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Orthorexia nervosa – a separate clinical entity, a part of eating disorder spectrum or another manifestation of obsessive-compulsive disorder?

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Summary

Aim. The aim of the study was to determine the prevalence of orthorexia nervosa in the population of adolescents and young adults, as well as to determine whether orthorexia is a separate clinical entity, a part of eating disorder or another manifestation of obsessive-compulsive disorder.

Material and method. The study group consisted of 864 subjects (599 females and 265 males). The mean age of female participants was 20.21±3.27 years, and of male participants 18.93±3.67 years. As a part of the study, we used a proprietary questionnaire to collect patient data, as well as following diagnostic questionnaires: ORTO-15 by Donini et al. (Polish version validated by Janas-Kozik et al.), EAT-26 by Garner and Garfinkel, and MOCI (Maudsley Obsessive Compulsive Inventory) by Hodgson and Rachman. The results were analyzed statistically.

Results. 27% of subjects were found to be at risk of orthorexia nervosa (score of 35 was considered a cut-off point). These subjects achieved significantly higher scores in the EAT-26. There were no statistically significant differences in the MOCI scores. The highest risk of orthorexia was observed in subjects aged 13–16 years old (junior secondary school) and the lowest in 16–19-year-olds (senior secondary school). Individuals with suspected orthorexia tended to have significantly higher BMI. Specific analysis of environmental features will be exposed in the next issue.

Conclusions. Orthorexia nervosa is not a separate clinical entity. It does not belong to the OCD spectrum, but meets the criteria of eating disorder spectrum.

Key words: orthorexia nervosa, prevalence, eating disorders, obsessive-compulsive disorders

Introduction

Steven Bratman, an American physician, experienced a period of strict dietary control which he described in his book "Health Food Junkies". He tried to consume only healthy foods, he had his own organic produce farm. With time, though, he noticed a negative effect that thoughts of food had on various areas of his life, including social relationships. He found the same symptoms in many of his patients. Based on these experiences in 1997 he proposed the term orthorexia nervosa to denote a pathological preoccupation with eating healthy food. The Greek prefix *ortho* means 'correct' and *orexis* means 'longing or appetite'; the term suggests a connotation of anorexia nervosa [1].

The focus of orthorexia nervosa is to reach optimum health through strict dietary control [2–4]. Affected individuals have an unhealthy fixation on the quality rather than quantity of the food they eat. They spend copious amounts of time checking the sources of foods, preparation and processing procedures, preservative content, or materials used for packaging. Orthorexia also involves the need to hoard food products and to weigh or measure them, as well as planning meals ahead, and obsessive thoughts about food when performing other tasks [5]. A four-stage description of daily behavior was collated. Stage one involves excessive thoughts on food to be eaten on a given day and the following days. Next stage involves gathering of food products with excessive control and criticism. The third stage involves careful meal preparation ensuring its perfect compliance with healthy eating principles. Finally, the feeling of accomplishment or failure follows, depending on the perceived outcomes of all preceding stages [6].

None of the DSMs have so far created a classification entry for orthorexia nervosa. Due to numerous case reports of this phenomenon, the attempts have been made to introduce diagnostic instruments identifying the problem. In 2004, Donini et al. [4] postulated diagnosing orthorexia nervosa based on the pattern of excessive preoccupation with healthy eating coexistent with features of obsessive-compulsive personality. Based on their research, they developed the ORTO-15 questionnaire, which addresses main features of orthorexia. The validation study indicated the cut-off score of 40, with results below this threshold indicating the risk of orthorexia [7].

In 2014, Moroze et al. [8] developed new diagnostic criteria of orthorexia nervosa, which were divided into four key domains: A – obsessional preoccupation with eating "healthy foods", focusing on concerns regarding the quality and composition of meals; B – the obsessional preoccupation becomes impairment of physical health or severe distress or impairment of social, academic, or vocational functioning; C – the disturbance is not merely an exacerbation of the symptoms of another disorder such as obsessive-compulsive disorder or of schizophrenia or another psychotic disorder; D – the behavior is not better accounted for by the exclusive observation of organized orthodox religious food observance or when concerns with specialized food requirements are in relation to professionally diagnosed food allergies or medical conditions requiring a specific diet.

Aim

The aim of the study was to determine the prevalence of orthorexia nervosa in the population of adolescents and young adults, as well as to determine whether orthorexia is a separate clinical entity, a part of eating disorder, or another manifestation of obsessive-compulsive disorder. Furthermore, an attempt was made to correlate orthorexia with participants' demographics and socio-familial factors, as well as concomitant eating disorders, obsessive-compulsive disorder and depressive symptoms.

Material and method

The study group consisted of 864 subjects (599 females and 265 males) aged 13–30 years. Among them, there were 185 junior secondary students (99 females and 86 males), 167 senior secondary students (112 females and 55 males) and 512 university students (388 females and 124 males). The age range in female subgroup was 13–29 years with the mean age of 20.21±3.27 years. The age range in male subgroup was 13–30 years, with the mean age of 18.93±3.67 years. The lowest and highest BMI scores in studied females were 14.71 and 34.38, respectively with the mean score of 20.8±2.85. The lowest and highest BMI scores in studied males were 15.57 and 35.75, respectively with the mean score of 22.62±3.3.

The survey used in the research consisted of the following questionnaires:

1. A proprietary questionnaire to collect basic patient data. It included anthropometric data (age, sex, height, body weight). BMI for each subject was calculated based on their body weight and height. The participants were requested to state the school they attended (junior secondary, senior secondary, university). Subsequent items collected information on family situation of participants. They were requested to indicate parental level of education (primary, secondary, vocational, university) and their job status (employed in learned profession, employed in another profession, retired/pensioner, unemployed), as well as the number of siblings. Final items addressed substance use habits. The participants were asked whether they were or had ever been smoking. Similar items ascertained alcohol consumption frequency (never, 1–3 times a month, 1–2 times a week, more often) and drug abuse (never, few times in my life, 1-3 times a month, 1-2 times a week, more often). The last item regarded substance dependence in family members (alcohol abuse, smoking, drug abuse, other).
2. ORTO-15 questionnaire was developed by Donini et al. based on Bratman's model and validated in 2005 [7]. It consists of 15 multiple choice items (always, often, sometimes, never), which address obsessive attitude to choosing, buying, preparing and eating healthy foods. The items focus on cognitive (1, 5, 6, 11, 12, 14), clinical (3, 7–9, 15) and emotional (2, 4, 10, 13) aspects of the disorder. Each item can score 1, 2, 3 or 4 points with behaviors related to high risk of orthorexia

scoring 1, and healthy eating-related behaviors scoring 4 points. Total score for each test ranges between 15 and 60 points. The risk of orthorexia negatively correlates with the scores, with high scores indicating healthy eating-related behavior. Donini established the score of 40 as the cut-off value. The Polish version of the questionnaire was validated in 2015 by Stochel, Janas-Kozik et al., who determined the score of 35 as the cut-off value [9].

3. Eating Attitude Test (EAT-26) was developed in 1982 by Garner and Garfinkel [10]. As an instrument to assess eating attitude, each item is intended to probe symptoms of eating disorder belonging to one of three categories: diet, bulimia with excessive focus on eating, and oral control Each item can score 3, 2, 1 or 0 points, depending on symptom severity. It is used for population screening. Total scores fall in the range of 0–78. The risk of eating disorder increases with the score. The score of 20 or more indicates the presence of eating disorder. The Polish version of EAT-26 was validated by Włodarczyk-Bisaga and Żechowski [11].
4. Maudsley Obsessive Compulsive Inventory (MOCI), developed in 1977 by Hodgson and Rachman, is used for population screening for obsessive-compulsive disorder. It consists of 30 true/false items, which quantify the general "obsessiveness", as well as its subscales: checking, cleaning, slowness and doubting. Scoring depends on the number of abnormal responses to items addressing general obsessiveness and individual subscales, with the maximum achievable score of 30. Due to the discrepant views of researchers regarding the cut-off value for the definite diagnosis of OCD and in order to avoid excessive number of false positive results, the inventory only quantifies the risk of OCD, which increases with the score [12].

We randomly selected 2 junior secondary schools in Morag municipality, 1 junior secondary school in Tricity area, 1 senior secondary school in Morag municipality, 1 senior secondary school in Tricity area, as well as three universities (University of Technology, University and Medical University). Having obtained the consent of school head teachers, all study procedures were approved by the Independent Bioethical Committee (NKBBN/602/2015-2016).

In junior and senior secondary schools, two groups of first, second and third year students were randomly chosen with survey carried out during the form time. At universities, we randomly chose 6 student groups per a university carrying out our research during breaktime between lecture sessions. All participants were briefed about issues covered in the research and its procedures. Each participant gave their voluntary, written informed consent to participation in research with the possibility to withdraw from participation at any time. In participants below 16 years of age, parental/legal guardian's consent was additionally sought. In secondary schools, the survey was supervised by form tutors of respective groups, who reported to the researchers, while at universities the survey was carried out by the researches themselves.

Statistical analysis

The arithmetic mean was used for describing the average intensity of quantitative variables in the study group, with standard deviation quantifying the amount of variation. The Shapiro-Wilk test was used to verify the distribution normality of the analyzed variables. Since the distribution differed significantly from the normal, the non-parametric Mann-Whitney *U* test and Kruskal-Wallis test were used for the comparison of 2 variables and 3 variables, respectively. In order to verify distribution normality of qualitative data (categorical variables), structural indices were used, whereas the χ^2 test of association and independence was used to compare distributions and determine the association between the variables. The strength of correlation was measured using the Spearman's correlation coefficient. The value of $p \leq 0.05$ was considered statistically significant. Statistical analyses were carried out using IBM SPSS Statistics v. 23 and Statistica 12 software.

Results

The risk of orthorexia was confirmed in 27.78% of participants, i.e., 240 people.

The analysis demonstrated that the distribution of demographic and social variables in participants at risk of orthorexia did not differ significantly from the distribution seen in a group without the risk of orthorexia: sex ($p = 0.133$), age ($p = 0.635$), educational level ($p = 0.138$), maternal education and employment status ($p = 0.271$ and $p = 0.418$, respectively), paternal education and employment status ($p = 0.177$ and $p = 0.367$, respectively), number of siblings ($p = 0.550$). Therefore, none of these characteristics was significantly associated with the risk of orthorexia.

There was no statistically significant relationship between the risk of orthorexia and the substance use in our participants or their families: alcohol consumption ($p = 0.343$), drug abuse ($p = 0.421$), smoking ($p = 0.358$), substance use in family members ($p = 0.227$).

The analysis revealed that individuals with suspected orthorexia tended to have significantly higher BMI ($p = 0.021$). The mean BMI score in individuals at risk of orthorexia was 21.62 (±2.99) as compared to 21.56(±3.15) in those without such a risk. When calculating BMI in participants below 18 years of age, the BMI growth charts developed by Palczewska and Niedźwiecka were used [13].

The prevalence of the risk of orthorexia and the risk of eating disorder is shown in Table 1.

Table 1. **Risk of orthorexia and risk of eating disorders**

Risk of eating disorders	Risk of orthorexia	No risk of orthorexia	Total
Yes	61 (62.2%)	37 (37.8%)	98 (100.0%)
No	179 (23.4%)	587 (76.6%)	766 (100.0%)
Total	240 (27.8%)	624 (71.2%)	864 (100.0%)

The *χ2* test confirmed a statistically significant correlation between the risk of orthorexia and eating disorders ($\chi^2 = 64.456$; $p < 0.001$). The proportion of participants at risk of orthorexia among those with an established risk of eating disorders was almost two-times higher than among those without the risk of eating disorders; and among those without the risk of eating disorders the risk of orthorexia was almost three-times lower than among those with an established risk of eating disorders. The odds ratio was 5.40, which means that the risk of orthorexia in those at risk of eating disorder is over five-fold higher than in those without such a risk ($p < 0.001$).

Additionally, we compared the EAT-26 scores between the groups with and without the risk of orthorexia. The results are shown in Table 2.

Table 2. **EAT-26 scores and risk of orthorexia**

Feature	Risk of orthorexia *n* = 240	No risk of orthorexia *n* = 624	Mann-Whitney U test/p-value
EAT-26 total score	14.10 (±10.73)	7.39 (±6.47)	z = 9.90; $p < 0.001$
EAT-26 diet	10.54 (±7.77)	5.08 (±5.02)	z = 10.508; $p < 0.001$
EAT-26 bulimia	1.50 (±2.64)	0.76 (±1.85)	z = 4.992; $p < 0.001$
EAT-26 oral control	2.06 (±2.84)	1.56 (±2.13)	z = 2.522; $p = 0.012$

Our study demonstrated that individuals at risk of orthorexia scored higher in the EAT-26, both as total score and in individual subscales, so it is safe to conclude that eating disorders are significantly associated with orthorexia.

Therefore, we assessed the strength and direction of correlation between the ORTO-15 and the EAT-26 scores in individuals at risk of orthorexia. The results are shown in Table 3.

Table 3. **ORTO-15 vs. EAT-26 scores in a group at risk of orthorexia**

Feature	Risk of orthorexia (*n* = 240)	
	Spearman's *r*	*p*
EAT total score	-0.328	<0.001
EAT diet	-0.307	<0.001
EAT bulimia	-0.259	<0.001
EAT oral control	-0.109	0.093

The increased risk of eating disorders, as reflected by total score as well as diet and bulimia subscales, correlated with the increasing risk of orthorexia. There was no statistically relationship between the EAT-26 oral control scores and the increased risk of orthorexia.

Next, we attempted to determine differences in scores of the MOCI, used to assess obsessive-compulsive tendencies, in individuals with and without the risk of orthorexia. The results are shown in Table 4.

Table 4. **MOCI scores and risk of orthorexia**

Feature	Risk of orthorexia *n* = 240	No risk of orthorexia *n* = 624	Mann-Whitney U test/p-value
MOCI total	10.31 (±4.60)	9.71 (±4.44)	z = 1.784; *p* = 0.059
MOCI checking	3.41 (±1.56)	3.29 (±1.46)	z = 0.854; *p* = 0.393
MOCI cleaning	3.84 (±1.84)	3.58 (±1.81)	z = 1.885; *p* = 0.635
MOCI slowness	2.80 (±1.24)	2.71 (±1.23)	z = 0.914; *p* = 0.361
MOCI doubting	3.24 (±1.27)	3.11 (±1.29)	z = 1.273; *p* = 0.203

There were no statistically significant differences in the MOCI scores, both total and individual subscales between the study groups. Then, it can be assumed that there is no link between the severity of obsessive-compulsive tendencies and the risk of orthorexia.

Therefore, we assessed whether there is a correlation between the ORTO-15 and the MOCI scores in individuals at risk of orthorexia. The results are shown in Table 5.

Table 5. **ORTO-15 vs. MOCI scores in a group at risk of orthorexia**

Feature	Risk of orthorexia (*n* = 240)	
	Spearman's *r*	*p*
MOCI total	-0.092	0.153
MOCI checking	-0.172	0.007
MOCI cleaning	-0.029	0.657
MOCI slowness	-0.029	0.655
MOCI doubting	-0.049	0.449

There were no relationships between the severity of obsessive-compulsive tendencies and the risk of orthorexia, with the exception of the MOCI checking subscale, which was true for both risk-positive and risk-negative subgroups. These results confirm lack of relationships between the severity of obsessive-compulsive tendencies and the risk of orthorexia.

Discussion

Since orthorexia was first described only 20 years ago, there has been no extensive research on its prevalence and the available studies often offer conflicting results depending on the analyzed population and the adopted diagnostic criteria. In a study published in 2004, attempting to preliminarily determine the extent of the phenomenon, Donini et al. determined the prevalence of orthorexia to be 6.9% in a cohort of 404 participants [4]. The Turkish study conducted in 2007 in a group of medical doctors in Ankara demonstrated presence of orthorexia in almost every second study participant

(45.5%) [14]. The ORTO-15 questionnaire with a cut-off score of 40 points was used [14]. Cross-Cultural differences in occurrence of orthorexia were acknowledged by other researchers [15, 16].

Polish version of the ORTO-15 questionnaire was validated in 2015 by Stochel, Janas-Kozik et al. in a cohort of 399 citizens of Sosnowiec city aged 15–21 years. Eating Attitude Test (EAT-26), which assesses symptomatic severity of eating disorders, was also used in the validation process. Results deemed the ORTO-15 questionnaire a reliable tool for assessing the risk of orthorexia in population-based studies. Assuming the cut-off score of 40 points in the ORTO-15, the compliance with the EAT-26 in establishing the risk of orthorexia and eating disorders was 47.2%, as compared to 88.2%, when the cut-off score of 35 points was assumed. In our study we also assumed the score of 35 as a cut-off value [9].The cut-off score suggested by Donini would result in significant overdiagnosis of orthorexia indicating that 76.7% of subjects were at risk. Even with stricter diagnostic criteria, 27% of subjects were found to be at risk of orthorexia.

Scientists are debating the position of orthorexia among mental disorders. Some researches claim that it is a separate clinical entity, others point out to the similarities between orthorexia and anorexia nervosa, whereas another ones still classify it as a manifestation of obsessive-compulsive disorder. Bratman initially classified orthorexia as a separate disorder [1]. Martins et al. [17] indicated that behaviors and aspirations of orthorexia sufferers differed from those of individuals with eating disorders. Individuals suffering from anorexia and bulimia nervosa are motivated by the need to achieve a perfect, slim figure by constantly losing weight, whereas those with orthorexia strive to reach optimum health by strictly adhering to what they consider a healthy diet. The authors claimed, therefore, that the underlying cause of orthorexia is the pursuit to maintain health rather than low self-esteem. The diet itself focuses on the quality of food, rather than on its quantity; it does not seek physical attractiveness, which is the key value in other eating disorders, but focuses on health instead [18, 19].

Many researchers classify orthorexia as part of the obsessive-compulsive spectrum, due to the phenotypical similarities between those disorders [20]. Orthorexia sufferers, similarly to those with eating disorders, experience continuous obsessive thoughts and focus on behaviors related to their diet, food, and their physical appearance. Patients with obsessive-compulsive disorder are similarly preoccupied with their obsessive, recurring pathological doubts and thoughts about harming themselves or others, along with compulsive behaviors including for instance obsessive cleaning, washing, counting, or checking the same things multiple times. An individual with orthorexia experiences obsessive thoughts and exerts particular meticulousness and care when preparing meals, as well as focuses on cleanliness [20]. Meal preparation becomes a ritual with special care to prevent food contamination [5].

On the other hand, there is a body of published evidence to support similarities between orthorexia and eating disorders. Having observed the spiral of losing oneself

to the symptoms, Bratman referred to anorexia nervosa when coining a name for this phenomenon. Both clinical entities are characterized by the strive for perfection, high anxiety levels, and a strong need for control. The common features of both disorders include goal-orientation, keeping dietary restrictions as a marker of self-discipline, with each dietary 'transgression' perceived to be a failure. Some studies suggested that presence of orthorexia can become a risk factor for the development of eating disorder in later life [5, 20, 21]. Furthermore, according to one study, patients with orthorexia more often had a history of eating disorder as compared to the control group [5]. Barnes and Caltabiano [22] showed in their study that attachment style, tendencies toward perfectionism, aspiration for perfect body image are similar for orthorexia, anorexia and bulimia nervosa.

We did not confirm the relationship between obsessive-compulsive disorder and orthorexia nervosa in our study. Obsessive and ritualistic focus on eating seen in orthorexia is common in patients with eating disorder. Researchers studying mental health comorbidities emphasize that in order to diagnose obsessive-compulsive disorder in an individual with eating disorder, it is essential to prove that their obsessions or compulsive behaviors are not food-related, since exaggerated focus on food type, its quantity and quality or meal preparation constitutes a clinical feature of eating disorder [23–25]. The absence of statistically significant correlation between orthorexia nervosa and OCD seen in our study supports the hypothesis of them being two separate disorders.

Our results suggest that orthorexia nervosa is not a separate clinical entity. Instead, it belongs to the eating disorder spectrum, which is supported by statistical data and clinical observations including health symptoms and consequences, reports of discarding and narrowing interests and complex activities, as well as impaired social relationships of affected individuals [22]. However, we treat our study as a voice in the open discussion about the possibility of correlation between eating disorders, OCD or even autism spectrum disorders [26].

The highest risk of orthorexia was observed in subjects attending junior secondary school and the lowest in those attending senior secondary school. Other studies did not show differences in the prevalence of orthorexia depending on age [27]. Individuals with suspected orthorexia tended to have significantly higher BMI. It may be related to the epidemics of overweight in teenagers and particular preoccupation with physical appearance, commonly seen in adolescents building their self-esteem who cannot reasonably ensure their proper diet and body weight yet.

Orthorexia involves a number of somatic complications, which include malnutrition, vitamin and micronutrient deficiencies as well as acid-base and electrolyte imbalance. There have been published reports confirming serious physical complications of orthorexia, such as: severe hyponatremia, hypokalemia, metabolic acidosis, subcutaneous and mediastinal emphysema or pancytopenia [28]. Although relatively new and compliant with contemporary culture, orthorexia is a disorder posing a threat to human health and life, which requires further research and development of effective treatment algorithms [29, 30]. Due to the fact that thoughts and behaviors of individu-

als with orthorexia are egosyntonic, it is difficult to convince them of the deleterious effect of their own health fixation, especially since the slogans promoting healthy eating and living have become a commonplace [31]. Treatment of orthorexia requires multidisciplinary approach involving psychiatrists, pediatricians or GPs, psychotherapists, dieticians, and nurses. In some cases, selective serotonin reuptake inhibitors (SSRI) may prove useful as supportive treatment.

Conclusions

Based on the conducted study, the risk of orthorexia was found in 27% of respondents (score of 35 was considered a cut-off point). The analysis of the obtained information allows us to conclude that orthorexia nervosa is not a separate clinical entity. It meets the criteria of eating disorder spectrum. This is evidenced by statistical analyzes and clinical observations. The lack of a statistically significant correlation between orthorexia and OCD, found in the study, confirms the hypothesis that they are two separate clinical syndromes.

References

1. Bratman S, Kniight D. *Health food junkies. Orthorexia nervosa: Overcoming the obsession with healthful eating*. New York: Broadway Books; 2000.
2. Vandereycken W. *Media hype, diagnostic fad or genuine disorder? Professionals opinions about night eating syndrome, orthorexia, muscle dysmorphia and emetophobia*. Eat. Disord. 2011; 19(2): 145–155.
3. Zamora MLC, Bonaechea BB, Sánchez FG, Rial BR. *Orthorexia nervosa. A new eating disorder?* Actas Esp. Psiquiatr. 2005; 33(1): 66–68.
4. Donini LM, Marsili D, Graziani MP, Imbriale M, Canella C. *Orthorexia nervosa: A preliminary study with a proposal for diagnosis and an attempt to measure the dimension of the phenomenon*. Eat. Weight Disord. 2004; 9(2): 151–157.
5. Koven NS, Abry AW. *The clinical basis of orthorexia nervosa: Emerging perspectives*. Neuropsychiatr. Dis. Treat. 2015; 11: 385–394.
6. Mathieu J. *What is orthorexia?* J. Am. Diet. Assoc. 2005; 105(10): 1510–1512.
7. Donini LM, Marsili D, Graziani MP, Imbriale M, Canell C. *Orthorexia nervosa: Validation of a diagnosis questionnaire*. Eating and Weight Disord. 2005; 10(2): 28–32.
8. Moroze RM, Dunn TM, Craig Holland J, Yager J, Weintraub P. *Microthinking about micronutrients: A case of transition from obsessions about healthy eating to near-fatal 'orthorexia nervosa' and proposed diagnostic criteria*. Psychosomatics. 2015: 56(4): 397–403.
9. Stochel M, Janas-Kozik M, Zejda J, Hyrnik J, Jelonek I, Siwiec A. *Validation of ORTO-15 Questionnaire in the group of urban youth aged 15–21*. Psychiatr. Pol. 2015; 49(1): 119–134. Doi: 10.12740/PP/25962.
10. Garner DM, Olmsted MP, Bohr Y, Garfinkel PE. *The eating attitudes test: Psychometric features and clinical correlates*. Psychol. Med. 1982; 12(4): 871–878.

11. Żechowski C. *Polska wersja Kwestionariusza Zaburzeń Odżywiania (EDI) – adaptacja i normalizacja*. Psychiatr. Pol. 2008; 42(2): 179–193.
12. Thomas J, Turkheimer E, Oltmanns TF. *Psychometric analysis of racial differences on the MOCI*. Assessment. 2000; 7(3): 247–258.
13. Palczewska I, Niedźwiedzka Z. *Siatki centylowe wskaźnika względnej masy ciała (BMI) chłopców i dziewcząt warszawskich. Ocena rozwoju somatycznego dzieci i młodzieży*. Medycyna Praktyczna. 2002; 3: 18.
14. Fidan T, Ertekin V, Işikay S, Kırpınar I. *Prevalence of orthorexia among medical students in Erzurum, Turkey*. Compr. Psychiatry. 2010; 51(1): 49–54.
15. Gramaglia C, Brytek-Matera A, Rogoza R, Zeppegno P. *Orthorexia and anorexia nervosa: two distinct phenomena? A cross-cultural comparison of orthorexic behaviours in clinical and nonclinical samples*. BMC Psychiatry. 2017; 17; 1–5. Doi: 10.1186/s12888-017-1241-2.
16. Dunn TM, Gibbs J, Whitney N, Starosta A. *Prevalence of orthorexia nervosa is less than 1%: Data from a US sample*. Eat. Weight Disord. 2017; 22(1): 185–192. Doi: 10.1007/s40519-016-0258-8.
17. Martins MCT, dos Santos Alvarenga M, Vargas SVA, de Jesus Sato KSC, Scagliusi FB. *Orthorexia nervosa: Reflections about a new concept*. Rev. Nutr. 2011; 24(2): 345–357.
18. Kaye W. *Neurobiology of Anorexia and Bulimia Nervosa Purdue Ingestive Behavior Research Center Symposium Influences on Eating and Body Weight over the Lifespan: Children and Adolescents*. Physiol. Behav. 2008; 94(1): 121–135.
19. Shah S. *Orthorexia nervosa Healthy Eating or eating disorder*. 2012, Masters Theses. Paper 991.
20. Brytek-Matera A. *Orthorexia nervosa – An eating disorder, obsessive-compulsive disorder or disturbed eating habit?* Archives of Psychiatry and Psychotherapy. 2012; 14(1): 55–60.
21. Kinzl J, Hauer K, Traweger C, Kiefer I. *Orthorexia nervosa in dieticians*. Psychoter. Psychosom. 2006; 75(6): 395–396.
22. Barnes MA, Caltabiano ML. *The interrelationship between orthorexia nervosa, perfectionism, body image and attachment style*. Eat. Weight Disord. 2017; 22(1): 177–184.
23. Łucka I. *Zaburzenia lękowe u dzieci współwystępujące z jadłowstrętem psychicznym*. Psychiatr. Pol. 2006; 40(1): 83–96.
24. Rabe-Jabłońska J. *Zaburzenie obsesyjno-kompulsywne u dziewcząt z zaburzeniami odżywiania*. Psychiatr. Pol. 1996; 30(2): 187–200.
25. Thiel A, Broocks A, Ohlmeier M, Jacoby GE, Schüssler G. *Obsessive-compulsive disorder among patients with anorexia nervosa and bulimia nervosa*. Am. J. Psychiatry. 1995; 152(1): 72–75.
26. Dell'Osso L, Abelli M, Carpita B, Pini S, Castellini G, Carmassi C et al. *Historical evolution of the concept of anorexia nervosa and relationships with orthorexia nervosa, autism, and obsessive-compulsive spectrum*. Neuropsychiatr. Dis. Treat. 2016; 12: 1651–1660. Doi: 10.2147/NDT.S108912, PMCID: PMC4939998.
27. Hyrnik J, Janas-Kozik M, Stochel M, Jelonek I, Siwiec A, Rybakowski JK. *The assessment of orthorexia nervosa among 1899 Polish adolescents using the ORTO-15 questionnaire*. Int. J. Psychiatry Clin. Pract. 2016; 20(3): 199–203. Doi: 10.1080/13651501.2016.1197271.
28. Park SW, Kim JY, Go GJ, Jeon ES, Pyo HJ, Kwon YJ. *Orthorexia nervosa with hyponatremia, subcutaneous emphysema, pneumomediastimum, pneumothorax, and pancytopenia*. Electrolyte Blood Press. 2011; 9(1): 32–37.
29. Brytek-Matera A, Rogoza R, Gramaglia C, Zeppegno P. *Predictors of orthorexic behaviours in patients with eating disorders: A preliminary study*. BMC Psychiatry. 2015; 15: 252. Doi: 10.1186/s12888-015-0628-1, PMCID: PMC4608153.

30. Costa CB, Hardan-Khalil K, Gibbs K. *Orthorexia nervosa: A review of the literature*. Issues Ment. Health Nurs. 2017; 38(12): 980–988.
31. Bartrina JA. *Orthorexia or when a healthy diet becomes an obsession*. Arch. Latinoam. Nutr. 2007; 57(4): 313–315.

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