THE IMPACT OF BODY MASS INDEX AND AGE OF WOMEN ON DEVELOPMENT OF EATING DISORDERS

Ziuzin V.O.

Medical Institute of the Petro Mohyla Black Sea National University, Mykolaiv, Ukraine

ABSTRACT

Background. Obesity and overweight cause more than 1.3 million deaths each year, but even this figure may be an underestimate. According to the Global Nutrition Report, in 2021, 61.4% of men and 55.5% of women in Ukraine faced this problem. 90.0% of obesity cases are the result of lifestyle, eating disorders and physical activity.

The aim of the study was to evaluate the influx of indicators of the body mass index and age of women on the development of disordered eating behavior.

Materials and Methods. The study involved 240 female patients divided into 4 groups depending on the BMI: group 1 included 60 women with underweight, with Body Mass Index (BMI) average (18.0 ± 0.75) kg/m^2; group 2 – 60 overweight women with BMI average (27.5 ± 0.98) kg/m^2, group 3 – 60 obese women with BMI average (32.2 ± 1.21) kg/m^2. Of the women of group 3, 40 had gynoid type obesity, 20 – abdominal type obesity. The control group consisted of 60 women with average BMI (23.5 ± 1.11) kg/m^2. The age of the patients ranged from 18 years to 75, average age was (46.5 ± 1.41) years. During the investigation, a variety of psychometric tests were used (Eating Attitudes Tests, Body Attitudes Test and Eating Disorder Examination Interview).

Results and Conclusions. In women of group 1 bulimia nervosa was recorded 8 times $(p<0.05)$ more often, and anorexia nervosa 2.7 times $(p<0.05)$ more often than in the control group. In patients of group 2, compulsive overeating was recorded 5 times $(p<0.05)$ more often, and in group 3 – 18 times $(p<0.05)$ more often than in the control group. Strong correlation was established between the young age (18–30 years) and bulimia nervosa $(r=0.7, p=0.02)$, atypical bulimia nervosa $(r=0.8, p=0.001)$, anorexia nervosa $(r=0.76, p=0.003)$ and atypical anorexia nervosa $(r=0.87, p=0.004)$.

Keywords: obesity, overweight, compulsive overeating, food behavior disorders.

Introduction

Obesity is a complex multifactorial disease characterized by excessive deposition of adipose tissue in the body. Globally, obesity and overweight cause more than 1.3 million deaths each year, but even this figure may be an underestimate [1]. In the European Region, the situation with overweight and obesity has investigated epidemic proportions. 63.0% of men and 54.0% of women are overweight. The highest rates of overweight and obesity are found in Mediterranean and Eastern European countries. People with lower levels of education are more likely to be overweight [2]. According to the Global Nutrition Report, in 2021, 61.4% of men and 55.5% of women in Ukraine faced this problem [3]. Over 13 years, according to the State Statistics Service, the average weight of Ukrainians has increased by 2 kg. Mostly, the population over the age of 50 has recovered: in 2008, the average weight of adult Ukrainians was 73 kg, in 2021 – 75 kg [4]. Obesity, according to the State Statistics Service, affects 16.0% of the adult population of Ukraine. This is more than the world average (8.0%). According to the Ministry of Health, there is some dissociation between the urban and rural populations: in rural areas, obesity was detected in 18.0% of men and 36.0% of women, while in urban areas – 12.0% and 21.0% respectively. Overweight is

Corresponding Author:
Ziuzin Viktor – Doctor of Medical Science, Professor, Head of the Department of Hygiene, Social Medicine, Public Health and Medical Informatics of the Medical Institute of Petro Mohyla Black Sea National University.
Address: Ukraine, 54000, Mykolaiv, 68 Desantnykiv str., 10.
E-mail: nawal08th@gmail.com

present in 35.0% of men and 32.0% of women living in villages, and in 33.0% of men and 27.0% of women living in cities [5]. It is quite natural that the proportion of obese people is increasing among representatives of older age groups: for example, among women 55–64 years old, 38.0% suffer from this disease, while among women 18–24 years old – only 3.0% [6] (*Fig. 1*).

vian countries was equal to that of Europe. Point width ranged from 0.4 to 1.5 cm, and lifetime width ranged from 0.7 to 5.8 cm for disordered binge eating in women [10]. In the study, which included Argentina, Brazil, Chile, Colombia, Mexico and Venezuela, the breadth of food behavior disorder was 3.53 percent [11–13]. Thus, this particular study showed that the prevalence of disor-
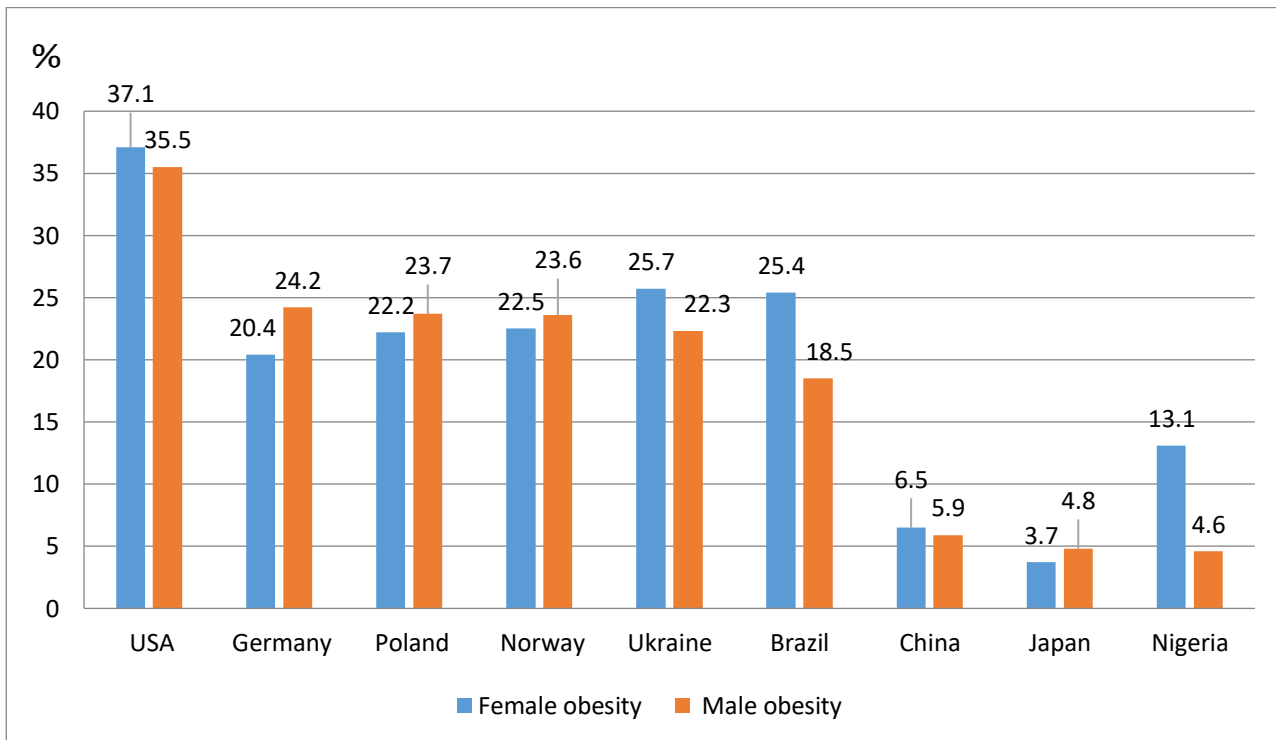

Fig. 1. Epidemiology of overweight and obesity in different countries during 2021–2022.

About 90.0% of obesity cases are the result of lifestyle, eating disorders and physical activity: long intervals between meals and excessive portions; overeating in the evening; eating before bed; a large amount of carbohydrates and fats (especially confectionery and animal origin) with a lack of fiber and dietary fiber; excess intake of calories compared to their expenditure; lack of physical stimulation of muscle tissue to participate in fat processing. This also includes family predisposition and psychogenic overeating. Evidence of the increasing eating disorders is observed in developing countries and among ethnic minorities. While further investigation of disorders reported, as a rule, is concentrated in Western America. This discord is growing in different cultures [7–9]. Currently, in the United States, food behavior disorder is present in 0.8% of adult men and 1.6% of adult women. In the study, which included Finland, Sweden, Norway and Iceland, the prevalence of disordered grub behavior in the Scandina-

dered food behavior in these Latin American countries is equal to that of Western countries [14].

The aim of the study was to evaluate the influx of indicators of the body mass index and age of women on the development of eating disorders.

Materials and Methods

During the study 240 female patients were examined at the University Clinic of Petro Mohyla Black Sea National University. All patients were divided into 4 groups depending on Body Mass Index (BMI): group 1 included 60 women with underweight with BMI average (18.0 ± 0.75) kg/m^2, group 2 – 60 overweight women with BMI average (27.5 ± 0.98) kg/m^2, group 3 – 60 obese women with BMI average (32.2 ± 1.21) kg/m^2. Of women from the group 3, 40 had gynoid type obesity, 20 had abdominal type obesity. The control group consisted of 60 women with patients with average BMI (23.5 ± 1.11) kg/m^2. The age of the patients ranged from 18 years to 75, average age was (46.5 ± 1.41) years.

The examination of patients included detailed collection of patient history and complaints. During history taking, we specified the changes in the body weight over the past 2 years; eating habits, physical activity; taking medications; early diseases of the cardiovascular system (myocardial infarction or sudden death of the father or other first-degree male relatives ≤55 years, or the mother or other first-degree female relatives ≤65 years); identification and assessment of the impact of diseases associated with obesity (diabetes, hypertension, dyslipidemia, cardiovascular, respiratory and joint pathology, non-alcoholic fatty liver disease, sleep disorders, etc.). Physical examination included BMI calculation; WC (Waist Circumference) measurement; the examination was carried out for the presence of papillary pigmentary dystrophy of the skin (acanthosis nigricans) as a sign of insulin resistance; assessment of severity there are accompanying ones. Laboratory examination included measurement of total cholesterol, high-density lipoprotein, low-density lipoprotein, triglycerides, glucose, aspartate transaminase, alanine transaminase, uric acid, glucose tolerance test, with an increase in fasting glucose of more than 5.6 mmol/l, a family history of diabetes, indirect signs of insulin resistance. Data from instrumental research methods were taken from the patients' medical records.

The diagnosis of eating disorders was made by a psychiatrist after a thorough examination of the patients, in accordance with the American Family Physician criteria. To determine the type and triggers of eating disorders, during the investigation, a variety of psychometric tests were used (Eating Attitudes Tests (EAT), Body Attitudes Test (BAT), Eating Disorder Examination Interview (EDE).

Completing the EAT based on three criteria: 1) the total score based on the answers to the EAT-questions; 2) answers to the behavioral questions related to eating symptoms and weight loss; and 3) the individual's BMI calculated from their height and weight. Generally, a referral is recommended if a respondent scores "positively" or meets the "cut off" scores or threshold on one or more criteria. Regardless of the score, if a respondent feels that they are suffering from feelings that are interfering with daily functioning; they should seek an evaluation from a trained mental health professional.

The BAT is a self-reported questionnaire consisting of 20 questions. The patients are asked to score each statement 0–5, 0 meaning they do not relate to the statement at all, and 5 meaning the statement frequently describes their sentiment. The answers to these questions are then analyzed and provide information regarding four factors that evaluate the patient's subjective view on their body: negative appreciation of body size, lack of familiarity with one's own body, general body dissatisfaction, and rest factor.

The Eating Disorder Examination Interview (EDE) is a semi-structured interview conducted by a trained clinician to assess the psychopathology associated with the diagnosis of an eating disorder. The EDE is rated through the use of four subscales and a global score. The four subscales are: restraint, eating concern, shape concern, weight concern. The questions concern the frequency in which the patient engages in behaviors indicative of an eating disorder over a 28-day period. The test is scored on a 7-point scale from 0–6. With a zero-score indicating not having engaged in the questioned behavior.

The patients' medical reports with compulsive eating behavior are usually characterized by the following: eating, over a period of time (for example, within 2 hours), an amount of food that is significantly more than most people would eat in the same period of time under the same circumstances. Patients with binge eating disorder complain of not feeling full while eating and have lost control over when to stop eating. The person eats much faster than usual. A person eats until a feeling of excessive and uncomfortable fullness of the stomach appears large amount of food without feeling physical hunger. A person eats alone because he is embarrassed by the amount of food he eats. The person feels disgusted with himself, depressed, or guilty about his overeating. There is distress (negative stress) due to binge eating. It occurs at least 2 days every week for 6 months.

The patients with bulimia nervosa are usually defined as having repeated episodes of binge eating (at least twice a week for a three-month period), in which large amounts of food are consumed in a short period of time. There was a constant preoccupation with eating, a strong desire or obsessive desire to eat. The patient attempts to counteract the fattening effects of food intake by one of the following: inducing vomiting; self-administration of laxatives; alternating periods of fasting; use of medications, in particular appetite suppressants; diuretics.

During a bulimic episode, a person with inappropriate compensatory behaviors regularly induces vomiting, uses laxatives, diuretics or enemas, fasts, or engages in excessive physical acti-

vity on a regular basis. Atypical bulimia nervosa is characterized by repeated episodes of overeating and excessive use of laxatives without significant changes in body weight. Typical concerns about body shape and weight may be absent.

The study was approved by the commission on ethics and bioethics of the Medical Institute of Petro Mohyla Black Sea National University. The study was conducted in accordance with the basic bioethical norms of Helsinki Declaration of the World Medical Association on Ethical Principles of Scientific and Medical Research, as amended (2000, amended in 2008), the Universal Declaration on Bioethics and Human Rights (1997), the Council of Europe Convention on Human Rights and Biomedicine (1997). All participants were informed about the aims, organization, methods of the study and signed an informed consent to participate in it, and all measures were taken to ensure patient anonymity.

Statistical processing of the findings was carried out by the methods of variation statistics implemented by the standard package of application programs SPSS 13.0 for Windows. Under the conditions of normal distribution, quantitative indicators were displayed in the form of mean (M) and standard deviation (S). Discrete values are presented in the form of absolute and relative frequencies (percentage of observation to the total number of examined. The obtained results were considered statistically significant at $p<0.05$. The relationship between indicators of the quantitative scale was evaluated using the Spearman correlation coefficient (r). The strength of the relationship was interpreted as follows: very weak – (0–0.3); weak – (0.3–0.5); medium strength – (0.5–0.7); strong – (0.7–0.9); very strong – (0.9–1.0).

Results and Discussion

The study recorded that in women with a body mass index below 18.0 kg/m^2, bulimia nervosa was recorded 8 times ($p<0.05$) more often, and anorexia nervosa 2.7 times ($p<0.05$) more often than in the control group. In patients of group 2 (overweight), compulsive overeating was recorded 5 times ($p<0.05$) more frequently, and in group 3, 18 times ($p<0.05$) more often than in the control group. During the study, a direct positive correlation relationship was established between the BMI of patients and the type of eating behavior. In women of group 1, a strong correlation with bulimia nervosa ($r=0.9$, $p=0.002$) and anorexia nervosa ($r=0.88$, $r=0.001$) was established. In the group 2, the average correlation was between weight and compulsive overeating ($r=0.7$, $p=0.0001$), bulimia nervosa ($r=0.7$, $p=0.03$). In the group 3 of obese patients, a strong direct connection was established between compulsive overeating and BMI ($r=0.83$, $p=0.02$), while in patients in the control group (with an optimal index), a strong connection was recorded with healthy eating behavior ($r=0.85$, $p=0.001$) (*Table 1*).

Table 1. Structure of eating disorders in the examined patients depending on the body mass index

Eating behavior, eating disorder	Group 1, n=60			Group 2, n=60			Group 3, n=60			Control group, n=60		
	n (%)	r	p	n (%)	r	p	n (%)	r	p	n (%)	r	p
Compulsive overeating	5 (8.3)	0.3	0.06*	10 (16.7)	0.7	0.0001*	36	0.83	0.02*	2 (3.33)	0.2	0.2
Bulimia nervosa	16 (26.7)	0.9	0.002*	20 (33.3)	0.7	0.03*	8	0.5	0.2	2 (3.33)	0.42	0.05
Atypical bulimia nervosa	22 (36.7)	0.5	0.23	14 (23.3)	0.4	0.08	4	0.47	0.31	3 (5.0)	0.31	0.99
Anorexia nervosa	8 (13.3)	0.88	0.001*	7 (11.7)	0.3	0.10	5	0.32	0.41	3 (5.0)	0.4	0.81
Atypical anorexia nervosa	7 (11.7)	0.45	0.09	6 (10.0)	0.37	0.90	3	0.46	0.2	2 (3.34)	0.2	0.65
Healthy eating behavior	2 (3.3)	0.37	0.01*	3 (5.0)	0.41	0.01*	4	0.35	0.12	48 (80.0)	0.85	0.001

Notes: * – the difference is probable at $p<0.05$.

A detailed collection of the patient's medical history allows us to establish the main causes of behavioral disorders in women of different recurrent categories, such as: the influence of social factors – 109 (45.6%); environmental factors – 68 (28.4%); personal factors – 34 (14.0%), genetic factors – 16 (7.0%); presence of chronic somatic diseases – 12 (5.0%) (*Fig. 2*).

The study documented a strong correlation between young age (18–30 years) and bulimia nervosa (r=0.7, p=0.02), atypical bulimia nervosa (r=0.8, p=0.001), anorexia nervosa (r=0.76, p=0.003) and atypical anorexia nervosa (r=0.87, p=0.004). In the age group of women 31–44 years of age, an average correlation was established with compulsive overeating (r=0.6, p=0.03), bulimia nervosa (r=0.63, p=0.02) and anorexia nervosa (r=0.62, p=0.01). In women aged 45 years and above, a stronger correlation was established with compulsive overeating (r=0.8, p=0.002) (*Table 2*).
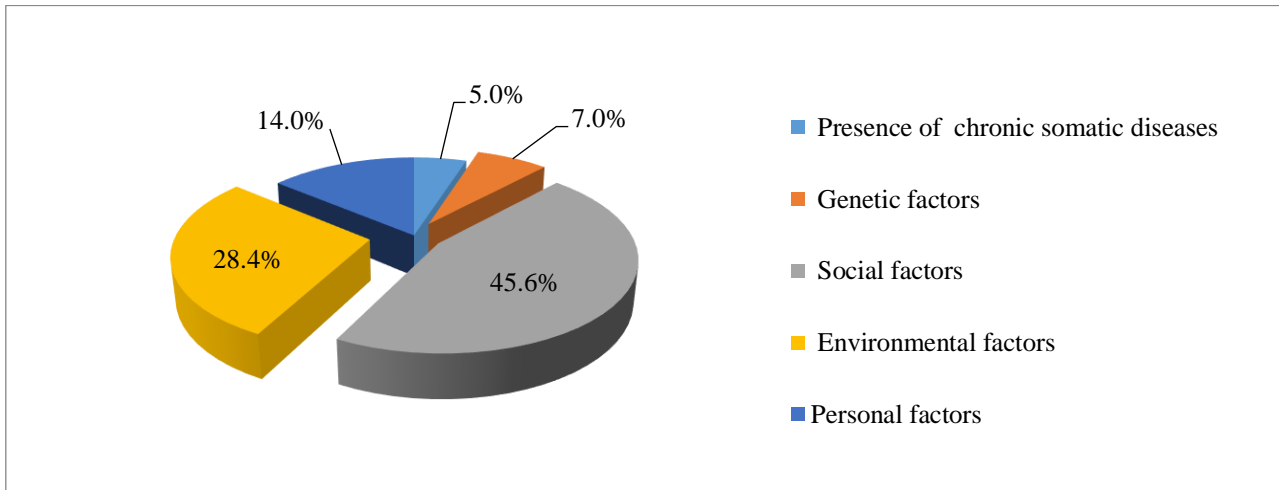

Fig. 2. Main causes of eating disorders in the clinical groups

Table 2. Structure of eating disorders in the examined patients, depending on the patients' age

Eating behavior, eating disorder	Patients' age, years											
	18–30			31–44			45–67			>68		
	n (%)	r	p	n (%)	r	p	n (%)	r	p	n (%)	r	p
Compulsive overeating	6 (10.0)	0.5	0.1	11 (18.3)	0.69	0.03*	36 (60)	0.89	0.002*	37 (61.7)	0.81	0.001*
Bulimia nervosa	14 (23.3)	0.7	0.02*	8 (13.3)	0.63	0.02*	6 (10.0)	0.1	0.21	5 (8.3)	0.2	1.32
Atypical bulimia nervosa	7 (11.7)	0.8	0.001*	3 (5.0)	0.49	0.001*	4 (6.7)	0.2	0.34	3 (5.0)	0.1	0.09
Anorexia nervosa	21 (35.0)	0.76	0.003*	14 (23.4)	0.62	0.01*	8 (13.3)	0.3	0.54	7 (11.7)	0.3	0.43
Atypical anorexia nervosa	8 (13.3)	0.87	0.004*	16 (26.7)	0.41	0.002*	4 (6.7)	0.01	0.58	5 (8.3)	0.4	0.44
Healthy eating behavior	4 (6.7)	0.4	0.06	8 (13.3)	0.2	0.05	2 (3.3)	0.2	1.03	3 (5.0)	0.45	0.32

Notes: * – the difference is probable at $p < 0.05$.

Management of individuals with eating disorders included psychoeducation about the disorder, monitoring of body weight, mental and physical risks, any other risk factors, and was multidisciplinary with coordination between services. Family members were also involved. Changing body weight was the key to supporting other psychological and physical changes necessary for recovery. In the treatment of anorexia, the first priority was psychological help (of course, if the patient's condition allowed it, when hospitalization in the intensive care unit was not required). Cognitive-behavioral therapy (CBT), which was aimed at making the patient responsible for controlling his eating, showed high effectiveness in correcting eating disorders. Patients kept records of food intake and vomiting; tried to identify external stimuli or emotional changes that precede the emergence of a craving for overeating, in order to subsequently eliminate or avoid these factors. Treatment involved reducing dietary restrictions and developing cognitive and behavioral skills to overcome cravings or refusal to eat. Patients were taught to identify and change dysfunctional thoughts and attitudes about their body image, weight, and eating, as well as any dysfunctional thoughts and attitudes that contribute to negative emotions that lead to overeating or avoidance of food.

In our study, anorexia nervosa was characterized by loss of body weight 15% below normal, a BMI of 17.5 or below. Weight loss occurred as a result of the patients' refusal of "fatty food". Patients perceived themselves as "too fat", there was an obsessive fear of gaining weight.

Randomized trials by other authors have also shown superiority of cognitive-behavioral therapy over other types of psychotherapy and pharmacological interventions. On average, CBT helps approximately 50.0% of all patients get rid of binge eating and purging, while the percentage reduction in binge eating and purging in all patients who undergo CBT is typically 80.0% or more. CBT gives good and stable results: therapeutic changes persist for a year or more. Long-term prospective follow-up after CBT (mean duration 5.8 years) showed that approximately two-thirds of patients remained free of eating disorders. A peculiarity of CBT for bulimia is also its speed: the frequency of attacks begin to decrease already after the first therapy sessions [14]. Thus, our results are consistent with the results of other authors.

Conclusion

The study determined, that in women of group 1 bulimia nervosa was recorded 8 times (p<0.05) more, and anorexia nervosa 2.7 times (p<0.05) more often than in the control group. In patients of group 2, compulsive overweight was recorded 5 times (p<0.05) more often, and in group 3 – 18 times (p<0.05) more often than in the control group. Strong correlation was installed between young age (18–30 years) and bulimia nervosa (r=0.7, p=0.02), atypical bulimia nervosa (r=0.8, p=0.001), anorexia nervosa (r=0.76, p=0.003) and atypical anorexia nervosa (r=0.87, p=0.004).

The study found that overweight young women are at risk for developing eating disorders; therefore, treatment of such patients should be handled by a team of multidisciplinary specialists.

Obesity is directly related to the patient's lifestyle, eating habits, and the influence of the environment. To achieve success in optimizing the population's weight: a range of measures is needed, such as limiting food advertising aimed at children, taxes on sugar-sweetened drinks and improving measures to control obesity. To achieve optimal body weight, age and initial BMI must be taken into account. Treatment of obesity and behavioral disorders requires a multispecialty approach, with the mandatory participation of a psychiatrist, general practitioner and endocrinologist.

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