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# Orthorexia nervosa – a distorted approach to healthy eating

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**Summary**

Consumers are increasingly reaching for food which is safe for their health. This tendency may give rise to eating disorders defined as orthorexia nervosa. The prevalence of orthorexia in society ranges from 1% to 60% and is mainly related to lifestyle. Research conducted over the last 10 years shows that the number of people facing the risk of orthorexia is increasing. People with orthorexia pay special attention to the quality of food they eat, which leads to the elimination of certain products from their diet. Dietary restrictions are accompanied by stress, anxiety and self-aversion. The study seeks to systematize the knowledge of orthorexia in light of the latest publications concerning this disorder, providing a description of psychometric tools used to diagnose orthorexia. The diagnostic questionnaires available today, which are intended to assess the risk of orthorexia, have different psychometric values, which usually makes the disorder hard to assess on a global scale. The available research tools do not sufficiently identify the boundary between an excessive interest in healthy eating and lifestyle and a real disorder that affects everyday functioning.

**Key words**: eating disorders, orthorexia nervosa, obsession

## Introduction

In recent years, a number of studies have been published on adverse dietary behaviors, which are considered to be a major health determinant. Excessive consumption of highly processed food with an inadequate balance of nutrients has contributed to the deterioration of public health [1]. In the face of intensifying civilizational threats, which increase the incidence of diet-dependent diseases, and given the growing awareness of food contamination from toxins present in soil, water and air, interest in organic and health-oriented food is growing [2]. Such concerns have been exploited

by food producers who introduce new, innovative products to the market and launch special advertising campaigns to foster desirable food behaviors [3]. Similarly, many governmental agencies and international organizations have been running programs intended to promote healthy lifestyles [4, 5]. Although a healthy lifestyle and a balanced diet are desirable due to their positive impact on health, exaggerated concentration on healthy eating may become pathological and imply negative effects, as exemplified by the existence of orthorexia nervosa [6, 7].

The aim of the article was to systematize the knowledge about this relatively new phenomenon of obsessive approach to healthy eating (orthorexia). The Authors' attempt in this regard of was based on a review of psychological literature in Polish and English in the period 1997–2019. The majority of the examined studies have been carried out in the last 5 years. The issue of orthorexia has been addressed in terms of psychometric diagnostics, its epidemiology and causes of this disorder.

Orthorexia nervosa is a relatively new eating disorder, which has not been included in ICD-11 and DSM-V disease classifications. Although orthorexia has not been classified as a disease, numerous studies have been carried out [8]. The disorder was first described in 1997 by American physician Steve Bartman in Yoga Journal, and then in his book entitled *Health Food Junkies* [9]. The term orthorexia comes from Greek words: *orthos* – 'normal', *orexia* – 'appetite'. It is a psychologically motivated obsessive-compulsive disorder, involving excessive concentration on healthy eating [6, 10]. A person suffering from orthorexia nervosa pays special attention to the quality of food. He or she eliminates foods that are highly processed or contain artificial additives thus not meeting their excessive nutritional criteria. An orthorectic person places a lot of emphasis not only on the quality of food but also on the technique and equipment used in its preparation. Such a person reads product labels carefully and often does the shopping in healthy food stores. The purchase and preparation of food is accompanied by a number of concerns (Table 1). In order to maximize the health benefits of eating, an orthorectic patient creates specific patterns of behavior, for example, by not combining certain foods or eating selected foods only at specific times of the day or at specific intervals. Between meals, a person suffering from healthy food obsession devotes a great deal of time reading about food, cataloguing it, weighing food products and planning meals [11]. Some orthorectics give up food processing and eat it raw [12].

If the activities undertaken by the patients are disrupted or prevented, they respond with strong frustration. If they do not satisfy the requirements of their own restrictive diet, they feel guilt or even self-aversion. As a consequence of restrictive observance of principles of healthy diet, they may feel the urge to punish themselves, which leads to stricter dietary restrictions or the use of purifying starvation diet [11, 13]. Too much concentration on dietary choices is reflected in the functioning of the patient in society. Such a person avoids meeting friends, especially in places where meals are eaten. During meetings, an individual affected by orthorexia deliberately brings up topics related to nutrition and healthy diet, a behavior which is sometimes badly perceived by others [14].

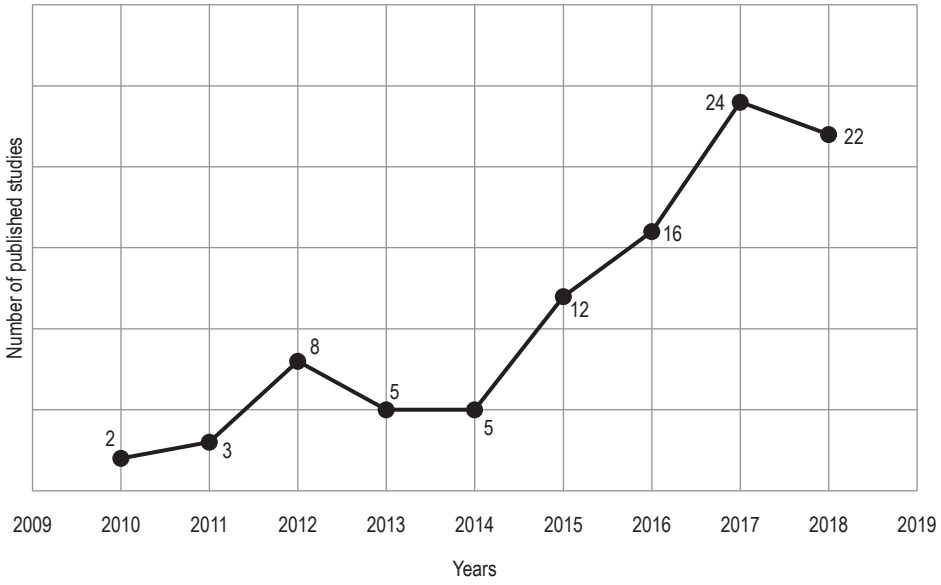


Figure 1. **The number of studies found for the years 2010–2018 in the Scopus research database after entering the phrase "orthorexia nervosa". As of 14 October 2018**

Table 1. **Sample concerns manifested by an orthorexic patient regarding food [11]**

| Source of concerns | Type of concern |
|---|---|
| Origin of food | Were the vegetables treated with pesticides or artificial fertilizers?<br>Are dairy products free from hormones? |
| Storage of food | Were any nutrients lost during cooking?<br>Were any preservatives added? |
| Packaging | Can packaging cause food contamination (e.g., with carcinogenic substances)?<br>Do food labels provide reliable information needed to assess the health safety of a specific product? |

## The prevalence of orthorexia and an attempt at its diagnostic classification

Eating disorders are a common problem that affects between 5% and 18% of the population. Young people are particularly affected [10, 15]. The incidence of risk of orthorexia in the general population is estimated at 7% [16]. DSM-4, the American classification of mental disorders, mentions the following eating disorders: anorexia nervosa (AN), bulimia nervosa (BN) and an eating disorder not otherwise specified (ENDOS). In 2013, the next edition of the classification was published (DSM-5), extending the range of eating disorders with new categories: binge eating disorder,

chewing disorder, Pica syndrome, avoidant/restrictive food intake disorder (ARFID), other specified eating disorders, other unspecified feeding or eating disorders. Neither the WHO International Statistical Classification of Diseases and Health Problems ICD-10 nor the 2018 draft of ICD-11 distinguished orthorexia as a separate disorder. ICD-10 distinguishes the following types of eating disorders: anorexia nervosa, bulimia nervosa, overeating related to other psychological factors, other eating disorders, and unspecified eating disorders. Some authors point out that the classifications of eating disorders presented in ICD-10 and DSM-5 are imperfect, detached from clinical practice and call for frequent modifications of diagnosis. Moreover, the diagnostic criteria of ICD and DSM have little utility when diagnosing eating disorders in children and adolescents [17]. In 2003, the National Eating Disorders Association (NEDA) posted official information about orthorexia on its website [18].

In clinical practice, it is not obvious whether orthorexia should be classified as an eating disorder or an obsessive-compulsive disorder. Due to the fact that the symptoms are related to food intake, orthorexia nervosa can be classified as a non-specific dietary behavior [16, 19]. Considering its mechanism, the condition is more like an obsessive-compulsive disorder [6, 10]. The available literature does not make it clear whether orthorexia should be treated as a separate disorder, a variance of other syndromes, or a cultural attitude. Orthorexia and anorexia are linked by behaviors such as the presence of food-related rituals, excessive focus on nutrition, restrictive dietary habits, dependence of self-esteem on dietary control, and lack of awareness of the consequences of dietary restrictions. People with anorexia are mainly focused on their body image, food intake and weight gain. Low levels of BMI are rarely found in people at risk of orthorexia. The goal of a person with anorexia is to lose weight, and their well-being depends on that. Orthorexia and obsessive-compulsive disorder, on the other hand, are characterized by the need for control, anxiety and fear, perfectionism. Obsessive-compulsive disorder is associated with ego-dystonic behaviors, whereas in people at risk of orthorexia egosystonic behaviors are observed [7, 16]. Research conducted by Łucka et al. [20] carried out among adolescents and adults up to 30 years of age did not confirm the connection between orthorexia and obsessive-compulsive disorders, but they suggest that orthorexia could be classified in the spectrum of eating disorders. This view has been confirmed by research conducted by Bóne et al. [21] concerning the analysis of trends in the occurrence of orthorexic behaviors in Hungarians attending gyms.

Ziółkowska [22] emphasizes the difficulty in properly distinguishing orthorexia nervosa (regarded as ENDOS) from avoidant/restrictive food intake disorder (ARFID). The latter is accompanied by fear of eating and tension associated with having meals; dietary restrictions are an attempt at suppressing these negative emotions. In orthorexia, on the other hand, choices and dietary restrictions are made due to the patient's subjective convictions about a healthy lifestyle. Of all eating disorders, non-specific eating disorders are diagnosed in more than 60% of cases [19].

Research carried out worldwide so far indicates that the incidence of risk of orthorexia ranges from less than 1% to even 57.6%. Such considerable differences can

be explained by the way the sample is selected for testing and by the limitations of currently used diagnostic tools. So far, studies have focused on the assessment of the prevalence or risk of orthorexia occurring in selected communities, such as students of different majors, sports people, artists, vegetarians, or healthcare workers [6, 23].

If we review the available literature, we can conclude that some social or professional groups are particularly exposed to orthorexia, for example, athletes [24, 25], dieticians [26], healthcare workers and medical students [27], artists [28], people who have had eating disorders before [29], and those with unique eating habits [30].

## Lifestyle as a correlate of orthorexia risk

Research conducted in Portugal on a sample of nearly 200 subjects training at a gym demonstrated orthorexic behaviors in over 51% of subjects. The risk of orthorexia was lower with age. The sex and education of the subjects had no significant effect on the risk of the disorder. The authors stress that the occurrence of risk of orthorexia is linked to non-dietary aspects related to appearance and physical activity [25].

Burke et al. [31] compared the risk of orthorexia occurring in medical and non-medical professionals, and they demonstrated no significant differences between these social groups. Such findings are corroborated by the research carried out by Çiçekoğlu and Tunçay [32] on a sample of 62 adult vegetarians, vegans and those who observed neither diet. The outcomes of this research demonstrate that persons who follow a special vegetarian/vegan diet scored 27.7 on average in the ORTO-11 questionnaire, while non-dieting persons scored 27.1. The authors remark that the subjects decided to follow a vegetarian/vegan diet for ethical reasons not out of concern for their health. Different conclusions can be drawn from a study conducted in Poland on a group of 1,346 vegetarians and 1,265 non-vegetarians which was based on the BOT (*Bratman Orthorexia Test*). The studies mentioned above permit a conclusion that healthy food obsession is more specific for vegetarians (30.5%) than non-vegetarians (26.4%). Orthorexia affected lacto-vegetarians and ovo-vegetarians stronger than vegans. It was also more noticeable in younger persons who were less educated and observed vegetarianism for a shorter period [33]. This can be explained by the fact that veganism, as a more restrictive form than vegetarianism, is a philosophy, a lifestyle eliminating the use of all products of animal origin or products made with the use of animals, the health aspect being only an added value. Vegetarianism, albeit also used for ethical reasons, is focused more on consumption and health.

Hrynik et al. [34] conducted wide-ranging diagnostic research among 1,899 secondary students using the Polish version of the ORTO-15. The authors evaluated the risk of orthorexia using three cut-off values. The first cut-off value (40 points) was suggested by the authors of the test. Given this criterion, we would have to regard as many as 61.3% of the subjects as persons at risk of orthorexia. Some of the authors believe that only a threshold at 33 points, based on the fifth percentile within the orthorexia distribution index, can be assumed to indicate orthorexia [13, 34]. This score

was achieved by 4.2% of the subjects. Hrynik et al. [34] proposed another cut-off value, i.e., at 35 points to account for 13.7% of the subjects. The adoption of such a cut-off value was justified by willingness to use an intermediate cut-off value between the ones used today, which the authors regard as extreme.

Using the American version of the ORTO-15 test, Reynolds [35] ran a pilot study which demonstrated that the 35-point threshold should demonstrate orthorexia in 21% of Australian college students. Having adopted some additional criteria, such as underweight, the figure and social conduct of the subjects, the author estimated that the risk of orthorexia may be present in 6.5% of the examined students. For comparison, the results of Italian research involving a large group of students (more than 75% of the respondents) and university employees indicate that 32.7% of college students are at risk of orthorexia (cut-off value at 35 points). This study suggests that this disorder affects women more often than men. Also, ORTO-15 test results confirmed additional criteria, such as BMI or a more frequent use of diets that eliminate animal food products, in women [6]. A relatively high incidence of the risk of orthorexia in the university setting (35.4%) was reported by Hayes et al. [36]. The subjects were diagnosed with such symptoms as the feeling of guilt associated with failure to observe the diet and the sense of control during eating. Symptoms of orthorexia were correlated with perfectionism, concern about appearance and obsessive-compulsive disorder to a small or medium degree. These results should be compared with the results obtained by Bundros et al. [37] in a study carried out in a group of college students by means of the original Bartman test. The BOT questionnaire indicated the risk of orthorexia in 54.3% of the respondents. The researchers, however, point out that the BOT questionnaire cannot be considered as a reliable diagnostic tool, hence the growing popularity of the ORTO-15 and its adaptations [38].

As mentioned before, another social group at a high risk of orthorexia are athletes. Apart from an obsession with a healthy diet, athletes may develop an obsessive approach to physical exercise, which is also mentioned as one of several predictors of orthorexia [25]. This claim is confirmed by German research using the DOS (*Düsseldorf Orthorexia Scale*) with gym users [39]. Malmborg et al. [40] attempted to explain whether students of sports-oriented majors of study are more prone to the risk of orthorexia than students of economics who do not take part in sports classes. The sports students achieved better scores in a general health test, yet they complained more about pain problems and showed a tendency to develop orthorexia in comparison with the economics students who did not practice any sports. Another German study of professional athletes demonstrated that orthorexia was positively correlated with a compulsive disorder, i.e., dependence on physical exercise [39]. A similar correlation was shown by research involving Italian athletes [24].

Dietician is a profession that is clearly associated with a rational approach to nutrition. Paradoxically, it turns out that this occupational group is also at risk of orthorexia. Kinzl et al. [41] assessed the risk of this disorder in dieticians. Using the BOT questionnaire, it was shown that 34.9% of the respondents manifested ortho-

rexic tendencies, while 12.8% have orthorexia. Comparable results were obtained by Maghetti et al. [42].

## Cultural context of the spread of orthorexia

Most studies in orthorexia nervosa have been focused on the assessment of its prevalence. Some researchers have examined the correlation between orthorexia and personal factors such as gender, education and diet. However, there is not enough research in environmental factors which may affect the development of orthorexia. Studies conducted so far suggest that this disorder occurs mainly in the Western countries. Therefore, some authors draw attention to the purposefulness of including cultural aspects in the assessment of the risk of developing orthorexia. This seems particularly important given the progressing globalization and the risk of this disorder spreading [43, 44]. An immensely important role in the develoment of eating disorders is played by the media and the way in which they disseminate information about food contamination as well as building the pressure to control the quality of consumed products [44, 45]. The influence of the media on eating habits can be illustrated by the increasing interest in gluten-free diet in persons who do not suffer from gluten intolerance. Gluten-related diseases, such as celiac disease and gluten ataxia are rare, affecting 1% of the US population. Despite their rarity, there has been a significant increase in gluten-free food consumption in the United States in recent decades. In the years 2005–2016, gluten-free diet was one of the most frequently searched diets on the Internet by Americans [46, 47]. An increased interest in gluten-free products has been noticeable for several years, also in Europe. The popularity of gluten-free diet was caused by many factors, the most important ones being: aggressive marketing of food producers, media reports on the benefits of gluten-free diet, and popularity among celebrities [47].

Weber et al. [48] carried out studies among athletes who were on gluten-free diet and those consuming gluten products. Orthorexia was diagnosed in a large proportion of the respondents; however, no significant differences in its incidence were noted between athletes eating gluten-containing products and those who had eliminated them from their diet. Such findings are not endorsed by other authors [47]. Syurina et al. [49] are of the opinion that the Western culture is exerting a significant impact on the development of orthorexia. Greater prosperity makes it easier to obtain healthy, organic food. The dietary and fitness industry have a hugely important factor in the development of obsessions with healthy food and the pursuit of a perfect, slim figure. Social media also have a significant influence on the promotion of orthorexic behaviors. A person at risk of orthorexia often gets inspired by a new idea found on the Internet or finds acceptance for his or her actions there, which strengthens their commitment.

**Tools to assess the risk of orthorexia**

The first tool used to diagnose the risk of orthorexia was a test developed by the originator of the notion of orthorexia. The BOT (*Bratman Orthorexia Test*) consists of 10 questions. Respondents give "yes/no" answers to each question. Every "yes" scores 1 point, and "no" scores zero. A score of 0–1 means that the respondent does not suffer from orthorexia, 2–3 points indicate orthorexia risk, and anything above that denotes orthorexia [10, 18]. The test has been adapted for German, Swedish, English, and Polish [29, 39]. In research practice, this test is not extensively used due to claims that it is not a psychometric test [10]. Bartman himself admits that his test does not fulfill the stringent criteria imposed on questionnaires used in scientific research [44]. Tests results obtained using the BOT should be evaluated because requirements concerning the quality of consumed meals should not be identified as eating disorders [50].

The BOT was used by Donini et al. [51] to develop a more accurate diagnostic tool – the ORTO-15 measure comprising 15 questions. Each of them can be answered using a 4-point scale: "always", "often", "rarely", "never". Answers which suggest the risk of orthorexic behaviors are assigned 1 point, while those related to proper attitudes towards eating receive 4. The cut-off value is 40 points. A lower score than that indicates proneness to orthorexia. Currently, this test and its adaptations are typically utilized in scientific research [45, 52]. The ORTO-15 questionnaire has many adaptations. Most of them consist of 15 items, sometimes 11 [53]. The German version has the shortest form consisting of 9 items [54]. In the literature, we find information about the use of various cut-off values in order to graduate the severity of eating disorders in relation to healthy nutrition. In the original version of the ORTO-15 test, the cut-off value was 40 points, but we can find cut-off values of 35 and 33 points as well [6, 34]. The ORTO-15 questionnaire was adapted to the Polish conditions by Stochel et al. [55]. Research conducted among adolescents proves that the ORTO-15 questionnaire is a reliable tool for identifying a suspicion of orthorexia, characterized by high repeatability. Scientists are still debating on the use of an appropriate cut-off point in the ORTO-15 test. Most authors who use the ORTO-15 test use 40 points as the cut-off value. In some studies, too many diagnoses required that the cut-off point should be reduced. When making these changes, the authors were guided by an evaluation of the degree of distribution of results in the tested samples [6, 34, 55].

According to Cena et al. [56], the ORTO-15 and the BOT self-test have been the most commonly used psychometric tools in orthorexia research so far. Researchers from Germany also use the DOS (*Düsseldorf Orthorexia Scale*) to assess the incidence of orthorexia. The test consists of 10 questions, which can be answered with "I agree" or "I don't agree". Overall, from 10 to 40 points can be scored. A score in the range of 25–29 points indicates proneness to orthorexic behaviors and results of 30 points or more are indicative of orthorexia [39]. In the opinion of authors who use the DOS, its psychometric characteristics are good; they also point out that it has higher valid-

ity and reliability than the ORTO-15. The incidence rate of orthorexia in the general population measured using the DOS ranges from 1% to 3.3% [39, 57].

In 2018, Barrada and Roncero [58] published their own questionnaire examining the risk of developing orthorexia called the TOS (*Teruel Orthorexia Scale*). This questionnaire responds to criticism of earlier research instruments and allows us to distinguish between an acceptable interest in healthy eating and pathological one. For this purpose, the authors of the scale introduced two concepts, such as: (1) "orthorexia", i.e., striving to maintain a healthy diet, and (2) "orthorexia nervosa", which is associated with negative consequences for human health and psychosocial functioning [58].

## Conclusions

Over the recent years we have seen an increased interest in healthy food, which is free from contaminants and substances considered unfavorable to health. Although this trend is beneficial, in some people it takes the form of pathological anxiety and obsession about the quality of food they consume. Orthorexia nervosa does not constitute a separate disease. In clinical practice it is classified as an eating disorder, unspecified or obsessive-compulsive disorder. In further search for the proper classification of this disorder, the possibility of interpreting it as an overvalued ideal, diverting one's attention from important problems or giving life a purpose. It is also worth examining whether this disorder occurs in isolation or whether it is one of several elements of a healthy lifestyle, or one of many obsessions. At present, heterogeneity of orthorexia cannot be ruled out.

Scientific research conducted over the last 10 years indicates that the number of orthorexia patients has been growing. The prevalence of the risk of orthorexia and orthorexia itself varies depending on the studied social group. The disorder most often affects people who are concerned about proper diet and physical activity. The origin of orthorexia has been traced in obsessive-compulsive disorder, phobias or hypochondria, but the research to date does not permit a formulation of unambiguous conclusions. Some researchers suggest that orthorexia should be located within the spectrum of eating disorders, but the exact etiology of this disorder has not been elucidated. The questionnaires used in the scientific literature to diagnose orthorexia are characterized by different psychometric values, which frequently makes it difficult to assess the phenomenon of orthorexia worldwide. The questionnaires do not sufficiently define the boundary between the excessive interest in healthy eating and lifestyle and the actual disorder that interferes with everyday functioning. Our analysis of available literature permits a conclusion that further investigation of orthorexia is needed, and the attention of physicians and specialists must be drawn to a distorted approach to nutrition and health.

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