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THE SUCCESS OF MEDICAL NUTRITION THERAPY IN BOTH GENDERS AND IN DIFFERENT AGE GROUPS

Abstract: More than half of the adult population of the Republic of Serbia is overweight or obese. Obesity carries various risks and general health complications, which can significantly impair one's functioning and well-being. On the other hand, beneficial effects of body mass reduction are clearly confirmed. The therapeutic approach to obesity involves the use of various measures. Treatment may include: medical nutrition therapy, programmed physical activity, medicaments and surgical treatment. The aim of this study was to examine if the effectiveness of medical nutrition therapy depends on the sex and age structure. This investigation was conducted as a retrospective study for the period from January 2008. until July 2009. During this time, 990 people came to the Counceling center for obesity. Only patients who came regularly to the controls and had BMI higher than 25 kg/m^2 were included in this study. The average BMI in men was 31.55 kg/m^2 and 32.66 kg/m^2 in women. Compared to the first examination, majority of females (n = 35, 24.56%) and males (n = 23, 25.27%) reduced their BMI from 0 to 0.5 kg/m^2 after medical nutrition therapy. Based on the results of X2 test, we concluded that there were statistically significant differences between men and women in effectiveness of medical nutrition therapy, while differences in the effectiveness of treatment in different age groups do not exist, neither in men nor in women.

Key words: obesity, body mass index, male, female, medical nutrition therapy.

Introduction

Obesity is a chronic disease characterized by an accumulation of excess adipose tissue (1). In adult population obesity is defined by BMI (body mass index): BMI greater than 25kg/m^2 is considered overweight and above 30 is considered obese (1).

In modern society, *obesity* has reached *epidemic proportions.* More than a billion people are overweight, of which at least 300 million obese (2). This is the most important food-related disease in developed countries, where the prevalence of obesity has increased rapidly in last two decades (2). In seven european countries that carried out measurements on adults, 53.5%-68.5% of men and 47.2%-61.8% of women were overweight. The prevalence of obesity ranged in men from 14.2% to 26.0% and in women from 13.3% to 30.0% (3).

According to data from 2000. which was published by the Institute of Public Health of Serbia "Dr Milan Jovanovic Batut" (IZZS), epidemiological data for Serbia indicate that more than half (54%) of the adult population is overweight or obese (36,7% are overweight and 17.3% are obese). The highest overall prevalence is in Vojvodina, 58.5%, while the average BMI in the population of the adult population of Serbia is 26 +4.74 kg/m^2 (1).

Obesity is often accompanied with very serious diseases. With every kilogram of body weight, the risk of cardiovascular disease increases by 3.1% (4). Well-known Framingham study showed that obesity acts as an independent risk factor for ischemic heart disease (4). Metabolic complications are very common: Carey observed that women with large waist circumference (in this study, defined over 92 cm) were more than five times as likely as their peers with small waists (67cm) to develop diabetes type 2, regardless their overall adiposity (5). One estimation suggests that for every 20% excess of body weight, the risk for diabetes mellitus type 2 rises for 150% (6). Metabolic disorders of lipids and lipoproteins are present in approximately 30% of obese individuals (7). Obesity is often accompanied by gallbladder disease (chronic cholecystitis and cholelythiasis) and fatty infiltration of the liver (7). Numerous studies have shown that obese patients with BMI over 35 kg/m^2 have increased mortality from malignant disease 1.5 times (6).

Because of these reasons, the direct costs of obesity in Europe are estimated to be around 6% of total costs of health care funds (8). The therapeutic approach involves the use of various measures. Treatment may include: medical nutrition therapy, programmed physical activity, medicaments and surgical treatment (1).The goals of treatment should be much wider than just the weight loss and could include complete decrease of all major risk factors and an increase of general health (9). Therefore, the involvement of medical professionals who are focused on the prevention, reduction and elimination of obesity is essential. It is crucial to reduce overall morbidity and mortality, as well as to reduce significant direct economic costs of obesity.

Aims

The aim of this study was to determine the nutritional status of both genders in the sample and to evaluate the effectiveness of medical nutrition therapy in males and

females and success of medical nutrition therapy in different age groups. Evaluation of risk for metabolic complications was also the subject of this research.

Methods

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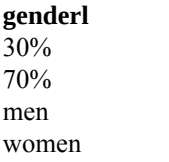
This research was conducted as a retrospective study for the period from January 2008. until July 2009. The survey included people with a BMI greater than 25 kg/m^2 who came regularly to the controls. The patients came on their own initiative or upon a GP referral. The analysis did not include patients who came only once, because for them there are only data at the time of arrival, but there are no data about changes of their body weight over time. Medical examination included medical history, physical examination and laboratory tests. Medical history should include information about time when person gained weight, the course of weight gain, duration, maximum weight, previous use of drugs, as well as the effects of previously treatment, diet information, physical activity, smoking and alcohol consumption, detailed personal and family history about diseases associated with obesity. Physical examination includes the measurement of body weight, body height, waist circumference and blood pressure. Body weight is measured, preferably in the morning, before breakfast, after emptying the bladder and bowel. Medical decimal scale with an accuracy of 100 g is used. Measurement is read to the nearest 0.1kg. Body height is measured in the morning without shoes. Heels, vertex and shoulder blades should be at the same level. Frankfurt line, which extends from the lower edge of the orbit to the external auditory canal opening, should be positioned horizontally. After measurements, BMI, relative body weight and ideal body weight are calculated. The patient usually comes with results of laboratory tests (CBC, fasting glucose, OGTT, if necessary, triglycerides, cholesterol, LDL, HDL, etc.). After that, nutrition advice are offered, medical nutrition therapy is made (individualized and based on gender, age, lifestyle, concomitant diseases, comedication) and physical activity, in relation to health, is recommended.

Statistical analysis was done. A database was created with elementary and derived variables, and statistical analysis was performed using the computer program Mathematica Wolfram 7. In data's analysis the following statistical methods were used: basic descriptive statistics for the anthropometric indicators (arithmetic mean, standard deviation (SD), percentage values), and X^2 test was used for attribute features.

Results

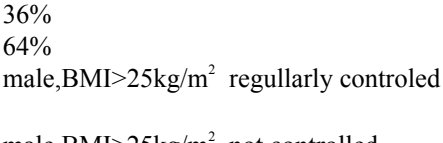
In the period of January 2008-June 2009. 990 patients came in clinic: 693 women (70%) and 297 men (30%).

Figure 1. Gender structure of sample



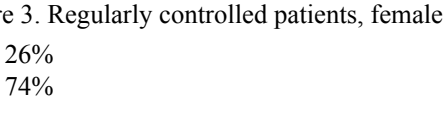
254 men (86.53%) were overweight or obese and 43 men (14.47%) had their BMI lower than 25 kg/m^2. From a total of 254 men, 91 patients (35.83%) came regularly to controls . (Figure No.2)

Figure 2. Regularly controlled patients, male



During observed period 693 females came to Counceling center. 553 women were overweight or obese (79.80%). 142 females came to regular check ups. (25.68%). (chart No. 3).

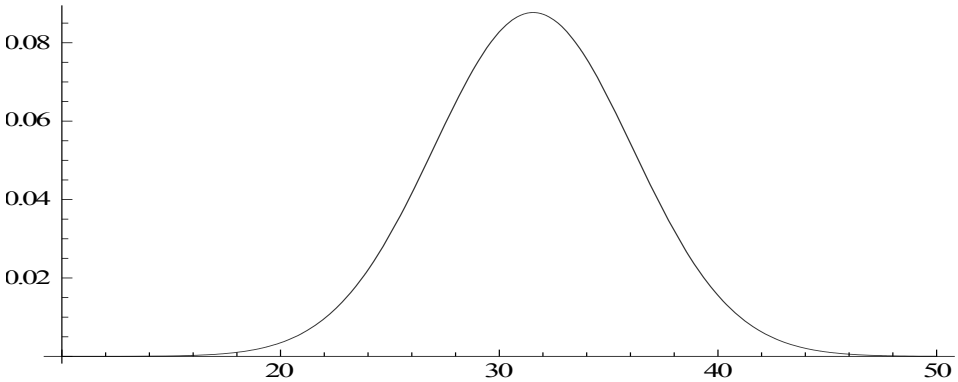
Figure 3. Regularly controlled patients, female



The study included 233 participants (91 women and 142 men). In the study group, the average body weight of women was 85.78 kg, average women's body weight after treatment was 82.85 kg. The female subjects lost on average 2.93 kg. At the first medical examination mean BMI of women in the study group was 32.66 kg/m^2, and after therapy was 31.56 kg/m^2. BMI decreased for 1.1 kg/m^2 in female group. Average body weight of males at the first medical examination was 99.01kg, and after therapy was 95.68 kg. Male respondents, lost on average 3.33 kg. The average BMI of men's

group was 31.55 kg/m^2 at the first medical examination, and the average BMI after medical nutrition therapy was 30.49 kg/m^2. Therefore, the average reduction of BMI after therapy was 1.06 kg/m^2 .

Figure 4. Gaussian curve- distribution of BMI in men



The highest percentage of females (39.43%) and males (45.05%) had a BMI in the range from 25 to 29.99 kg/m^2. Moderately obese (obese class I) are 30.99% of women and 36.26% of men. 18.31% of female and 12.09% of men are severly obese (obese class II), and 11.27% of women and 6.59% of men are very severly obese (obese class III)

Figure 5. BMI values in both genders.

We observed effect of medical nutrition therapy, which was defined as the difference between BMI before and after therapy. Compared to the first examination, the majority of females (n = 33, 24.56%) and males (n = 23, 25.27%) reduced their BMI after treatment from 0 to 0.5 kg/m^2. Changes in BMI in both sexes after medical nutrition therapy is shown on figures No 6 and 7.

Figure 6. BMI before and after medical nutrition therapy, female

Figure 7. BMI before and after medical nutrition therapy, male

The difference between values of BMI before and after medical nutrition therapy is observed in dependence on age in both sexes. Following data were obtained:

TABLE 1. Changes of BMI values after treatment by age, male

Male BMI (kg/m^2)	<-2	[-2,-1.5)	[-1.5,-1)	[-1,-0.5)	[-0.5,0)	[0,0.5)	[0.5,1)	[1,1.5)	[1.5,2)	[2,2.5)	[2.5,3)	[3,3.5)	>=3.5	sum
<20 years	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[20,30)	0	0	0	0	0	1	0	0	0	0	0	2	0	3
[30,40)	0	0	0	2	1	1	4	4	3	1	0	1	0	17
[40,50)	0	1	0	1	0	5	5	1	4	1	1	1	1	21
[50,60)	1	1	1	0	2	4	6	4	2	5	1	1	2	30
[60,70)	0	0	1	1	1	10	3	1	0	1	0	0	0	18
>=70	0	0	0	0	0	2	0	0	0	0	0	0	1	3
Sum	1	2	2	4	4	23	18	10	9	8	2	5	4	92

The same is done for women, ie. BMI values were observed in relation to age

TABLE 2. Changes of BMI values after treatment by age, female

Women BMI (kg/m^2)	<-2	[-2,-1.5)	[-1.5,-1)	[-1,-0.5)	[-0.5,0)	[0,0.5)	[0.5,1)	[1,1.5)	[1.5,2)	[2,2.5)	[2.5,3)	[3,3.5)	>=3.5	sum
<20godina	0	0	0	0	0	0	1	1	0	0	1	0	0	3
[20,30)	0	0	0	0	0	1	2	2	3	1	1	1	2	13
[30,40)	0	0	0	0	0	4	4	3	2	3	2	0	1	19
[40,50)	1	1	1	0	2	4	1	2	4	5	1	1	0	23
[50,60)	0	0	1	3	1	12	7	7	3	1	3	0	3	41
[60,70)	1	0	1	2	1	12	5	4	3	2	1	0	1	33
>=70	0	0	0	0	0	1	6	1	0	1	0	0	0	9
sum	2	1	3	5	4	34	26	20	15	13	9	2	7	141

We have also analyzed waist circumference in women (only 133 patients) and in men (only 70 patients). Following data were obtained:

Table 3. Waist circumference (in cm), woman

Waist circumference (cm)	<80	80-88	>88	sum
Women	2 (1,5%)	25 (18,8%)	106 (79,7%)	133(100%)

TABLE 4. Waist circumference (in cm), men

Waist circumference (cm)	<94cm	94-102	>102	sum
Man	1 (1,43%)	18 (25,71%)	51 (72,86)	70(100%)

Figure 8. Waist circumference, female

Women
2%
19%
79%
<80 cm
80-88 cm
>88 cm

Figure 9. Waist circumference, male

Men
1%
26%
73%
<94cm
94-102cm
>102cm

Discussion

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In the observed period, 297 men (30%) and 693 women (70%) came to the Counceling center. Based on those data, we can conclude that women were twice as many interested in achieving physiological body mass. Middle-aged females are most interested in achieving optimal body weight (10). More than 3/4 of obese women tried to reach their physiological body weight (10). Male respondents came regularly in 35.83% cases, while only 26% of women came for regular checkups. Also, 2/3 male and as many as ¾ female respondents came only to the first medical examination. It might be interesting to note that male respondents made regular check-ups in larger numbers than females. The average BMI in male's group is 31.55 kg/m^2, and in female's group is 32.66 kg/m^2. BMI of women was slightly higher than men's (for 1.11 kg/m^2). The largest number of male (45.05%) and females (39.43%) had BMI in the range from 25 to 29.99 kg/m2. In relation to the calculated values of BMI in the study group of men and women, we examined if gender played an important role

in one's nutritional status, which was tested with X^2 test. Our results showed that gender had no influence on one's nutritional status, which could be explained by the fact that this is not the general population, but selected subjects who came on their own to the counseling centre.

Furthermore, female respondents lost an average 2.93 kg, while the male respondents lost 3.33 kg. Compared to the first examination, the majority of females (24.56%) and males (25.27%) reduced their BMI after medical nutrition therapy for 0 to 0.5 kg/m2. The success of diet (based on the calculated difference between the BMI of the first examination and BMI after treatment) in females and males was tested using X^2 test. Based on these results, we can undoubtedly conclude that statistically significant differences between men and women in the success of diet do not exist.

Similar results were noted in one study conducted in Germany, which showed that difference in weight loss for males and females doesn't exist. The weight loss program lasted 15 weeks. Patients were instructed to follow a mixed diet. Calorie intake was restricted to 1500 kcal/day for the men and 1200 kcal/day for the women**.** Weight loss was similar for both sexes (13.4 kg vs. 12.8 kg). Although weight loss was similar, males lost more abdominal fat, and women lost more subcutaneous adipose tissue (11)

Another study, conducted in Germany, in the Teutoburger-Wald Clinic, gave similar results. During that investigation, 15 men and 15 women with obesity (body mass index 29-36 kg/m^2) were given a reducing diet. Among the men body weight fell from 93.1 +/- 2.1 to 83.8 +/- 2.0 kg, but the women declined only from 92.9 +/- 2.0 to 84.7 +/- 1.9 kg. Although men achieved a greater weight loss, there wasn't statistically significant difference in weight loss (12).

Moreover, Ballor and Phoeman conducted 33 studies, which included 491 females and 147 males. In this study, men lost more weight (17.5 kg) than women (11.5 kg). Men lost an average of 16% of their body weight, and women 12% (13).

In our study, we also tested, using X^2 test, whether there are age differences in the effectiveness of medical nutrition therapy. We concluded that age had no influence on weight loss.

Increased risk for metabolic complications is present in men with a waist size greater than 94 cm, in this study such risk was detected in 25.71%, a markedly increased risk had 72,86% of men. In female patients, increased risk for metabolic complications have 18.79% of women, a highly elevated risk was observed in 79.69% of women.

Conclusion

Following conclusions can be made: In this sample there was no statistically significant difference between genders in the effectiveness of medical nutrition thera-

py. Also, significant difference in success of the implementation of medical nutrition therapy in any age group and both genders counld not be found.

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