

DIETARY HABITS OF OBESE PATIENTS QUALIFIED FOR BARIATRIC PROCEDURES

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ABSTRACT

Background. Patients with obesity, including morbid obesity, commit numerous dietary mistakes. They prefer high-energy diets, but of poor nutritional value. Patients qualified for bariatric procedures show deficiencies in vitamins and minerals due to insufficient intake of vegetables, fruit and whole grain products.

Objective. Analysis of dietary habits in morbidly obese patients prepared for bariatric surgery, including assessment of eating style and frequency of consumption of certain products.

Material and methods. The study group contained 39 people aged 18 - 65 years, who were surveyed with a questionnaire elaborated in the Department of Clinical Dietetics and Nutrition, Medical University of Białystok. The following factors were assessed: number of meals, snacking between meals and eating at night, types of snacks eaten, and frequency of consumption of certain foods. Results were analyzed using Statistica 9.0.

Results. The majority of surveyed men (41.7%) ate three meals a day, whereas most women (40.7%) had at least 4 meals a day. Nearly 85% of the respondents admitted snacking between meals, mainly eating fruit, sweets and sandwiches. Whole grain cereal, milk and dairy products, fish, fruit, vegetables and pulses appeared in diet of patients qualified for treatment of obesity very rarely.

Conclusions. Dietary habits of obese patients qualified for bariatric procedures are not consistent with recommendations. Therefore, these patients should receive nutritional education in order to foster proper eating habits that will help in the postoperative nutrition

Key words: *morbid obesity, adults, nutrition manner*

STRESZCZENIE

Wstęp. Osoby z otyłością, w tym z otyłością olbrzymią, popełniają liczne błędy żywieniowe. Dieta otyłych jest wysokoenergetyczna, jednak posiada niską wartość odżywczą. U osób zakwalifikowanych do zabiegów bariatrycznych występują niedobory witamin i składników mineralnych spowodowane niewystarczającym spożyciem między innymi warzyw, owoców oraz produktów pełnoziarnistych.

Cel. Analiza zachowań żywieniowych pacjentów z otyłością olbrzymią przygotowywanych do operacji bariatrycznej, na którą składały się ocena trybu żywienia oraz częstotliwości spożycia poszczególnych artykułów spożywczych.

Material i metody. Badaniem objęto grupę 39 osób w wieku 18 – 65 lat. Badanie przeprowadzono z użyciem kwestionariusza ankiety, opracowanego w Zakładzie Dietetyki i Żywienia Klinicznego UM w Białymstoku. Ocenie poddano między innymi ilość spożywanego posiłków, zwyczaj pojadania między posiłkami i jedzenia w nocy, rodzaj spożywanego przekąsek oraz częstotliwość spożycia wybranych produktów spożywczych. Analizę wyników wykonano w programie Statistica 9.0.

Wyniki. Wykazano, że większość ankietowanych mężczyzn (41,7%) spożywała 3 posiłki dziennie, a kobiet (40,7%) przynajmniej 4 posiłki dziennie. Blisko 85% badanych pojadało między posiłkami, głównie owoce, słodycze i kanapki. Osoby zakwalifikowane do chirurgicznego leczenia otyłości zbyt rzadko spożywały produkty zbożowe z pełnego przemiału, mleko i przetwory mleczne, ryby, warzywa i owoce oraz nasiona roślin strączkowych.

Wnioski. Sposób żywienia osób otyłych zakwalifikowanych do zabiegów bariatrycznych nie jest zgodny z zaleceniami żywieniowymi. Należy objąć ich edukacją, w celu kształtowania prawidłowych zachowań żywieniowych, które pomogą w późniejszym żywieniu pooperacyjnym.

Słowa kluczowe: *otyłość olbrzymia, dorośli, sposób żywienia*

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INTRODUCTION

The prevalence of obesity, including morbid obesity, increases with age and is a major health problem in developed and developing countries. Obesity is becoming increasingly common also in Poland. The National Multicenter Health Survey (WOBASZ) (2003 – 2005) demonstrated that overweight and obesity affected 61% of Polish men and 48.1% of Polish women, with more women (2.2%) suffering from pathological obesity (BMI \geq 40 kg/m²) in comparison with men (0.6%) [3].

Obesity, especially its morbid form, is the major cause of many diseases, particularly cardiovascular disorders and type 2 diabetes which increase the risk of premature death [22, 40]. Bariatric surgery is recently the most efficient method of obesity treatment. It provides to the significant loss of body mass and consequently to the improvement of patient's quality of life [12]. What is more, bariatric surgery significantly improves metabolism of insulin, glucose and lipids [20, 21].

The diet of the obese patients is nutritionally poor. It is characterized by low intake of whole-grain cereal products, milk and dairy products, red meat, sea fish, fruit and vegetables. According to international reports, patients qualified for surgical treatment of obesity are often diagnosed with nutritional deficiencies, especially of vitamins D₃, B₁, calcium, iron, zinc and selenium [14, 17, 27, 28, 36] which occur due to insufficient supply of dietary nutrients [2, 10, 26, 35, 36].

In accordance with the European guidelines of Bariatric Scientific Collaborative Group, the decision for bariatric surgery should be preceded by an assessment of dietary habits and nutritional status, since effective dietary preparation of the patient before the procedure determines their post-operative condition.

The aim of the study was to analyze eating behaviors of patients with morbid obesity prepared for bariatric surgery, including the evaluation of eating habits and frequency of consumption of certain foods.

MATERIAL AND METHODS

The study involved 39 patients (27 women and 12 men) qualified for surgical treatment of obesity. The average age was 39.4 \pm 12.93 (range 18 - 65) for women and 38.1 \pm 11.77 (range 20-62) for men. The mean body mass index was 46.8 \pm 7.96 kg/m² in women (range 36.1 - 72.6 kg/m²) and 45.0 \pm 6.78 kg/m² (range 38.3 - 60,5 kg/m²) in men. The study subjects were surveyed with a questionnaire elaborated in the Department of Clinical Dietetics and Nutrition, Medical University of Białystok. The first part of the questionnaire contained particulars and questions concerning eating habits (such

as number of meals consumed, snacking between meals, eating at night, type of snacks eaten, places where food was consumed). The second part was related to the usual frequency of consumption of certain food products. The results were analyzed using Statistica 9.0. The study was approved by the Ethics Committee UMB No. RI-002/525/2010. All patients signed a voluntary consent to participate in the study. The study was financed from research funds of the Department of Clinical Dietetics and Nutrition, Medical University of Białystok.

RESULTS

The analysis showed that the majority of obese men qualified for bariatric surgery (50%) lived in large cities (population of over 150,000 inhabitants). The results are presented in Table 1. The highest percentage of obese women (48.1%) was residents of small towns. Women and men with higher education accounted for 33.3% and 16.7%, respectively; 33.3% of women and 33.3% of men had secondary education; 25.9% of women and 33.3% of men had vocational education. Nearly 59% of patients surveyed were employed; women more frequently performing mental work (37%), whereas men - physical work (50%). Over 23% of the respondents were unemployed. Pensioners accounted for approximately 18% of all the respondents.

Table 1. Characteristics of examined women and men

	Women n = 27		Men n = 12		Total n = 39	
	n	%	n	%	n	%
Place of living						
City (more than 150,000 inhabitants)	10	37	6	50	16	41.0
Town (less than 150,000 inhabitants)	13	48.1	4	33.3	17	43.6
Rural areas	4	14.8	2	16.7	6	15.4
Education						
None	1	3.7	1	8.3	2	5.1
Primary	1	3.7	1	8.3	2	5.1
Vocational	7	25.9	4	33.3	11	28.2
Secondary	9	33.3	4	33.3	13	33.3
University	9	33.3	2	16.7	11	28.2

In the current study, the majority of men surveyed (41.7%) had three meals a day, and women (40.7%) at least 4 meals a day (Table 2). In both groups, breakfast, dinner and supper were the most frequently consumed meals. Breakfast was eaten more frequently by women than men (92.6% vs 75%), whereas dinner (100% vs 88.9%) and supper (100% vs 96.3%) - more often by men as compared to women. Lunch was consumed by only 33.3% of the respondents, and only 20.5% ate at

tea time. As many as 71.8% of the respondents (70.4% of women and 75% of men) ate irregularly and the intervals between meals were longer than 4 hours. The most frequently, the respondents ate at home (92.6% of women and 66.7% of men). About 89% of women and 75% of men participating in the study were snacking between meals (often up to 40.7% of women and 35.9% of men). Night snacking habit was reported by 18.5% of women and about 8% of men. Most commonly eaten snacks were fruits (61%), sweets (50%) and sandwiches (47%). Women showed a stronger preference for sweets and fruit, whereas men for fruit and sandwiches. Detailed evaluation of eating habits is shown in Table 2.

Table 2. Nutritional habits of obese patients qualified for bariatric procedures.

	Women n=27		Men n=12		Total n=39	
	n	%	n	%	n	%
Occupation						
Mental work	10	37	3	25	13	33.3
Physical work	4	14.8	6	50	10	25.6
Pensioner	5	18.5	2	16.7	7	17.9
Unemployed	8	29.6	1	8.3	9	23.1
Number of meals						
1	0	0	0	0	0	0
2	6	22.2	3	25	9	23.1
3	10	37	5	41.7	15	38.5
≥ 4	11	40.7	4	33.3	15	38.5
Meals						
Breakfast	25	92.6	9	75	34	87.2
Lunch	9	33.3	4	33.3	13	33.3
Dinner	24	88.9	12	100	36	92.3
Tea	7	25.9	1	8.3	8	20.5
Supper	26	96.3	12	100	38	97.4
Snacking						
Yes, often	11	40.7	3	25	14	35.9
Yes, sometimes	13	48.1	6	50	19	48.7
Rather not	3	11.1	2	16.7	5	12.8
No, never	0	0	1	8.3	1	2.6
Eating at night						
Yes, often	2	7.4	0	0	2	5.1
Yes, sometimes	3	11.1	1	8.3	4	10.2
Rather not	1	3.7	2	16.7	3	7.7
No, never	21	77.8	9	75	30	76.9
Eating place						
At home	25	92.6	8	66.7	33	84.6
At a restaurant	0	0	0	0	0	0
In bars	0	0	1	8.3	1	2.6
Buy ready meals	1	3.7	1	8.3	2	5.1
Home + bar	1	3.7	1	8.3	2	5.1
Home + restaurant	0	0	1	8.3	1	2.6

Apart from dietary habits, also routine frequency of consumption of certain products was assessed in the study. The analysis revealed that people qualified for surgical treatment of obesity ate whole grain cereal products very rarely. More than 29% of women consumed

cereal only once a week, and nearly 26% less than once a month. The majority of men (41.7%) ate cereal once or twice a month, and 25% did not eat those products at all. Women ate pasta and rice 1-2 times a week, and men once a week. Obese patients were also found to prefer white bread. More than 41% of women and 58% of men consumed white bread at least once a day. Daily consumption of wholemeal rye bread was reported by only 22.2% of women and 25% of men. The largest group of women (29.6%) did not consume wholemeal rye bread at all and 41.7% of men admitted consuming it only once a week.

The assessment of the frequency of milk intake revealed that this product was consumed by only 37% of women and 16.6% of men, 7 or more times a week. Milk fermented beverages in daily diet were consumed by only 29.6% of women and 8.3% of men. In both groups, cottage cheese was eaten usually once a week (by 41% of women and 25% of men). The main source of protein, present in the diet of the obese patients qualified for surgical treatment, was meat. In the current study, the most commonly consumed meat was poultry and pork. The largest group of women (51.8%) had poultry meat 2-3 times a week, whereas men (41.7%) 4-6 times a week. Pork was consumed once a week by 33.3% of the respondents, 4-6 times a week by 22.2%, and 2-3 times a week by 18.5%. The largest percentage of men (41.7%) ate pork 2-3 times a week, and 25% of them ate pork 7 times a week or more. In both groups, the consumption of marine fish was very seldom (once a week). The frequency of consumption of fat meat products seems to be alarming. Sausages, luncheon meat, meat pies in the group of obese women were routinely consumed at a frequency of 2-3 times a week, and once a week in the group of obese men.

Daily consumption of raw vegetables was reported by only 40.7% of women and 41.7% of men, and raw fruits by 29.6% and 33.3%, respectively. Potatoes in both groups were consumed at a frequency of 4-6 times a week. A very low intake of legumes is alarming. More than 38% of all the respondents consumed such products only 1-2 times a month, 23% less than 1-2 times a month, and nearly 31% did not eat them at all. It was also observed that obese patients chose butter and soft margarine (in both groups consumed 7 times a week or more) rather than olive oils and vegetable oils (in both groups used only 2-3 times a week). The consumption of confectionery products by patients qualified for bariatric surgery is very common, especially among women. More than 29.6% of women consumed sweets up to 7 times a week or more, and 25.9% of them 2-3 times per week. The highest percentage of men (33.3%) ate sweets 2-3 times a week. Men consumed large quantities of sweet fizzy drinks, with 33.3% of

them consuming it 7 times a week or more and nearly 17% 4-6 times a week.

DISCUSSION

High energy diet, low physical activity and sedentary lifestyle play an important role in the emergence of obesity [7, 49]. It has been proven that the main factors contributing to the development of obesity are: a small number of meals, irregular food intake, too long intervals between meals and snacking [51].

In the current study, men reported to eat 3 meals a day, and women at least 4 meals a day. In another study involving a group of morbidly obese patients qualified for bariatric surgery, 50% of respondents consumed 3 meals per day [5]. Similar results have been obtained by other authors [19, 24, 43, 50]. In accordance with the prevention and treatment of overweight and obesity, 4-5 meals are recommended to eat per day, as the distribution of daily food intake in smaller portions is beneficial for maintaining healthy body weight. In an American study, consuming meals more often during the day was associated with a lower risk of obesity (≥ 4 meals vs. 3 meals) [31]. This seems to be confirmed by the observations reported by *Gacek* and *Chrzanowska*, who showed a statistically significant correlation between BMI and the number of meals [19]. It also affects food consumption in patients after bariatric surgeries.

In the present study, the most frequently eaten meals were respectively supper, dinner and breakfast. Comparable results have been obtained by *Stefańska*, who reported that over 90% of overweight and obese patients had three main meals (breakfast, dinner and supper) [45].

From a nutritional point of view, the most important meal of the day is breakfast. Many studies have provided evidence that regular breakfast consumption improves insulin sensitivity and glucose tolerance during subsequent meals, and also contributes to lower levels of triglycerides and LDL cholesterol in the blood [16, 33, 42]. The morning meal provides an appropriate amount of carbohydrates which affect the release of hormones responsible for the feeling of satiety [6, 13], whereas the presence of substantial amounts of protein and fat from milk and dairy products modulates ghrelin secretion, thus inhibiting the feeling of hunger [18]. Avoiding breakfast is associated with an increased incidence of obesity [31]. In a study conducted by *van der Heijden* et al., men eating breakfast regularly were characterized by a lower body weight gain, compared to those who did not eat breakfast [47]. According to British observations, patients consuming high-energy breakfasts had a lower mean BMI and lower weight

gain over the following five years, compared to those consuming low-calories breakfasts [41].

In our study, more than 71% of the respondents consumed meals irregularly, which is a common phenomenon among Poles, both with normal and excessive body weight [5, 8, 19, 24, 29, 34]. Food intake irregularity is one of the dietary factors conditioning overweight and obesity [8, 15, 38]. It also may impede a 5 meal regime after bariatric surgery.

In our study, over 84% of the respondents qualified for bariatric treatment admitted snacking between meals. This percentage was higher in a study conducted by *Boniecka* et al. [5]. Similar results have been obtained by *Mędrela-Kuder*, who reported snacking habit in 96% of women with excess body weight [34]. In the current study, the most commonly consumed snacks between meals were fruits, sweets and sandwiches. Similar results have been obtained by other authors [5, 37, 45]. Type of food and frequency of consumption also play an important role in the prevention and treatment of overweight and obesity. A properly composed menu, containing such products as whole grain cereal, skim milk and dairy products, fruit and vegetables, lean meat, fish or pulses, helps maintain good health.

The assessment of the frequency of consumption of the selected products by the morbidly obese qualified for bariatric surgery showed a very low intake of grits, pasta, rice and wholemeal bread. Similar results have been obtained by *Stefańska* et al. [45] in their research presenting that wholemeal bread and grits were eaten once a day by 33% of obese women, whereas only once a week by obese men (28.3%). In the present study, consumption of white bread and semi-confectionery products at least once a day was reported by 41% of women and 52% of men. Such low intake of wholemeal products may cause deficiency of B vitamins, especially vitamin B₁. It has been proven that 15-29% of patients with morbid obesity show vitamin B₁ deficiency [9, 17]. We also observed a low intake of milk and dairy products in obese patients. In a study conducted by *Stefańska* et al., the largest number of obese women -30%- reported intake of milk and dairy products at least once a day, whereas obese men (about 28%) 2-3 times a week [44]. Milk and dairy products are an excellent source of easily absorbed calcium. Several studies have shown a negative correlation between calcium intake and serum lipids, blood glucose and insulin levels [1, 39]. In addition, *Liu* et al. have shown that the risk of metabolic syndrome decreases with a greater consumption of calcium [30]. Insufficient intake of milk and dairy products can also cause latent deficit of calcium in patients who are prepared for bariatric surgery.

Our observations and results reported by other authors demonstrate a high intake of meat (poultry and pork) among people with normal and excessive body

weight [8, 25, 44, 46]. In this study, obese patients demonstrated low intake of fish (only once a week). Similar results have been obtained by *Ostrowska et al.* [37], *Iłow et al.* [25], *Gacek et al.* [19], *Włodarek et al.* [50]. Moreover, the majority of respondents reported consumption of beef and veal less than once a month. Red meat is an excellent source of easily absorbed iron, and its low consumption may contribute to iron severe deficiency. Other studies involving patients with morbid obesity have revealed iron deficiency in 12% - 43.9% of them [17, 32, 48]. Vegetables and fruit should dominate in the diets of overweight and obese patients. Of those surveyed in the present study only 40.7% of women and 41.7% of men reported daily intake of raw vegetables, and 29.6% and 33.3% of raw fruits, respectively. In a study by *Włodarek et al.*, 79% of obese women and 64% of obese men reported daily fruit intake. Only 45% of respondents reported consumption of vegetables once a day and every fourth person consumed it 3 times a day [50]. Similarly, another study has shown that the diet of people with excess body weight is characterized by low intake of fruits and vegetables, which are a valuable source of food fibers, vitamins and minerals [34]. This can cause insufficient supply of vitamin C, which is indispensable for the absorption of iron in the gastrointestinal tract.

The assessment of dietary habits showed a very low consumption of legumes that are rich in B vitamins, potassium, iron and magnesium. It should be noticed that about 30% of all the respondents did not consume them at all. Another study evaluating the frequency of consumption of selected products by obese patients presented that more than 60% of men and women consume pulses less than once a week [44]. The analysis of fat intake revealed that the obese patients preferred soft margarine and butter. Olive oil and vegetable oils were used 2-3 times a week. Preferences concerning fat spreads vary. Female inhabitants of Legnica with its surroundings and Warsaw often used soft margarine, while obese patients with high blood pressure chose butter [8, 23, 25]. Vegetable oils were most commonly used for frying [4, 8, 11, 25]. Both in our study and in those conducted by other authors, 20-35% of the respondents consumed sweets 2-3 times a week [44, 50], and large amounts of sugary drinks delivering glucose and fructose to the body. Excessive intake of simple carbohydrates in diet increases its energy value and is one of the main reasons for the positive energy balance. It can be thus concluded that the nutrition manner of the respondents are not consistent with dietary guidelines. Numerous studies have shown nutritional deficiencies, especially of vitamin D₃, vitamin B₁ and iron in morbidly obese individuals qualified for bariatric surgery, despite dietary energy excess [14, 17, 26, 27, 28, 36]. This is

due to inadequate intake of whole grain cereal products, legumes, milk, dairy products, beef, veal and fish.

CONCLUSIONS

1. Dietary mistakes committed by obese patients, such as consumption of high-energy products (meat, fat) and low intake of milk and dairy products, could increase the risk of morbid obesity.
2. Consumptions of large amounts of high-energy products with poor nutritional value may provide to the development of latent nutritional deficiencies. Obese patients should be encouraged to eat more grains, cereal products, vegetables, fruit, milk and dairy products, red meat and fish with simultaneous reduction of the intake of fatty meat and sweet snacks.
3. Obese patients qualified for bariatric procedures should receive dietary education in order to foster healthy nutritional habits that will help to maintain healthy diet after surgery.

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Conflict of interest

The authors declare no conflict of interest.

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