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Orthorexic eating behavior among dietitians and nutrition students in Brazil: A cross-sectional study of prevalence and agreement between ORTO-15 and DOS-BR

Comportamento alimentar ortoréxico entre nutricionistas e estudantes de nutrição no Brasil: Um estudo transversal de prevalência e concordância entre ORTO-15 e DOS-BR

Comportamiento alimentario ortoréxico entre dietistas y estudiantes de nutrición en Brasil: Un estudio transversal de prevalencia y concordancia entre ORTO-15 y DOS-BR

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Abstract
Previous research has reported substantial heterogeneity in prevalence estimates of orthorexic eating behavior. This study aimed to describe its prevalence in a specific academic context and to analyze associated factors. A cross-sectional online survey was conducted using two assessment tools (ORTO-15 and DOS-BR), along with sociodemographic, academic, anthropometric, clinical, and dietary intake data. The sample included 309 dietitians and 177 Nutrition college students from a large Brazilian university. According to the ORTO-15, 90.90% of participants were classified as presenting orthorexic eating behavior, whereas 10.90% were classified as at risk/present according to the DOS-BR, with no significant differences between dietitians and students. Agreement between the tools was poor (kappa = 0.024, p = 0.015), and Nutrition students had higher DOS-BR scores. Factors associated with orthorexic eating behavior (DOS-BR) included preoccupation with food additives and calorie content, history of eating disorders, increased concern with food after the Nutrition course reported by family and friends, weighing foods, and self-reported food allergies/intolerances. The findings highlight substantial differences between assessment tools, with the DOS-BR providing a more conservative and psychometrically robust evaluation in this academic context.
Keywords: Orthorexia Nervosa; Nutritional Sciences; Disordered Eating Behavior.

Resumo
Pesquisas anteriores têm relatado uma heterogeneidade substancial nas estimativas de prevalência do comportamento alimentar ortoréxico. Este estudo teve como objetivo descrever sua prevalência em um contexto acadêmico específico e analisar os fatores associados. Foi realizado um levantamento transversal online utilizando dois instrumentos de avaliação (ORTO-15 e DOS-BR), juntamente com dados sociodemográficos, acadêmicos, antropométricos, clínicos e de consumo alimentar. A amostra incluiu 309 nutricionistas e 177 estudantes de Nutrição de uma grande universidade brasileira. De acordo com o ORTO-15, 90,90% dos participantes foram classificados como apresentando comportamento alimentar ortoréxico, enquanto 10,90% foram classificados como em risco/presentes de acordo com o DOS-BR, sem diferenças entre nutricionistas e estudantes. A concordância entre as ferramentas foi baixa (kappa = 0,024, p = 0,015), e os estudantes de Nutrição apresentaram escores mais altos no DOS-BR. Os fatores associados ao comportamento alimentar ortoréxico (DOS-BR) incluíram preocupação com aditivos alimentares e teor calórico, histórico de transtornos alimentares, aumento da preocupação com a alimentação após o curso de Nutrição relatado por familiares e amigos, pesagem de alimentos e alergias/intolerâncias alimentares autodeclaradas. Os resultados destacam diferenças substanciais entre as ferramentas de avaliação, sendo a DOS-BR uma ferramenta mais conservadora e psicometricamente robusta neste contexto acadêmico.
Palavras-chave: Ortorexia Nervosa; Ciências da Nutrição; Comportamento Alimentar Desordenado.

Resumen
Investigaciones anteriores han informado de una heterogeneidad sustancial en las estimaciones de prevalencia de la conducta alimentaria ortoréxica. Este estudio tuvo como objetivo describir su prevalencia en un contexto académico específico y analizar los factores asociados. Se realizó una encuesta transversal en línea utilizando dos herramientas de evaluación (ORTO-15 y DOS-BR), junto con datos sociodemográficos, académicos, antropométricos, clínicos y de ingesta dietética. La muestra incluyó 309 dietistas y 177 estudiantes universitarios de Nutrición de una gran universidad brasileña. Según el ORTO-15, el 90,90% de los participantes fueron clasificados como presentando una conducta alimentaria ortoréxica, mientras que el 10,90% fueron clasificados como en riesgo/presente según el DOS-BR, sin diferencias entre dietistas y estudiantes. La concordancia entre las herramientas fue pobre (kappa = 0,024, p = 0,015), y los estudiantes de Nutrición tuvieron puntuaciones más altas en el DOS-BR. Los factores asociados con la conducta alimentaria ortoréxica (DOS-BR) incluyeron la preocupación por los aditivos alimentarios y el contenido calórico, antecedentes de trastornos alimentarios, mayor preocupación por la comida después del curso de Nutrición, según informaron familiares y amigos, el pesaje de alimentos y la autodeclaración de alergias/intolerancias alimentarias. Los hallazgos destacan diferencias sustanciales entre las herramientas de evaluación, siendo la DOS-BR una evaluación más conservadora y psicométricamente robusta en este contexto académico.
Palabras clave: Ortorexia Nerviosa; Ciencias de la Nutrición; Conducta Alimentaria Desordenada.

1. Introduction

Adopting healthy eating practices plays a central role in promoting health and maintaining adequate nutritional status. (WHO, 2019). Research indicates that diet plays a central role in health maintenance. However, when healthy eating becomes rigid or extreme, it may lead to dysfunctional eating patterns. This phenomenon has been named “orthorexia nervosa” (ON) and it has been proposed to describe a pattern of eating marked by excessive rigidity and preoccupation with food quality, which has increasingly drawn academic and clinical interest. (Valente, Syurina & Donini, 2019). The term was initially presented by the physician Steven Bratman in 1997 to describe a pathological fixation to eat proper food (Bratman 1997). Evidence suggests that orthorexic eating behavior may negatively affect physical health, psychological well-being, and social functioning (Dunn & Bratman, 2016). Within its consequences, ON can lead to nutritional deficiencies, medical complications, social isolation, and poor quality of life (Koven & Wabry, 2015).

Although there is growing attention in academics, the diagnostic criteria are still in debate. Besides, orthorexia nervosa is not mentioned in the Diagnostic and Statistical Manual of Mental Disorders – 5th edition (DSM-5) published in May 2013 (American Psychiatric Association, 2013) or in the 11st version of the International Statistical Classification of Diseases and Related Health Problems (ICD) updated in May 2018 (WHO, 2018). The Orthorexia Nervosa Task Force (ON-TF), established in 2016, has been intensively studying ON around the world and it has summarized some key points that should be presented in the official diagnostic criteria: (i) obsessive focus on dietary practices believed to promote optimum well-being through healthy eating; and (ii) consequent clinically significant impairment (Cena et al., 2018).

The prevalence of ON has been reported by numerous researchers with rates varying considerably according to the tool used, the conceptualization of ON, and the population studied (McComb & Mills, 2019; Valente et al., 2019). Regarding the tests used, in 2019, a systematic review (Valente et al., 2019) found six existing assessments instruments for orthorexia nervosa: the “Bratman Orthorexia Test” (BOT) (Bratman, Steven & Knight, 2000), the “Orthorexia Nervosa 15 Questionnaire” (ORTO-15) (Donini et al., 2005), the “Eating Habits Questionnaires” (EHQ) (Gleaves, Graham & Ambwani, 2013), the “Düsseldorfer Orthorexie Skala” (DOS) (Barthels, Meyer & Pietrowsky, 2015), the “Barcelona Orthorexia Scale” (BOS) (Bauer et al., 2018), and the “Teruel Orthorexia Scale” (TOS) (Barrada & Roncero, 2018). Recently, the “Orthorexia Nervosa Inventory” (ONI) was presented by Oberle et al. (2020) and the “Test of Orthorexia Nervosa” (TON-17) by Rogowska et al. (2021).

About the populations evaluated in studies, some researchers have indicated that health-related students and professionals, especially Nutrition college students (Abdullah, Al Hourani & Alkhatib, 2020; Agopyan et al., 2018;

Grammatikopoulou et al., 2018; Marchi & Baratto, 2014; Penaforte et al., 2018; de Souza & Rodrigues, 2014) and dietitians (Abdullah et al., 2020; Alvarenga et al., 2012; Asil & Sürücüoğlu, 2015; Tremelling et al., 2017) had more tendency to orthorexic symptoms. When compared with other areas, Nutrition-related subjects had a higher prevalence of ON than individuals with studies related to Biology (Bo et al., 2014; Lemos et al., 2018), Exercise and Sport Science (Bo et al., 2014), and Physiotherapy (Dittfeld et al., 2017). Regarding the assessment instruments to evaluate ON, the studies used the ORTO-15 or its variations (e.g., ORTO-11) and the BOT.

The fact that Nutrition and Dietetics subjects are in constant contact with aspects related to diet and health may put them in the position of a model of healthy eating (Penaforte et al., 2018; Rocks et al., 2017). This situation can lead them to the risk of being obsessed with healthy eating and developing ON (Korinth, Schiess & Westenhoefer, 2010). Furthermore, a disturbing relationship with food, like in ON, can difficult for Nutrition professionals to provide proper nutrition counseling and dietetics recommendations (Alvarenga et al., 2012). Thus, this study aimed to describe its prevalence in a specific academic context and to analyze associated factors. Moreover, we aimed to analyze factors associated with orthorexic eating behavior in those subjects. Despite the widespread use of different self-report tools, no Brazilian study has directly compared orthorexia nervosa prevalence and associated factors using instruments with distinct conceptual and psychometric foundations. To the best of our knowledge, this is the first Brazilian study to directly compare orthorexic eating behavior using instruments with distinct conceptual and psychometric foundations in the same academic population.

2. Methodology

This study employed a quantitative epidemiological approach with a cross-sectional design (Pereira et al., 2018). Descriptive statistics with data classes, absolute frequencies and relative percentage frequencies were used (Shitsuka et al., 2014), in addition to inferential statistical analysis (Costa Neto & Bekman, 2009).

2.1 Participants and procedure

The sample represents a specific academic and professional context and does not aim to estimate population prevalence. In this way, a sample of dietitians and Nutrition college students enrolled in a Nutrition program from a large public institution in the southeast of Brazil was selected and their data were collected using an online Google Forms survey. To be eligible for participation, the subjects had to be 18 years old or older than that.

Sample size estimation was performed based on the method proposed by Dean et al. (2013) and the current population number of graduated and undergraduate students from the Nutrition program (621 and 314) at the data collection. We considered a Confidence Level of 95%, margin error of 5%, and the population proportion of 80% as reported in studies with similar audiences (Alvarenga et al., 2012; Penaforte et al., 2018). The result was a sample size of 172 and 113 graduated students (dietitians) and undergraduates (Nutrition college students), respectively.

Online informed consent was obtained before completing the survey as well. Recruitment occurred through e-mail invitations and social media propagation. The project was approved by the University's Ethics Committee with the Certificate of Presentation of Ethical Appreciation of 09159018.3.0000.5149.

2.2 Measures and variables

Our survey contained six sections described in the sequence. The first section asked about sociodemographic data (age and gender). The second section contained academic questions (college status: student/dietitian, and term in the course: 1st to 9th term). The anthropometric data were analyzed in the third section, and it was obtained through self-reported weight in

kilograms and height in meters. Body Mass Index (BMI) was calculated using the self-reported data of weight and height. We used the World Health Organization cutoffs to classify the nutritional status of the sample (WHO, 1998).

The fourth section asked about food intolerances/allergies, eating disorder history, physical activity, and supplements use. The fifth section contained the two tools of orthorexia nervosa available in Brazilian Portuguese (ORTO-15 and DOS-BR), the tests are described in the following topic. Besides, additional questions about eating behavior were realized (e.g., dieting, preparing own meals, bringing own food to college/work, and weighing own foods). It also contained questions about attitudes related to the Nutrition course based on the study of Koritar & Alvarenga (2017) (e.g., getting more worried about their diet, trying to change family and friends' diets, getting more worried with food after the Nutrition course according to family and friends, and feeling pressured to have a healthy diet for being related to Nutrition Science).

The sixth section asked about the dietary intake by food consumption markers (e.g., beans, fruits, raw and cooked vegetables, soda / artificial powdered juice, and milk). A score with these food markers was calculated to evaluate the food consumption as stated by Souza et al. (2011), in which each food marker receives a point from 0 to 4. The point received depends on the frequency of the consumption of the marker. The score ranges from 0 through 24 points, where higher points indicate a healthier diet. For data analysis, the food consumption score was divided into two categories according to the Percentile 75th (P75) into the sample data: <P75 (0-18) and ≥P75 (19-24).

2.2.1 Orthorexia Nervosa 15 Questionnaire

The "Orthorexia Nervosa 15 Questionnaire" (ORTO-15) was developed by Donini et al. (2005) and consists of a self-report 15-item test and measures orthorexic symptoms. The tool evaluates three dimensions of ON: (i) cognitive-rational (e.g., "When eating, do you pay attention to the calories of the food?"); (ii) clinical (e.g., "Does the thought about food worry you for more than three hours a day?"); and (iii) emotional (e.g., "Do you feel guilty when transgressing?"). A four-point scale from "always" (1 point) to "never" (4 points) is used. The points are inverted for items 2, 5, 8 and 9, and items 1 and 13 have a different score ("always" = 2 points; "often" = 4 points; "sometimes" = 3 points; and "never" = 1 point). Lower scores reflect a greater inclination toward orthorexic eating behavior. The maximum score is 60 points and the cut-off score < 40 has was presented to indicate ON (Donini et al., 2005). We used the Brazilian version of the test transculturally adapted by Pontes et al. (2014). In the present study, the ORTO-15 showed low internal consistency (Cronbach's alpha = 0.274), consistent with previous literature. Despite these limitations, the test was included in our study, to compare the ON evaluation with the DOS-BR in our samples and other studies with Nutrition-related subjects. Furthermore, it is the test most widely used in studies and the only tool applied in Brazilian researches.

2.2.2 Düsseldorfer Orthorexie Skala

Considering the limitations of the ORTO-15, mentioned above, the "Düsseldorfer Orthorexie Skala" (DOS) was used as a second measure of orthorexia nervosa. The DOS consists of a self-report 10-item test that measures orthorexic eating behavior (e.g., "If I eat something I consider unhealthy, I feel really bad."). A four-point Likert-type scale is used: "applies to me" (4 points); "rather applies to me" (3 points); "rather does not apply to me" (2 points) and "does not apply to me" (1 point). Higher points indicate a greater tendency to orthorexia nervosa (Barthels et al., 2015), being 40 points the maximum score possible. A preliminary cut-off score ≥30 is used to indicate the presence of ON. A score between 25 and 29 points indicates the risk of ON (Barthels et al., 2017). The tool was transculturally adapted and validated to the Brazilian Portuguese (Souza, do Carmo & dos Santos, 2021). Cronbach's alpha coefficient was 0.795.

2.3 Data analysis

Statistical procedures were performed using the Statistical Package for the Social Sciences (SPSS) version 19.0 (IBM, Armonk, New York, USA). The Kolmogorov-Smirnov test was used to analyze if the variables fit into a normal distribution, and all numeric variables presented a non-normal distribution. Data were expressed as median and range or quartile interval (percentile 25th and percentile 75th) for numeric variables, or absolute frequency and percentage for categorical variables.

The categories "orthorexia nervosa at risk" and "orthorexia nervosa present" from the DOS-BR were grouped as one single category for the statistical analysis in this current study. The kappa coefficient was calculated for the analysis of the agreement between the ORTO-15 and the DOS-BR classifications. This coefficient ranges from -1 to 1 and the values have the following meanings of agreement: <0.00 poor; 0.0-0.20 slight; 0.21-0.40 fair; 0.41-0.60 moderate; 0.61-0.80 substantial; and 0.81-1.00 almost perfect (Landis & Koch, 1977).

To compare the orthorexia nervosa assessment between dietitians and Nutrition college students, we used the Chi-Square test for ON categories from both tools (e.g., "ON present", "ON at risk", and "ON absent") and Mann-Whitney test for ORTO-15 and DOS-BR total scores. Then, we proceeded with the bivariate analysis, to evaluate the associated factors with orthorexia nervosa classification according to both instruments, the Chi-Square test was used.

To verify the associated independent factors with ON, measured by the DOS-BR, we conducted a Multiple Logistic Regression. The explanatory variables that obtained a P-value less than 20% ($p<0.20$) in the bivariate analysis were inserted by the backward method in the multivariate model of Multiple Logistic Regression, and those variables with less significance (greater p-value) were removed one by one from the model. The procedure was repeated until all variables presented in the model had statistical significance ($p<0.05$).

We did not conduct the multivariate model of Multiple Logistic Regression with the data from the ORTO-15 due to its well-documented psychometric limitations in previous studies. The test has presented some limitations to assess ON with overestimated prevalence for not evaluating the clinical impairments caused by the obsessive focus on healthy eating (Dunn et al., 2017; McComb & Mills 2019; Missbach et al., 2015; Roncero, Barrada, & Perpiñá 2017; Varga et al., 2014). Because of that, we conducted the multivariate analyzes only with the DOS-BR data, which has shown to be a more reliable measure of ON (Depa et al., 2017; Souza et al., 2021). The Hosmer & Lemeshow test was used to verify the fit of the final model ($p>0.05$). The Odds Ratio (OR) with a 95% Confidence Interval (95% CI) was used as a measure of the effect. For all analyses, the statistical significance value of 5% was adopted.

3. Results

In total, 486 Nutrition-related subjects replied to the online questionnaire. Regarding the college status, 63.6% were graduated (dietitians). 91.6% of participants were female, with an age range from 18 to 54 years old. Approximately 20% of the participants reported an eating disorder history, food allergy/intolerance, and dieting practice. Table 1 summarizes the main characteristics of the study sample.

Table 1 - Sample's study main characteristics (*n*=486).

Variables	Total	
	n	**%**
Gender		
Male	41	8.4
Female	445	91.6
College status		
Dietitian	309	63.6
Nutrition student	177	36.4
College term in the course		
Graduated/Dietitian	309	63.6
1st - 5th term	97	19.9
6th - 9th term	80	16.5
Age		
18-24 years	161	33.1
25-29 years	149	30.7
30-54 years	176	36.2
Body Mass Index (BMI)		
Underweight	41	8.5
Normal	356	73.5
Overweight	69	14.3
Obesity	18	3.7
Supplement use		
No, never	283	58.2
Yes	203	41.8
Physical activity		
None	137	28.2
1-2 days/week	122	25.1
3-4 days/week	141	29.0
5-6 days/week	72	14.8
Everyday	14	2.9
Eating disorder history		
No	390	80.2
Yes	96	19.8
Food allergies/intolerances		
No	398	81.9
Yes	88	18.1
Dieting		
No	402	82.7
Yes	84	17.3
Weighing own foods		
No	436	89.7
Yes	50	10.3
Preparing own foods		
No	20	4.1
Yes	353	72.6
Sometimes	113	23.3
Nutritional content with more preoccupation		
No preoccupation with nutritional content	66	14.2
Calories	58	12.4
Macronutrients	271	58.2
Micronutrients and fiber	33	7.1

Food additives	9	1.9
Nutrition composition at all	29	6.2
Getting more worried about own diet after Nutrition course		
No	40	8.2
Yes	446	91.8
Trying to change family and friends' diets after Nutrition course		
No	102	21.0
Yes	384	79.0
Getting more worried with food after Nutrition course according to family and friends		
No	220	45.3
Yes	266	54.7
Feeling pressure to have a healthy diet for being related to Nutrition Science		
No	178	36.6
Yes	308	63.4
Food and nutrition posting on social media		
No	233	47.9
Yes	240	49.4
No social media use	13	2.7
Food consumption score, *n* (P25-P75)	17 (15-19)	

P25, 25th Percentile; P75, 75th Percentile. Source: Research data (2025).

The median score of the ORTO-15 was 36 with a range from 24 to 49. In this sense, the results showed that 90.90% of the sample were classified as presenting orthorexic eating behavior according to the ORTO-15. On the other hand, according to the DOS-BR, 10.90% of the subjects were classified as ON at-risk/present. The median score of the DOS-BR was 18 with a range from 10 to 38. See Table 2. There was poor agreement between the ORTO-15 and the DOS-BR measures. We found kappa value=0.024, p=0.015, and 19.90% of agreement in the orthorexia nervosa classification between the two self-reported tools.

In the analysis of orthorexia nervosa among college status, Nutrition college students had higher scores in the DOS-BR (Table 2). However, there was no difference between dietitians and Nutrition college students among ON diagnoses and ORTO-15 scores. When we analyzed the DOS-BR categories grouped (e.g., ON at-risk/present), we did not observe statistical differences in risk/presence of ON among dietitians and Nutrition college students (p=0.155).

Table 2 - The ORTO-15 and the DOS-BR scores and Orthorexia nervosa evaluation according to college status.

Orthorexia nervosa	**Total (*n*=486)**	**Students (*n*=177)**	**Dietitians (*n*=309)**	***p*-value**
Scores†				
ORTO-15, Median (range)	36 (24-49)	35 (24-49)	36 (26-46)	0.336
DOS-BR, Median (range)	18 (10-38)	19 (10-36)	18 (10-38)	0.048*
ORTO-15 classification‡				
ON absent, *n* (%)	44 (9.10)	14 (7.90)	30 (9.70)	0.506
ON present, *n* (%)	442 (90.90)	163 (92.10)	279 (90.30)	
DOS-BR classification‡				
ON absent, *n* (%)	433 (89.10)	153 (86.40)	280 (90.60)	
ON at risk, *n* (%)	34 (7.00)	17 (9.60)	17 (5.50)	0.231
ON present, *n* (%)	19 (3.90)	7 (4.00)	12 (3.90)	

ON. orthorexia nervosa. Classification based on self-report instruments; results do not represent clinical diagnosis.
†. Mann-Whitney Test, ‡. Chi-Square Test. *P<0.05. Source: Research data (2025).

The bivariate analysis was conducted by the association between the variables and the orthorexia nervosa diagnosis by the ORTO-15 (Table 3). The results showed that ON was associated with preparing their own foods; nutrition content with more preoccupation; getting more worried about their diet after the Nutrition course; and food consumption score ($p<0.05$).

Table 3 - Variables associated with Orthorexia nervosa measured by the ORTO-15.

Variables	ON absent *n* (%)	ON present *n* (%)	*p*-value
Gender			
Male	1 (2.4)	40 (97.6)	0.123
Female	43 (9.7)	402 (90.3)	
College status			
Dietitian	30 (9.7)	279 (90.3)	0.506
Nutrition student	14 (7.9)	163 (92.1)	
College term in the course			
Graduated/Dietitian	30 (9.7)	279 (90.3)	
1st - 5th term	7 (7.2)	90 (92.8)	0.753
6th - 9th term	7 (8.8)	73 (91.2)	
Age			
18-24 years	10 (6.2)	151 (93.8)	
25-29 years	15 (10.1)	134 (89.9)	0.299
30-54 years	19 (10.8)	157 (89.2)	
Body Mass Index (BMI)			
Underweight	6 (14.6)	35 (85.4)	
Normal	32 (9.0)	324 (91.0)	0.342
Overweight	6 (8.7)	63 (91.3)	
Obesity	0 (0.0)	18 (100.0)	
Supplement use			
No, never	30 (10.6)	253 (89.4)	0.160
Yes	14 (6.9)	189 (93.1)	
Physical activity			
None	18 (13.1)	119 (86.9)	
1-2 days/week	10 (8.2)	112 (91.8)	
3-4 days/week	12 (8.5)	129 (91.5)	0.279
5-6 days/week	3 (4.2)	69 (95.8)	
Everyday	1 (7.1)	13 (92.9)	
Eating disorder history			
No	37 (9.5)	353 (90.5)	0.502
Yes	7 (7.3)	89 (92.7)	
Food allergies/intolerances			
No	39 (9.8)	359 (90.2)	0.223
Yes	5 (5.7)	83 (94.3)	
Dieting			
No	37 (9.2)	365 (90.8)	0.800
Yes	7 (8.3)	77 (91.7)	
Weighing own foods			
No	42 (9.6)	394 (90.4)	0.189

Yes	2 (4.0)	48 (96.0)	
Preparing own meals			
No	5 (25.0)	15 (75.0)	
Yes	30 (8.5)	323 (91.5)	0.039*
Sometimes	9 (8.0)	104 (92.0)	
Nutritional content with more preoccupation			
No preoccupation with nutritional content	12 (18.2)	54 (81.8)	
Calories	2 (3.4)	56 (96.6)	
Macronutrients	23 (8.5)	248 (91.5)	0.017*
Micronutrients and fiber	6 (18.2)	27 (81.8)	
Food additives	0 (0.0)	9 (100.0)	
Nutrition composition at all	1 (3.4)	28 (96.6)	
Getting more worried about own diet after Nutrition course			
No	9 (22.5)	31 (77.5)	0.002**
Yes	35 (7.8)	411 (92.2)	
Trying to change family and friends' diets after Nutrition course			
No	13 (12.7)	89 (87.3)	0.144
Yes	31 (8.1)	353 (91.9)	
Getting more worried with food after Nutrition course according to family and friends			
No	26 (11.8)	194 (88.2)	0.053
Yes	18 (6.8)	248 (93.2)	
Feeling pressure to have a healthy diet for being related to Nutrition Science			
No	18 (10.1)	160 (89.9)	0.536
Yes	26 (8.4)	282 (91.6)	
Food and nutrition posting on social media			
No	24 (10.3)	209 (89.7)	
Yes	20 (8.3)	220 (91.7)	0.390
No social media use	0 (0.0)	13 (100.0)	
Food consumption score			
<75th Percentile (0-18)	39 (12.1)	284 (87.9)	0.001**
≥75th Percentile (19-24)	5 (3.1)	158 (96.9)	

ON. orthorexia nervosa. Chi-Square Test. *p<0.05, **p<0.01. Source: Research data (2025).

Regarding the DOS-BR, the bivariate analysis was conducted by the association between the variables and the orthorexia nervosa categorized in ON absent and ON at-risk/present (Table 4). The results showed that ON at-risk/present was associated with eating disorder history; report of food allergy/intolerance; and weighing food of their meals; nutrition content with more preoccupation; and posting of food and nutrition information on social media (p<0.05). When we analyzed the attitudes related to the Nutrition course, ON was associated with trying to change family and friends` diets and getting more worried about food after entering the Nutrition course according to family and friends (p<0.05).

Table 4 - Variables associated with Orthorexia nervosa measured by the DOS-BR.

Variables	ON absent *n* (%)	ON at risk/present *n* (%)	*p*-value
Gender			
Male	37 (90.2)	4 (9.8)	0.805
Female	396 (89.0)	49 (11.0)	
College status			
Dietitian	280 (90.6)	29 (9.4)	0.155
Nutrition student	153 (86.4)	24 (13.6)	
College term in the course			
Graduated/Dietitian	280 (90.6)	29 (9.4)	
1st - 5th term	87 (89.7)	10 (10.3)	0.114
6th - 9th term	66 (82.5)	14 (17.5)	
Age			
18-24 years	138 (85.7)	23 (14.3)	
25-29 years	131 (87.9)	18 (12.1)	0.077
30-54 years	164 (93.2)	12 (6.8)	
Body Mass Index (BMI)			
Underweight	39 (95.1)	2 (4.9)	
Normal	313 (87.9)	43 (12.1)	0.208
Overweight	65 (94.2)	4 (5.8)	
Obesity	15 (83.3)	3 (16.7)	
Supplement use			
No, never	256 (90.5)	27 (9.5)	0.254
Yes	177 (87.2)	26 (12.8)	
Physical activity			
None	126 (92.0)	11 (8.0)	
1-2 days/week	114 (93.4)	8 (6.6)	
3-4 days/week	123 (87.2)	18 (12.8)	0.051
5-6 days/week	59 (81.9)	13 (18.1)	
Everyday	11 (78.6)	3 (21.4)	
Eating disorder history			
No	358 (91.8)	32 (8.2)	<0.001***
Yes	75 (78.1)	21 (21.9)	
Food allergies/intolerances			
No	361 (90.7)	37 (9.3)	0.016*
Yes	72 (81.8)	16 (18.2)	
Dieting			
No	358 (89.1)	44 (10.9)	0.951
Yes	75 (89.3)	9 (10.7)	
Weighing own foods			
No	394 (90.4)	42 (9.6)	0.008**
Yes	39 (78.0)	11 (22.0)	
Preparing own meals			
No	20 (100.0)	0 (0.0)	0.279
Yes	313 (88.7)	40 (11.3)	

Sometimes	100 (88.5)	13 (11.5)	
Nutritional content with more preoccupation			
No preoccupation with nutritional content	64 (97.0)	2 (3.0)	0.007**
Calories	45 (77.6)	13 (22.4)	
Macronutrients	244 (90.0)	27 (10.0)	
Micronutrients and fiber	28 (84.8)	5 (15.2)	
Food additives	7 (77.8)	2 (22.2)	
Nutrition composition at all	28 (96.6)	1 (3.4)	
Getting more worried about own diet after Nutrition course			
No	35 (87.5)	5 (12.5)	0.736
Yes	398 (89.2)	48 (10.8)	
Trying to change family and friend's diets after Nutrition course			
No	97 (95.1)	5 (4.9)	0.029*
Yes	336 (87.5)	48 (12.5)	
Getting more worried with food after Nutrition course according to family and friends			
No	206 (93.6)	14 (6.4)	0.003**
Yes	227 (85.3)	39 (14.7)	
Feeling pressure to have a healthy diet for being related to Nutrition Science			
No	165 (92.7)	13 (7.3)	0.053
Yes	268 (87.0)	40 (13.0)	
Food and nutrition posting on social media			
No	215 (92.3)	18 (7.7)	0.025*
Yes	205 (85.4)	35 (14.6)	
No social media use	13 (100.0)	0 (0.0)	
Food consumption score			
<75th Percentile (0-18)	287 (88.9)	36 (11.1)	0.811
≥75th Percentile (19-24)	146 (89.6)	17 (10.4)	

ON. orthorexia nervosa. Chi-Square Test. *p<0.05, **p<0.01, ***p<0.001. Source: Research data (2025).

In the Final Multiple Logistic Regression Model, it was observed that the risk/presence of ON measured by the DOS-BR was higher among individuals who reported to be more concerned with the content of food additives (OR: 9.892; 95% CI: 1.125-87.016), and calories (OR: 6.789; 95% CI: 1.394-33.058), when choosing what to eat; those with reported previous or current history of eating disorder (OR: 3.124; 95% CI: 1.569-6.219); who said they got more concerned with food after they started their studies in Nutrition Science, in the perception of friends and family (OR: 3.115; 95% CI: 1.515-6.405); who reported weighing the food in their meals (OR: 2.665; 95% CI: 1.142-6.215); and reported having a diagnosis of some type of food allergy/intolerance (OR: 2.14; 95% CI: 1.03-4.41). See Table 5.

Table 5 - Final Multiple Logistic Regression Model of the factors independently associated with Orthorexia nervosa at risk/present measured by the DOS-BR.

Variables	Odds Ratio	CI 95%	*p*-value
Food allergies/intolerance			
No	1		0.039*
Yes	2.140	1.039-4.410	
Weighing own foods			
No	1		0.023*
Yes	2.665	1.142-6.215	
Getting more worried with food after Nutrition course according to family and friends			
No	1		0.002**
Yes	3.115	1.515-6.405	
Eating disorder history			
No	1		0.001**
Yes	3.124	1.569-6.219	
Nutritional content with more preoccupation			
No preoccupation with nutritional content	1		
Nutrition composition at all	0.700	0.055-8.843	0.783
Macronutrients	2.685	0.597-12.078	0.198
Micronutrients and fiber	4.264	0.726-25.057	0.109
Calories	6.789	1.394-33.058	0.018*
Food additives	9.892	1.125-87.016	0.039*

CI. Confidence Interval. *p<0.05, **p<0.01. Model adjustment: Goodness of fit = 0.371. Source: Research data (2025).

4. Discussion

This study aimed to compare two self-report instruments for orthorexic eating behavior and to analyze associated factors among dietitians and nutrition students. The research contributes to the literature by comparing two widely used self-report instruments for orthorexic eating behavior: the ORTO-15 and the DOS-BR. Moreover, it was analyzed the associated factors of orthorexia nervosa in those subjects. The findings revealed marked discrepancies between the two instruments in the assessment of orthorexic eating behavior, with greater prevalences from the ORTO-15. Besides, Nutrition college students presented higher scores in the DOS-BR compared with dietitians. Regarding the independently associated factors with ON, measured by the DOS-BR, it was found eating-related aspects, report of food allergies/intolerances, and eating disorder history.

4.1 Comparison between instruments

Considering the evaluation of ON among the two tools, the ORTO-15 indicated a high prevalence for ON present (90.9%). Although being a high value for ON prevalence, this value is similar to other studies with Nutrition-related audiences in Brazil (Penaforte et al., 2018; Rodrigues et al., 2017; de Souza & Rodrigues, 2014). However, the DOS-BR showed lower values for ON present and at-risk (3.90% and 7.00%, respectively). Despite the shorter numbers, compared with ORTO-15, the results were similar to the study of Depa et al. (Depa et al., 2017) with female Nutrition students from Germany, which found that 3.40% of the sample were classified as ON present and 11.40% as at-risk measured by the DOS. Regarding the college status, there was no statistical difference in ON assessment among dietitians and Nutrition college students in our study, only

for the DOS-BR total score. The evaluation of ON in a sample of undergraduate and graduated students was only found in the study of Abdullah et al. (2020). The authors did not find differences in ON among undergraduate students of Nutrition and Dietetics, postgraduate students, and nutritionists using the ORTO-15.

As shown, the ON evaluation provided by the DOS differs when compared to the ORTO-15, in that it offered a possibility of distinguishing two groups of behaviors about the condition (e.g., ON at-risk and ON present). Although even when both values were grouped for data analysis in our study (10.90% of ON at-risk/present), the result remained lower than that provided by the ORTO-15. This was also observed in the study of Parra-Fernández et al. (2019) which used the Spanish version of both instruments (the ORTO-11 and the E-DOS). However, the difference in our study was higher, which can be explained by the fact the authors used a modified version of the ORTO-15, with four items removed. Besides, in the study of Gubiec et al. (2015) with Nutrition students, using two different tools for ON evaluation, it was also found higher prevalences provided by ORTO-15 (59.0%) compared to the BOT (33.0%).

The low level of agreement between instruments may be partly attributed to differences in their underlying conceptual frameworks (Valente et al., 2019) and the questionable psychometric properties of the ORTO-15 (Opitz et al., 2020). It has been discussed that ORTO-15 does not evaluate the clinical impairment of ON, for identifying dieting as pathological and overestimating the prevalence of ON (Dunn et al., 2017; Roncero et al., 2017). In this way, other cut-off points have been used in studies, like <35, to have a more accurate measure of ON (McComb & Mills, 2019). In Brazil, the majority of studies have been used <40 for ON assessment as recommended by the authors of the original version (Donini et al., 2005). But even when we set the 35-cut-off point, ON prevalence remained higher than the provided by the DOS-BR. The values changed to 47.2% and 52.0% for dietitians and Nutrition students, respectively. This great decrease in values when changing the cut-off point was also observed in the study of Abdullah et al. (2020) with a Nutrition-related sample.

Moreover, a recent comparison of different ON measures indicated that ORTO-15 is internally unreliable, while the DOS, the EHQ, and the BOT are internally reliable and highly correlated with each other (Meule et al., 2020). Besides Meule et al. (2020) found that these three tools seem to measure the same construct: the orthorexic eating behavior. Concerning the DOS-BR, it is important to mention that like the ORTO-15 and the other ON instruments, the DOS does not assess the physical impairments of orthorexia nervosa resulting from the unbalanced diet and nutritional deficiencies (Oberle et al., 2020). Furthermore, it was suggested that the DOS cannot distingue individuals suffering from orthorexia nervosa of those suffering from anorexia nervosa (Barthels et al., 2017). Although the DOS provided a value of prevalence more reasonable for the condition compared to the ORTO-15, these aspects could overestimate the prevalence of subjects with ON present and at the risk among Nutrition-related subjects, which are prone to experiencing food restrictions and weight control behaviors (Mahn & Lordly, 2015). However, the value found in our research is comparable with the 2.3% (Greetfeld et al., 2020) to 10.5% (Ferreira & Coimbra, 2020; Parra-Fernández et al., 2019) prevalence rates from studies using the DOS in different countries. In this way, the application of the DOS-BR among other populations in Brazil is important to observe ON evaluation in different contexts.

4.2 Associated factors

The presented findings revealed some differences between the two tools used. The nutrition content with more preoccupation was the only associated factor with orthorexia nervosa among both instruments. ON measured by the ORTO-15 was more pronounced in individuals who reported preparing their meals, getting more worried with food after attending the Nutrition course, and having healthier food consumption. Whereas, according to the DOS-BR, the risk/presence of ON was more pronounced in individuals who reported an eating disorder history, a food allergy/intolerance, weighting food for meals,

getting more worried with food according to family and friends, and posting about food and nutrition on social media. The differences in the prevalence and associated factors among the tools indicate that the instruments measure different aspects of eating behavior. However, the DOS-BR appears to better capture orthorexic eating behavior as conceptualized in recent literature, particularly regarding behavioral rigidity and distress.

Individuals with risk/presence of ON were more prone to be more worried about the content of food additives and calories, to have a previous or current eating disorder, and to get more concerned with food after they started their studies in Nutrition Science, in the perception of friends and family. Besides, the subjects were more predisposed to weigh the food in their meals and to report a diagnosis of some type of food allergy/intolerance. All these aspects are related to ON symptomatology, in which the individuals are more concerned with aspects about the quality of food eaten and its preparation (McComb & Mills, 2019). This fixation with food quality is prompted by a desire to maximize one's physical health and well-being (Bratman, 1997; Bratman, Steven & Knight, 2000). However, such preoccupation with health from food may elicit eating patterns that are especially complex (Koven & Wabry, 2015). In this way, individuals spend a great time involved with food and nutrition by researching and cataloging food, weighing and measuring food, and planning future meals (Bratman, Steven & Knight, 2000; Donini et al., 2005).

In addition, subjects suffering from orthorexia nervosa have limited insight into their condition and may not see their situation as problematic or potentially dangerous to their health (Bratman, Steven & Knight, 2000). The association with a history of an eating disorder was also reported in the systematic review of McComb & Mills (2019) about the psychosocial factors of ON. In this review, it was identified that ON has some common characteristics with different eating disorders (e.g., anorexia nervosa, bulimia nervosa, and avoidant-restrictive food intake disorder). Some of the similarities between ON and eating disorders include: over-concern about food and eating dominates one's life, adaptating of behavior and lifestyle to eating, diet becomes intertwined with identity and self-esteem, and health consequences (e.g., social isolation, somatic problems, and malnutrition) (Cena et al., 2018). Although it has been suggested that ON could be placed in the eating disorder's spectrum (Bartel et al., 2020), there is a debate about its appropriated nosologic classification, especially, due to the most available studies used poor psychometric tools (McComb & Mills, 2019; Strahler & Stark, 2020).

4.3 Strength and limits

The results of the present study should be interpreted considering its limitations. Orthorexia nervosa was evaluated in a sample composed of only Brazilian Portuguese-speaking Nutrition-related subjects and cannot be generalized to other populations or academic contexts. The number of male subjects observed in the current study was disproportional, but it is a common characteristic of the Nutrition-related population. Besides, the cross-sectional design does not allow to make inferences about the causal relationship between the variables analyzed. Regarding the ON assessment, the limitations are inherent to the tools available in Brazil, as discussed. The use of self-reported data of weight and height for Body Mass Index calculation is also a limitation of the study, which may contain an error in the nutrition status assessment. However, these data showed high agreement with direct measures among population-based investigation (Moreira et al., 2018).

Despite these limitations, our study has also some potentialities. It was the first research to use two different self-report tools of orthorexia nervosa in a single population in the Brazilian scenery, including a validated Brazilian version of DOS with adequate psychometric properties. The use of more than one instrument for ON assessment has been evaluated in a few studies (Gubiec et al., 2015; Meule et al., 2020; Parra-Fernández et al., 2019). We also included both Nutrition college students and dietitians in our study to evaluate orthorexia nervosa among those subjects, which have been evaluated separately. In this sense, our study is important, as it expands the literature about orthorexia nervosa in the Brazilian setting, especially

about the available instruments for the assessment of ON and its associated factors. Moreover, our research allowed studying ON in individuals who deal with aspects related to food and give dietetics recommendations to people. In this way, the results can contribute to expanding knowledge on orthorexia nervosa, particularly among dietitians and Nutrition college students, who are important food and nutrition source information.

5. Conclusion

Estimates of orthorexic eating behavior differed substantially depending on the assessment instrument applied, with substantially higher estimates obtained using the ORTO-15. Nutrition college students had higher scores in the DOS-BR compared to dietitians. Orthorexia nervosa was associated with eating-related aspects, a report of food allergies/intolerances, and an eating disorder history. Further research with longitudinal design should be conducted to confirm these results and with subjects not related to Nutrition Science, as a control group, to compare the prevalence data.

Despite the limitations of the tools, these findings highlight the importance of monitoring orthorexic eating behavior among nutrition-related populations. Besides, it should be noted that both measurement tools used in this study were developed in the absence of official diagnosis criteria for ON. However, the DOS-BR appears to provide a more conservative and psychometrically robust assessment of orthorexic eating behavior compared to ORTO-15, and it is more recommended for ON evaluation in the Brazilian scenery.

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