferences of the center dealing with surgical treatment of obesity (28-33). In patients taking pre-operative VLCD diet, the mean reduction in liver volume was 12-20% and

was dependent on the duration of the diet. From the meta-analysis conducted by van Wissen et al. (34), the mean duration of the VLCD diet (average energy value of 729 kcal) was 6.4 weeks (2-12 weeks) and contributed to liver reduction by 13.6%. The meta-analysis also shows that the low-calorie diet contributed to a reduction in liver size by an average of 2.4% per week, therefore, it is recommended to use it for at least 4 weeks before surgery (34).

According to the recommendations of The British Obesity and Metabolic Surgery Society (BOMSS), a low-energy "conventional" diet – traditional (1000 kcal), VLCD (800 kcal) industrial diet and a dairy diet can be used to reduce liver size. Conventional diet is a high-protein, low-carbohydrate diet (max. 90 g/day) and low-fat diet (35). Its use from a dietitian requires accurate calculation of the amount of energy and individual macronutrients in the daily food ration, and the patient's meticulous weighing of the products during the preparation of meals and eating the whole portion of the meal planned. It should be emphasized that diets with an energy value below 1000 kcal are deficient in vitamins and minerals. They may lead to a worsening of nutritional deficiencies, therefore, supplementation with a multivitamin should be considered. Industrial diets are specially prepared products used in diets with limited energy content to reduce body weight. They are most often consumed in the form of cocktails with a strictly defined energy value and optimal content of standard value protein, necessary unsaturated fatty acids, vitamins and minerals. They are ready for immediate consumption after they have been dissolved in water. VLCD diets should be used under the supervision of a physician due to the very low energy supply (often below 800 kcal). In turn, the dairy diet consists of consuming only semi-skimmed milk and yoghurts in the amount of 2 liters (about 800-1000 kcal) daily divided into 4-5 meals. It is a deficient diet and requires additional vitamin and mineral supplementation as well as fiber (35, 36).

Also worth mentioning are the results obtained by Iannelli et al., who assessed the influence of supplementation with omega-3 acids (without the need for a low-energy diet) on the volume of the liver. He proved that a 4-week supply of omega-3 acids in an amount of 1500 mg/day contributed to a reduction in the size of the left lobe of the liver by 20% (37). The results of the work are promising, however, require confirmation and conducting randomized studies on a larger group of patients, but it seems to be reasonable to consider supplementation with omega-3 acids in the pre-operative period. Currently, the low-energy "conventional" diet is the preferred method used to reduce the volume of the liver (34, 36).

An essential element of preparing an obese patient for surgical treatment is also nutritional education. It should include information on the principles of nutrition after bariatric surgery, especially in the early

post-operative period (diet progression, eating and drinking techniques). The patient should be made aware of the necessity of supplementation of vitamins and minerals, as well as protein supplements. In addition, nutritional complications after the procedure (nausea and vomiting, dehydration, food intolerance, constipation, hair loss, reactive hypoglycaemia and 'dumping' syndrome) and ways of dealing with them should be discussed. As part of nutrition education, attention should be paid to the need to check on the labels of food products, their composition, energy value

and content of individual nutrients, which promotes the right choice of nutrition (38).

## CONCLUSIONS

Summing up adequate nutritional preparation of the patient affects the course and effectiveness of surgical treatment of obesity. The nutritional education carried out by the dietician in the pre-operational assessment process and analysis of the patient's motivation to comply with dietary recommendations avoids post-operative failure.

## BIBLIOGRAPHY

- WHO: Obesity and overweight, Fact sheet, Reviewed February 2018; <http://www.who.int/mediacentre/factsheets/fs311/en/>.
- Bray GA: Medical Consequences of Obesity. *J Clin Endocrinol Metab* 2004; 89: 2583-2589.
- Binda A, Jaworski P, Tarnowski W: Chirurgiczne leczenie otyłości. *Post Nauk Med* 2013; 26: 49-54.
- Maggard MA, Shugerman LR, Suttrop M et al.: Meta-analysis: surgical treatment of obesity. *Ann Intern Med* 2005; 142: 547-559.
- Fried M, Yumuk V, Oppert JM et al.: International Federation for Surgery of Obesity and Metabolic Disorders-European Chapter (IFSO-EC); European Association for the Study of Obesity (EASO); European Association for the Study of Obesity Obesity Management Task Force (EASO OMTF): Interdisciplinary European guidelines on metabolic and bariatric surgery. *Obes Surg* 2014; 24: 42-55.
- Budzyński A, Major P, Głuszek S et al.: Polskie rekomendacje w zakresie chirurgii bariatrycznej i metabolicznej. *Med Prakt Chir* 2016; 6: 13-25.
- Yumuk V, Tsigos C, Fried M et al.: Obesity Management Task Force of the European Association for the Study of Obesity: European guidelines for obesity management in adults. *Obes Facts* 2015; 8: 402-424.
- Runkel N, Colombo-Benkmann M, Hüttl TP et al.: Evidence-based German guidelines for surgery for obesity. *Int J Colorectal Dis* 2011; 26: 397-404.
- Provost DA: Indications and contraindications for bariatric surgery. [In:] Nguyen NT, Blackstone R, Morton J (eds.): *The ASMBS Textbook of Bariatric Surgery*. Vol. 1. Springer New York, New York 2015: 73-76.
- Kulick D, Hark L, Deen D: The bariatric surgery patient: a growing role for registered dietitians. *J Am Diet Assoc* 2010; 110: 593-599.
- Krotki M: Rola dietytyka w opiece nad chorymi poddawanyimi operacjom bariatrycznym. *Post Nauk Med* 2015; 28: 667-672.
- Podgórska L, Paśnik K: Rola dietytyka w prowadzeniu chorego leczonego bariatrycznie. *Piel Zdr Publ* 2014; 4: 277-283.
- Jastrzebska-Mierzynska M, Ostrowska L, Hady HR et al.: Assessment of dietary habits, nutritional status and blood biochemical parameters in patients prepared for bariatric surgery: a preliminary study. *Wideochir Inne Tech Maloinwazyjne* 2012; 7: 156-165.
- Dagan SS, Zelber-Sagi S, Webb M et al.: Nutritional Status Prior to Laparoscopic Sleeve Gastrectomy Surge. *Obes Surg* 2016; 26: 2119-2126.
- Moizé V, Deulofeu R, Torres F et al.: Nutritional intake and prevalence of nutritional deficiencies prior to surgery in a Spanish morbidly obese population. *Obes Surg* 2011; 21: 1382-1388.
- Wolf E, Utech M, Stehle P et al.: Preoperative micronutrient status in morbidly obese patients before undergoing bariatric surgery: results of a cross-sectional study. *Surg Obes Relat Dis* 2015; 11: 1157-1163.
- van Rutte PW, Aarts EO, Smulders JF et al.: Nutrient deficiencies before and after sleeve gastrectomy. *Obes Surg* 2014; 24: 1639-1646.
- Krzizek EC, Brix JM, Herz CT et al.: Prevalence of Micronutrient Deficiency in Patients with Morbid Obesity Before Bariatric Surgery. *Obes Surg* 2018; 28: 643-648.
- Tey SL, Salleh N, Henry CJ et al.: Effects of Consuming Preloads with Different Energy Density and Taste Quality on Energy Intake and Postprandial Blood Glucose. *Nutrients* 2018; 10: 161-177.
- Kant AK, Andon MB, Angelopoulos TJ et al.: Association of breakfast energy density with diet quality and body mass index in American adults: National Health and Nutrition Examination Surveys, 1999-2004. *Am J Clin Nutr* 2008; 88: 1396-1404.
- Leidy HJ, Gwin JA, Roenfeldt CA et al.: Evaluating the intervention-based evidence surrounding the causal role of breakfast on markers of weight management, with specific focus on breakfast composition and size. *Adv Nutr* 2016; 7: 563S-575S.
- Smethers AD, Rolls BJ: Dietary Management of Obesity: Cornerstones of Healthy Eating Patterns. *Med Clin North Am* 2018; 102: 107-124.
- Sacks FM, Bray GA, Carey VJ et al.: Comparison of weight-loss diets with different compositions of fat, protein, and carbohydrates. *N Engl J Med* 2009; 360: 859-873.
- van Nieuwenhove Y, Dambrauskas Z, Campillo-Soto A: Preoperative very low-calorie diet and operative outcome after laparoscopic gastric bypass: a randomized multicenter study. *Arch Surg* 2011; 146: 1300-1305.
- Cordeiro L, Campos JM, de Paula PS et al.: Nonalcoholic steatohepatitis on preoperative period of gastric bypass: lack of correlation with degree of obesity. *Arq Bras Cir Dig* 2013; 26 (suppl. 1): 39-42.
- Losekann A, Weston AC, Carli LA et al.: Nonalcoholic fatty liver disease in severe obese patients, subjected to bariatric surgery. *Arq Gastroenterol* 2013; 50: 285-289.
- Reha JL, Lee S, Hofmann LJ: Prevalence and predictors of nonalcoholic steatohepatitis in obese patients undergoing bariatric surgery: a Department of Defense experience. *Am Surg* 2014; 80: 595-599.
- Colles SL, Dixon JB, Marks P et al.: Preoperative weight loss with a very-low-energy diet: quantitation of changes in liver and abdominal fat by serial imaging. *The Am J Clin Nut* 2006; 84: 304-311.
- Edholm D, Kullberg J, Haenni A et al.: Preoperative 4-week low-calorie diet reduces liver volume and intrahepatic fat, and facilitates laparoscopic gastric bypass in morbidly obese. *Obes Surg* 2011; 21: 345-350.
- Edholm D, Kullberg J, Karlsson FA: Changes in liver volume and body composition during 4 weeks of low calorie diet before laparoscopic gastric bypass. *Surg Obes Relat Dis* 2015; 11: 602-606.
- Fris RJ: Preoperative low energy diet diminishes liver size. *Obes Surg* 2004; 14: 1165-1170.
- Gonzalez-Perez J, Sanchez-Leenheer S, Delgado AR et al.: Clinical impact of a 6-week preoperative very low calorie diet on body weight and liver size in morbidly obese patients. *Obes Surg* 2013; 23: 624-631.
- Lewis MC, Phillips ML, Slavotinek JP et al.: Change in liver size and fat content after treatment with Optifast very low calorie diet. *Obes Surg* 2006; 16: 697-701.
- van Wissen J, Bakker N, Doodman HJ et al.: Preoperative Methods to Reduce Liver Volume in Bariatric Surgery: a Systematic Review. *Obes Surg* 2016; 26: 251-256.
- Segaran E, Wheeler A: Dietitian's guide to liver shrinkage prior to bariatric surgery. *DOM UK, BOSS* 2008.
- Baldry EL, Leeder PC, Idris IR: Pre-operative dietary restriction for patients undergoing bariatric surgery in the UK: observational study of current practice and dietary effects. *Obes Surg* 2014; 24(3): 416-421.
- Iannelli A, Martini F, Schneck AS et al.: Preoperative 4-week supplementation with omega-3 polyunsaturated fatty acids reduces liver volume and facilitates bariatric surgery in morbidly obese patients. *Obes Surg* 2013; 23: 1761-1765.
- Taube-Schiff M, Chaparro M, Gougeon L et al.: Examining Nutrition Knowledge of Bariatric Surgery Patients: What Happens to Dietary Knowledge over Time? *Obes Surg* 2016; 26: 972-982.

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