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Eating disorders as a consequence of improperly managed weight reduction - a study among women with moderate physical activity

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Abstract

Background: Eating disorders are a growing public health challenge. They are characterized by complexity, requiring a wide spectrum of treatment due to the diseases present, somatic complications, body dissatisfaction, and communication difficulties. The purpose of this study was to assess the prevalence of eating disorder risk associated with poorly managed weight loss.

Material and methods: the study was conducted on a group of 214 women using a questionnaire by indirect survey method through a form provided online. A proprietary survey questionnaire supplemented by two standardized questionnaires was used: EAT-26 and ORTO-15.

Results: The body mass index of 149 respondents (70%) remained normal, while overweight and obese women accounted for a total of 23% - 14% (31 subjects) and 7% (19 subjects), respectively. The study using the EAT-26 questionnaire showed that among the 214 respondents, 98 women were at risk for eating disorders, accounting for 46% of the study group. A cutoff score of 20 was taken as the threshold. A statistically significant difference was noted between BMI and the risk of eating disorders ($\chi^2=26.447$; $p<0.05$), as well as a statistically significant difference between relationships with food and the risk of eating disorders ($\chi^2=31.393$; $p<0.05$). A study using the ORTO-15 questionnaire showed a risk of orthorexia among 184 female respondents (86%) in the study group when a 40-point cutoff is adopted. A statistically significant relationship was observed between the occurrence of orthorexia risk and eating disorders ($\chi^2=4.980$; $p<0.05$). In the group of female respondents with an identified risk of eating disorders, almost half of the respondents show a risk of orthorexia

Conclusions: The occurrence of eating disorders and symptoms indicative of orthorexia does not depend on sociodemographic factors. The appearance of ED may be influenced by the BMI of the subjects. The risk of eating disorders is influenced by relationships with food. There is an ongoing need to promote the role of the nutritionist as a specialist in health and nutrition counseling.

Keywords: eating disorders, weight loss, diet, women

Background

Eating disorders are a growing public health challenge. They are characterized by complexity, requiring a wide spectrum of treatment due to the diseases present, somatic complications, body dissatisfaction, and communication difficulties [1]. We can divide the risk factors of eating disorders into general and individual. General ones include the female gender, adolescence, and early adulthood. Individual factors include depression, obesity, sexual abuse, anxiety and anxiety disorders, and perfectionism. Other factors influencing the development of eating disorders are genetic predisposition, relations with the family (e.g. notorious criticism of the child), severe stress (often a factor that gives rise to the disease), and character traits (e.g. the need to be perfect, fear of adulthood). Perfectionism, and with it a strong desire to follow the ideal created by the mass media, exacerbates the problem of low self-esteem among women. Women are believed to have much lower self-esteem than men. This can lead to behavior that promotes control of caloric intake and, with it, body weight, which ultimately contributes to the occurrence of eating disorders. Another problem for women who want to achieve the figure of their dreams and who develop eating disorders is a lack of identity and a sense of control, which they try to address through their bodies. Nowadays, beauty and career are associated with a kind of inner discipline and a slim figure. Women's strong need for social acceptance contributes to the use of more and more dietary restrictions to control their physical appearance and weight to live up to expectations, and this in turn can also lead to eating disorders [2].

Based on the DSM-5 classification, there are eight types of eating and eating disorders, including rumination disorder, pica, anorexia, bulimia, and overeating seizure disorder. The main problems faced by people with eating disorders are an excessive focus on food and physical appearance and body weight [1].

In early 2020, the Chinese CDC reported that a new coronavirus (SARS-CoV-2) had been detected as the causative agent of respiratory disease, later named COVID-19. Since then, the virus has spread around the world in a very rapid manner. All three pillars that define health as, "physical, mental and social well-being" have been affected by the COVID-19 pandemic [3]. Research suggests that public health messages related to COVID-19 harmed perceptions of body image [4].

Use of the media, including social media, is associated with an increased risk of eating disorders, particularly through exposure to content related to weight loss and diet culture, as well as food advertising [5]. Social media posts warned of the risk of weight gain

due to the possibility of overeating, and a sedentary lifestyle. Most of the posts referred to the risk of gaining about 7kg in weight during isolation and implicitly evoked stereotypes suggesting that obese people are lazy, and lacking in self-control while promoting unrealistic slim ideals [3]. The COVID-19 pandemic has resulted in restrictions on daily activities that have important consequences for nutrition, physical activity, and sleep, which in turn may increase the risk of ED behavior. For example, recommendations to restrict activities such as grocery shopping may increase the focus on food and encourage individuals to stockpile more food than usual, including snacks, which may increase the likelihood of paroxysmal overeating. Restrictions on access to regular physical activity, coupled with disturbed eating patterns, can lead to increased concerns about body shape and weight. Reduced social contact can be associated with boredom and frustration, which in turn can lead to an increased risk of eating disorders through more frequent emotional eating [5]. Eating disorders, characterized by disturbed attitudes toward eating, can become a serious health problem for adolescents and young adults. A growing body of evidence suggests that the prevalence of eating disorders and excessive weight concerns is increasing among the young population [6].

The purpose of this study was to assess the prevalence of the risk of eating disorders associated with improperly managed weight reduction among physically active women.

Material and methods

The study was conducted among women between the ages of 16 and 50. Only women with a history of reduced diets and a minimum moderate level of physical activity (PAL=1.4) who declared that they undertake exercise a minimum of 3 times a week (min. 30 min. per exercise session) could participate in the study. The study group consisted of 214 women. They were divided into four age groups: 15 to 25 years old, 26 to 30 years old, 31 to 40 years old, and over 40 years old.

The study was conducted using an indirect survey questionnaire through a form provided online. A proprietary survey questionnaire supplemented by two standardized questionnaires was used: EAT-26 and ORTO-15. The Eating Attitudes Test questionnaire (EAT-26) is a tool for detecting symptoms of eating disorders. It is used to screen populations at risk for anorexia, bulimia, and obesity. Questions 1 through 25 are scored on a scale of 3 to 0 points, where 3 means always and 0 means never. Question 26 is scored in reverse, where 3 means never and 0 means always. A maximum score of 78 can be obtained, while the cutoff point is 20 points or more, which indicates the risk of an eating disorder. Symptoms indicative of eating disorder risk are also taken into account, including, among others, overeating once a

week or more. The risk of eating disorders is also indicated by underweight subjects [7]. An ORTO-15 questionnaire is a tool for detecting the risk of orthorexia using 15 questions that explore attitudes toward eating. The respondent answers each question by assigning a selected statement from a four-point scale: always, often, sometimes, never. A maximum of 60 points can be obtained [8]. A cutoff point of 40 points is taken as the cutoff point, while 35 points were taken for the Polish population [9].

The collected data were entered into a database, created in Microsoft Excel, and analyzed in Statistica. The χ^2 test and V-Cramer correlation were used to analyze qualitative characteristics. A significance level of $p=0.05$ was adopted.

Results

Among the women surveyed, the largest group was in the 15-25 age range: 120 (56%). More than half of the surveyed women have completed higher education (58%), 34% of them have secondary education, while vocational and lower education was declared by 8% of women. The vast majority of the survey group (80%) reside in urban areas.

The body mass index of 149 respondents (70%) remained normal, while overweight and obese women accounted for a total of 23% - 14% (31 people) and 7% (19 people), respectively. Among female respondents, the most common reduction diet was the individually composed diet (62% of the total), as well as the diet recommended by a nutritionist (26%). Other diets, such as, for example, the 1000 kcal diet, the Dukan diet, or the ketogenic diet, were used by 17% of the survey group. More than half of the female respondents described their relationship with food as good (54%), while more than ¼ considered it bad (26%). In addition, more than 51% of the women reported that their relationship with food had changed during or after weight loss.

Among respondents, only 60% of women declared that they were sufficiently motivated during weight loss. Among the women who followed reduction diets, 76% discontinued this eating pattern because they were unable to follow it for a long time. Only 24% of women among them, had no problem with this.

Among the women surveyed, the most common reason women chose to reduce weight was physical appearance (63%), followed by health (14%), and lastly other reasons such as improving sports performance. Among the women surveyed, more than half of them (57%) had been losing weight for several months. The reduction diets lasted a year or more for 15% of the survey group. The same percentage declared weight loss lasting less than a

month. Just over half of the women (58%) were satisfied with the results after following a reduced diet.

Almost all of the women in the study group (95%) felt that the image of women created by the mass media has an impact on their body perception disorders. More than 90% of the female respondents felt that a psychodietetics specialist could effectively help them during the weight loss process. The vast majority of the female respondents (74%), following weight-reduction diets, lost weight without the help of a dietitian, only 26% of them used his help. Among the female respondents, half of their body weight increased after weight loss. Only 39% of them maintain the same weight they had after weight loss.

The study, using the EAT-26 questionnaire, showed that among 214 respondents, 98 women, or 46% of the study group, were at risk for eating disorders. A cutoff score of 20 was used as the threshold. No significant statistical differences were observed between education, age, or place of residence and the risk of eating disorders ($p>0.05$). However, a higher risk of eating disorders, compared to the total study group, was observed among overweight and obese women - its prevalence was 61% for overweight women and 74% for obese women. Among women with normal body weight, the risk of eating disorders appeared among 46% of respondents. A statistically significant difference was noted between BMI and the risk of eating disorders ($\chi^2=26.447$; $p<0.05$) (Table I).

Table I. BMI and risk of eating disorders (n=214).

BMI	Risk of eating disorders (yes)	Risk of eating disorders (not)	p-value
Underweight	15 (100%)	0	0.002
Standard	68 (46%)	81 (54%)	
Overweight	19 (61%)	12 (39%)	
Obesity	14 (74%)	5 (26%)	

A statistically significant relationship was also observed between relationships with food and the risk of eating disorders ($\chi^2=31.393$; $p<0.05$). The strength of the relationship at 0.383 was determined as the mean (Table II).

Table II. Relationships with food and risk of eating disorders (n=214)

Relationship with food	Risk of eating disorders (yes)	Risk of eating disorders (not)	p-value
Bad	46 (84%)	9 (16%)	0.001
Good	44 (38%)	71 (62%)	
I don't know	26 (59%)	18 (41%)	

The study, using the ORTO-15 questionnaire, found a risk of orthorexia among 184 female respondents (86%) when a 40-point cutoff is adopted. On the other hand, with the questionnaire's cutoff threshold of 35 points, the prevalence of risk is 40%. No significant statistical relationship was observed between education, age, or place of residence and the risk of orthorexia ($p>0.05$).

The highest prevalence of orthorexia risk was observed in the group of underweight women. It was 47% about 41% in normal-weight women, 39% in overweight women, and 26% in obese women. However, these differences were not confirmed by testing their statistical significance ($p>0.05$) (Table III).

Table III. BMI and risk of orthorexia (n=214).

BMI	Risk of orthorexia (yes)	Risk of orthorexia (not)	p-value
Underweight	7 (47%)	8 (53%)	>0.05
Standard	61 (41%)	88 (59%)	
Overweight	12 (39%)	19 (61%)	
Obesity	5 (26%)	14 (74%)	

A statistically significant relationship was observed between the occurrence of orthorexia risk and eating disorders ($\chi^2=4.980$; $p<0.05$). In the group of female respondents with an identified risk of eating disorders, almost half of the respondents show a risk of orthorexia (Table IV).

Table IV. Risk of orthorexia vs. risk of eating disorders (n=214)

Risk of eating disorders	Risk of orthorexia (yes)	Risk of orthorexia (not)	p-value
Yes	54 (47%)	62 (53%)	0.001
Not	31 (32%)	67 (69%)	

Discussion

Eating disorders, especially for girls and young women, are a serious health problem, at the root of which are inappropriate eating habits. Among the reasons for the increase in the incidence of eating disorders are the creation of a slim figure through social media, the use of fashionable weight-loss and restrictive diets, lack of self-confidence, and pressure to succeed [10]. Dissatisfaction with the perception of one's own body leads to the use of reduced diets due to the widely held belief that this is an effective strategy for achieving the desired figure. However, to cause weight loss, the diet must produce a negative energy balance. People on diets may overeat due to the effects of caloric deficiency or lack of cognitive control over food intake. Research suggests that episodes of overeating tend to occur especially at times that are preceded by periods of calorie restriction compared to normal eating. Importantly, most bulimia patients report that their symptoms first appeared while they were dieting [11].

An additional risk factor affecting women's psychological well-being and thus also increasing the risk of developing eating disorders is the COVID-19 pandemic. Studies have shown that anxiety, depression, post-traumatic stress symptoms, and eating disorders appeared in some people during the pandemic. According to the World Health Organization, in the five years preceding the COVID-19 pandemic, the global prevalence of eating disorders was about 15%. After the virus spread worldwide, the prevalence of these disorders was reported to have risen to 24%. It was also observed that the age of onset was lowered below 15 years of age, and those young people often cited the pandemic as a kind of trigger for the increase in eating disorders [12].

The modern assertion that an ideal figure is successful often leads many women to go on weight-loss diets or starve themselves, which can eventually lead to eating disorders [13]. Both body dissatisfaction and dieting are multidimensional, with the former encompassing a range of cognitive processes, emotions, and self-perceptions regarding physical appearance, and the latter encompassing a range of health-promoting activities aimed at changing or maintaining physical appearance through weight control [11]. The study was designed to demonstrate the relationship between inadequate weight reduction and the occurrence of

eating disorders, and to determine whether symptoms indicative of orthorexia were also present among the study group of women. The results of our own study showed that for 63% of the women, the main reason why they followed a reduced diet was the desire to achieve an ideal figure. In a study by Janiszewska, Kucharska, and Sinskaya [14], 75% of teenage girls believe that lack of acceptance of their appearance is the main reason for weight loss. In this study, the focus was only on three aspects: health, figure, and other, while Janiszewska, Kucharska, and Sinskaya [14] also point to other reasons, such as low self-esteem (34%), the fashion for being „fit" (22%) and the desire to look like models/celebrities from newspapers (12%). In our study, health came in second place, while in a study by Janiszewska, Kucharska, and Sinskaya [14], teenagers indicated a desire to control their bodies (35%). Also in a study by Kwiatkowska and Skop-Lewandowska [15], female respondents most often indicated that they undertook energy-restricted diets because they felt bad about their bodies.

The results of our own and other authors' studies lead us to wonder why a figure is still the most common reason for women to undertake weight loss treatments. In a study by Mendes et al. [16], body dissatisfaction was also identified as the main reason for girls to go on a diet. This may be related to adolescence, during which body image becomes one of the main components of self-esteem, reinforcing adolescents' desire to strive for an ideal figure. This ideal is often impossible to achieve, resulting in body dissatisfaction, which reaches its peak development during adolescence. In terms of the image of women, created by the mass media, and the related disorders in the perception of one's own body, almost all women (95%) responded that some kind of figure pressure affects their perception of their own body. This is confirmed by Romanowska-Tolloczko [17], in whom, in a study on a group of girls, 3/4 of them declared that the image of women presented in social media strongly influences their perception of their appearance. The results of our study showed that during the survey 43% of female respondents were slimming down, and 70% of them had normal BMI values. In a study by Janiszewska, Kucharska, and Sinskaya [14], it was noted that most of the teenage girls who slimmed down also had a normal BMI. In another study, which was conducted among female authors of weight-loss blogs, 40% of the women had a BMI of normal before weight reduction, while 4% of the respondents were underweight. This means that half of the respondents began weight loss having a normal weight or underweight, which the authors suggest is a contraindication to an energy-reduced diet [18]. In our study, the most common weight-loss diet among women was an individually created diet (62%), followed by diets arranged by a nutritionist (26%) and other diets, i.e. 1000 kcal diet, Dukan diet (17%). In contrast, in a study by Kwiatkowska and Skop-Lewandowska [15], only 14% of women were

under the care of a dietitian during weight reduction, and the most popular diet was the Dukan diet (41.7%). A study by Całyniuk et al. [18] indicated that the most common diets chosen by female blog owners were the Copenhagen diet, the starvation diet, and South Beach. The popularity of diets is constantly changing, so it is speculated that this may be the source of the observed differences.

The reason why women are choosing to lose weight without the help of a nutritionist may be because there is now a great deal of information on how to reduce weight on the Internet. In addition, devices or apps used for self-monitoring of health indicators are also gaining popularity. They monitor daily physical activity, including calories burned, and heart rate, and record daily food intake, including such information as calorie and nutrient intake. The use of health monitoring devices has shown positive associations with weight loss [19]. In our study, it was noted that 57% of women had been losing weight for several months, and a study by Kwiatkowska and Skop-Lewandowska [15] found that the duration of weight reduction most often lasted between 1 and 3 weeks (30.6%). In the present study and the study by Kwiatkowska and Skop-Lewandowska [15], half of the women's weight increased after weight loss, while Kwiatkowska and Skop-Lewandowska mention that, according to the respondents, about 17% had a „yo-yo" effect, and about 42% had a return to their pre-loss weight.

Based on the EAT-26 questionnaire, it was observed that 98 women (46%) who followed a weight loss diet were at risk for eating disorders. A study by Dorard and Mathieu [20] found that 3 participants in the vegetarian group and 7 in the basal diet group were considered at risk for eating disorders, while no participants were on negative energy diets. The results of Dorard and Mathieu [20] suggest that a vegetarian diet is not associated with an increased risk of eating disorder symptoms, particularly in women. In contrast, in a study by Uehara, Sakakibara [21], the prevalence of eating disorders among working Japanese women aged 20-39 was 2.4%. In our study, all underweight women had ED risk, while this was a very small group. Worryingly, among normal-weight women, the risk of eating disorders could be seen among 46% of respondents. In a study by Uehara, Sakakibara [21], EAT-26 scores >20 were most closely associated with a perceived BMI of <17.5 kg/m². The authors suggest that eating disorders may be more common in women who want to lose weight to achieve a BMI <17.5 kg/m² [21]. In our study, no statistically significant difference was observed between age and the risk of developing an eating disorder. On the other hand, a study by Morrissey, Gondoli, D., & Corning [11] mentioned that each stage (early, middle, and late adolescence) is characterized by specific changes that can increase girls' vulnerability

to eating problems. The onset of bulimia symptoms most often occurs in late adolescence, when girls are expected to exhibit increasingly mature behavior, and emotional support from their families, and this usually includes moving out of the family home. This in particular can exacerbate the harmful effects of dieting [11].

Based on the ORTO-15 questionnaire, it can be determined that the risk of orthorexia in the women studied is 86% when the 40-point cutoff suggested by the author of the original publication, Donini, is adopted [22]. In contrast, a 35-point cutoff threshold was developed by Stochel et al. who conducted a Polish validation of the ORTO-15 test [8]. The prevalence of orthorexia risk among the study group of women after lowering the cutoff threshold is then 40%. Our research and the study conducted by I. Lutsk, P. Domarecki, and others indicate that a higher cutoff score leads to an excessive number of people who are at risk for orthorexia, where the risk is 86% and 76.7%, respectively. The high ORTO-15 test score is likely related to the study group of women who followed weight-loss diets and were interested in healthy eating, so it may not necessarily mean the risk of orthorexia, as also suggested in their study by Lucka et al. [23]. In a study by Stochel et al. [8], the risk score for orthorexia was 14% in a group of urban adolescents, while in a study by Lucka et al. [23] - 27%. The authors of study Lucka et al. suggest that the differences may be because there is now an increased population awareness of healthy lifestyles, diet, and physical activity. Our study also noted an increase in the score compared to studies from a few years ago, this is probably related to a different study group, but may also relate to changes in society. It can be assumed that the use of weight-loss diets increases women's knowledge about healthy eating, which may consequently lead to the risk of orthorexia. Women after weight loss may also spend more time and attention on thinking about food, which stems from the desire to maintain weight, which may also explain the high score on the ORTO-15 questionnaire in our study. In the present study, the relationship between BMI and the risk of orthorexia was not proven, while in the study by Lucka et al. [23] suggested that the higher the BMI, the higher the risk of orthorexia. In our study, the BMI of 70% of the female respondents was normal, hence it is presumed that there is no relationship between the variables. The results of our study showed that no relationship was observed between the variables age, place of residence, and the prevalence of orthorexia among the study group of women ($p > 0.05$) - these data are consistent with the results obtained by Bień and Pieczykolan [24]. According to another study by one of the authors of the present study, Grajek, it appears that the risk of orthorexia is higher in people who are characterized by a rational diet and higher physical activity. In addition, according to data from the EAT-26 questionnaire, the authors of the studies

estimated that there is a higher risk of eating disorders among people with specialized knowledge (dietetics students) [25, 26].

The in-house study has some limitations, which probably affected the representativeness of the sample and the ability to determine the relationship between improperly conducted weight reduction and the risk of eating disorders. After analyzing the results of the study, it can be suggested to future researchers to lower the age of the study group of women to a maximum of 19 years old and increase the size of the study population. In the aspect of the questions posed in the questionnaire, the inability to assess the eating habits of female respondents was noticed. However, the included question about past diets seems too general and would need to be made more specific, especially in the aspect of individually composed diets and diets arranged by a nutritionist. It would also be interesting to examine specific diets and their impact on the risk of eating disorders and the motivation for following different diets [20]. It would also be worthwhile to examine the risk of eating disorders among amateur and professionally physically active women. Due to the voluminous nature of the questionnaire, it was not decided to address this topic in this paper, although it may prompt other researchers to do so.

Conclusions

- 1 The occurrence of eating disorders and symptoms indicative of orthorexia does not depend on sociodemographic factors (age, education, place of residence). However, based on the cited results, it is speculated that the appearance of ED may be influenced by the BMI of the subjects. In contrast, no effect of BMI on the appearance of orthorexia was noted.
- 2 According to our research, the risk of eating disorders is influenced by relationships with food.
- 3 Based on the results cited, it should also be mentioned that there is still a need to promote the role of the nutritionist as a specialist in health and nutrition counseling.

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