

ORIGINAL ARTICLE:

ASSOCIATION BETWEEN ORTHOREXIA NERVOSA TENDENCY, EATING ATTITUDES AND ANXIETY STUDIED AMONG MEDICAL STUDENTS OF RAWALPINDI MEDICAL UNIVERSITY: A CROSS-SECTIONAL STUDY

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Submitted: February 28, 2024

Accepted: March 19, 2025

ABSTRACT

OBJECTIVE

To assess how prevalent Orthorexia Nervosa is among students at the Rawalpindi Medical University and to explore its relationship with dietary attitudes and anxiety.

STUDY DESIGN

Descriptive cross-sectional study

PLACE AND DURATION OF STUDY

This study was conducted at the Rawalpindi Medical University, Pakistan from April to October 2023.

METHOD

Two hundred and eighty three 283 medical students were assessed using a questionnaire which incorporated items from three standardized tools: ORTO-15 (Orthorexia Nervosa assessment), Hamilton Anxiety Rating Scale (HAM-A), and Eating Attitude Test (EAT-26). The completed questionnaires were collected and analysed.

RESULTS

The research revealed that a majority, 62.9% of the medical students exhibited signs of Orthorexia Nervosa. However, analyses did not show significant association between the levels of Orthorexia Nervosa with either eating behaviours or anxiety levels.

CONCLUSION

The study concludes that there is no significant relationship between the tendencies towards Orthorexia Nervosa and dietary behaviours or anxiety levels. Additional research is required to identify potential risk factors associated with orthorexia nervosa.

KEYWORDS

Diet; Feeding Behaviour; Orthorexia Nervosa; Pakistan; Students, Medical; Universities.

INTRODUCTION

Orthorexia Nervosa (ON) is characterised by a compulsive fixation on consuming what is deemed an ideal diet, marked by extreme dietary purity, characterised by rigid restrictions and excessive avoidance of "unhealthy" foods. ¹ In 2016, a study was conducted that differentiated Orthorexia Nervosa (ON) from a common desire to be healthy through the identification of the harmful outcomes that include the impairment of one's health and disturbed social relationships. ² Prevalence rates vary, with estimates suggesting 7-58% of the general population exhibit orthorexic tendencies. Specific groups show higher rates:

approximately 28-30% in athletes, 45.5% in physicians, and 81.9% in dietitians, highlighting the need for awareness and support.

In individuals diagnosed with Orthorexia Nervosa (ON), the essential characteristics that are commonly observed in anorexics and bulimia nervosa (BN), such as an extreme concern about reducing weight and an illusory concept about the shape of one's body, are absent.³ A recent study mentioned that the signs of ON are the result of the attempt to control weight but are independent of dissatisfaction about one's appearance or uncontrolled consumption. Accordingly, it suggests that ON can be viewed as an independent eating disorder.⁴ The debate within the research community lingers regarding whether ON is to be viewed primarily as a lifestyle choice or an illness. However, some research papers have introduced certain clinical characteristics of this disorder.⁵

Researches have linked Orthorexia Nervosa (ON) to several factors, including perfectionism, obsessive-compulsive behavior, eating disorders, and body dissatisfaction.⁶ Some research has indicated there to be no correlation between ON and eating attitudes. Nevertheless, a study documented those participants who self-reported having experienced Orthorexia Nervosa had an average score of 30.89 (SD 12.60) on the EAT-26, within a range that indicates the need to further investigate the presence of an eating disorder.⁷ Also, individuals who are excessive exercisers and use Instagram regularly are likely to be influenced by beauty ideals within fitness gyms and social networks, such as 'Fitspiration' themes.⁸

This study explores the relationship between anxiety, eating attitudes, and Orthorexia Nervosa (ON) among medical students. It aims to investigate how emotional perspectives influence eating disorders and identify potential risk factors for ON. Currently, it is theorized that anxiety is inversely related to ON, while eating attitudes have a positive connection with ON. The findings of this study may inform future research, practice, and policy by deepening the understanding of ON).

METHOD

The study conformed to institutional, national, and international guidelines, including the 1964 Helsinki Declaration, and was approved by the Ethical Review Board of Rawalpindi Medical University and Allied Hospital, Rawalpindi, Pakistan (ref. no. 451/IREF/RMU/2023, dated: 11/07/2023) before commencement.

This descriptive cross-sectional study was conducted at Rawalpindi Medical University, Pakistan, from April to October 2023. The study included 1st to 5th year undergraduate medical students aged 18 and above, selected from a target population of 1000 eligible

students. A simple random sampling procedure was employed to select participants, using a Random Number Generator to randomly select participants from the target population.

The required sample size was determined to be 278 using Open Epi version 3.01, with a 95% confidence level and a 5% margin of error for type 1 errors. Participants were included if they were 1st to 5th year undergraduate students, aged 18 or older, and provided informed consent. Conversely, students with co-occurring anorexia nervosa or bulimia nervosa, or clinical conditions influencing food selection, such as renal insufficiency, food allergies, or obesity, were excluded.

A standardised questionnaire was used to collect data, which included demographic questions (age, gender, weight and height), as well as questions related to food allergies and eating disorders. Additionally, the questionnaire incorporated items from three standardized tools: The ORTO-15 for assessing Orthorexia Nervosa, The Hamilton Anxiety Rating Scale (HAM-A) for evaluating anxiety levels, and the Eating Attitude Test (EAT-26) for assessing eating disorder risk.

The questionnaire was administered to 288 participants, and the completed questionnaires were collected and analyzed. Participation was voluntary, and informed consent was obtained from each participant. After excluding 5 students with eating disorders or food allergies, the final analysis included 283 students (177 females, 106 males).

Instruments

Three tools were employed for assessment:

- i) **ORTO-15:**^{9,10} This is a 15-question inventory utilising a four-point Likert scale to evaluate an individual's focus on consuming what they consider healthy food. Scores range from 0 to 60, where higher scores suggest standard eating behaviours, and a score above 40 typically indicates Orthorexia Nervosa (ON).
- ii) **Hamilton Anxiety Rating Scale (HAM-A):**¹¹ Comprises of 14 items, this scale measures levels of anxiety. Scores under 17 suggest mild anxiety, scores from 17 to 24 suggest moderate anxiety, and scores above 25 indicate severe anxiety.
- iii) **Eating Attitude Test (EAT-26):**¹² This 26-item test helps identify potential eating disorders by asking respondents to rate their agreement with statements on a scale from "always" to "never," across three subscales. Scores at or above 20 are often seen as indicative of a potential eating disorder concern.

Statistical Analyses

The study utilised SPSS version 27 for statistical analyses. The analysis involved applying the

Mann-Whitney U test to compare scale scores between Orthorexia Nervosa (ON) tendency, anxiety levels, eating attitudes, and gender. Before applying these tests, the normality of the data was assessed using the Kolmogorov-Smirnov test and histogram frequency charts to examine the distributions of each variable. Additionally, Spearman’s rank correlation test was used to determine the relationships between ON tendency and independent variables, including gender, BMI, anxiety, and eating attitudes. A p-value of less than 0.05 was considered statistically significant

RESULTS

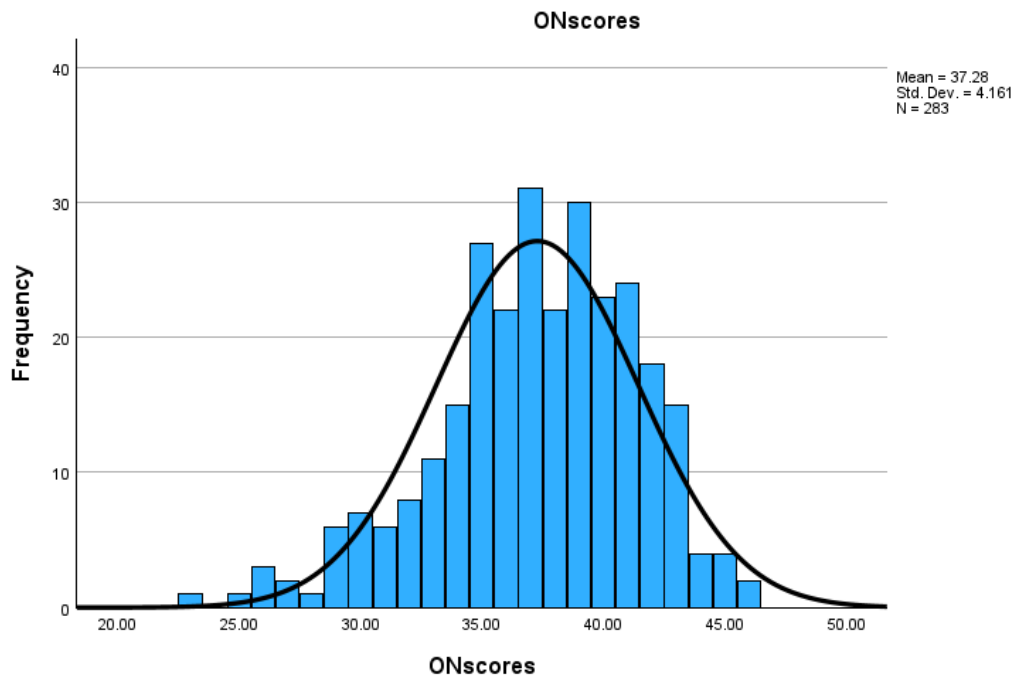
There were 283 participants out of which 177 (57.7%) were females and 106 (34.5%) were males. The mean in age was 20.12 ± 1.5 years. Body mass index was 22.85 ± 3.6 kg/m² in males while 19.82 ± 3.7 kg/m² in females. According to BMI, 80 (26.1%) were underweight, 170 (55.4%) were healthy weight, 24(7.8%) were overweight and 8 (2.6%) were in the obese category. According to the research statistics, 193 (62.9%) had scores below 40 which means they have the ON tendency. The mean of the ORTO-15 test score was 37.27 ± 4.16 , the Hamilton anxiety scale mean was 1.6 ± 1.02 and the eating attitude scale mean was 1.25 ± 0.44 .

In the statistical analysis of the distributions of the Orthorexia nervosa scores (ORTO-15 scores), eating attitudes scores, and anxiety scores, both the histograms and normality tests reveal significant deviations from normality. Specifically, the histogram for ORTO-15 scores exhibited a slight left-skew (Figure 1), while the Kolmogorov-Smirnov and Shapiro-Wilk tests confirm non-normality with p-values less than .001 (Table 1). Similarly, Eating attitudes scores and Hamilton anxiety scores showed a pronounced right-skew in their histogram. Given these findings, the data for these variables do not follow a normal distribution.

Table 1
Normality Test Results for ORTO-15, Eating Attitudes (EAT-26), and Hamilton Anxiety Scales (HAM-A).

Scores	Kolmogorov-Smirnov ^a			Shapiro-walk		
	Statistic	df	Sig.	Statistic	df	Sig.
ORTO-15	0.085	283	<0.001	0.974	283	<0.001
EAT-26	0.182	283	<0.001	0.833	283	<0.001
HAM-A	0.142	283	<0.001	0.901	283	<0.001

Figure 1: Histogram Distribution of Orthorexia Nervosa Scores as Measured by the ORTO-15 Scale



A comparative analysis using the Mann-Whitney test was conducted to compare the scores of Orthorexia Nervosa (ON) tendency, anxiety levels, and eating attitudes with respect to gender. The test revealed no statistically significant differences between males and females in terms of Orthorexia Nervosa (ON) tendency ($p = 0.211$) and Hamilton anxiety levels ($p = 0.836$). However, a significant difference was found in eating attitudes ($p < 0.05$), indicating a gender-specific difference in this variable. The mean scores of the ORTO 15 scale, Hamilton anxiety scale, and Eating Attitudes scale by gender are detailed in (Table 2).

Table 2
The mean scores of ORTO-15, Hamilton Anxiety scale, and the Eating Attitudes 26 by gender (mean \pm SD).

	Male	Female	z	Sig.	CI
ORTO-15	134.16	146.69	-1.251	0.211	0.196-0.211
EAT-26	157.5	132.7	-2.469	0.014	0.011-0.016
HAM-A	140.70	142.7	-0.207	0.836	0.83-0.846

Note: The bold number shows the significant relation

Comparative analysis using the Mann-Whitney test for individuals categorised by ORTO-15 scores (less than 40 and greater than 40 points) showed no statistical significance among differences in the Hamilton anxiety scale scores ($p = 0.888$) and Eating Attitudes scale scores ($p = 0.701$) across categories. This suggests that anxiety and eating attitudes are consistent across different levels of ON severity, as quantified by the ORTO-15 scale (Table 3).

Table 3
The mean scores of the Hamilton Anxiety scale and the Eating Attitudes scale by ORTO-15 scale

	ORTO-15 SCORES		Z	Sig.	CI
	<40	>40			
EAT-26	139.2	143.2	-0.384	0.701	0.693-0.710
HAM-A	143.0	141.5	--0.141	0.888	0.884-0.896

In the conducted analysis utilising Spearman's test to investigate the relationships between the ON tendency and the examined variables i.e gender, BMI, anxiety, eating attitudes—the results revealed no significant correlations ($p > 0.05$) (Table 4).

Table 4
Spearman test analysis showing correlations of individual factors with ON tendency.

	Correlation coefficient	Sig.	CI
Gender	0.105	0.077	-0.015-0.222
BMI	-0.024	0.687	-0.144-0.096
EAT-26	-0.036	0.520	-0.158-0.082
HAM-A	1.00	0.905	-0.127-0.133

DISCUSSION

Extensive researches have been performed to find the prevalence of Orthorexia Nervosa (ON) among various groups in recent times, revealing wide variations. Previous studies have reported the following Orthorexia Nervosa (ON) prevalence rates: 45.5% among resident medical officers in Ankara, Turkey, and 55.3% among individuals who regularly engage in physical exercise, as assessed by the ORTO-15 test (cutoff score: 40).^{13,14} The prevalence of

ON was 3.3% among German students, and another 9% were deemed at risk of developing the disorder.¹⁵ Populations that are higher socio-economically and more educated, like medical professionals and college students, are viewed to be more prone to developing ON based on the literature.

There are past studies where the use of health professionals' involvement has helped gain an understanding of surveying how Orthorexia Nervosa (ON) develops and who ordinarily develops it. It has been concluded that it is developed as the result of the persistent interaction of natural, mental, and social elements.¹⁶ Compulsiveness, psychopathology, disarranged eating, dieting and drive for slenderness were related to more prominent ON.⁷

The development of Orthorexia Nervosa (ON) tendencies is influenced by sociocultural factors, such as cultural values, social norms, and peer pressures. Excessive social media use, especially Instagram, has been found to exacerbate ON tendencies.¹⁷ Although online health trends have had positive effects, they also pose a risk of promoting unhealthy eating habits. Many bloggers have explained how social-media and blogs have spread unhealthy ideas about food restriction, contributing to a rise in disordered eating behaviours.

“Orthorexia runs uncontrolled on “healthy eating” blogs and Instagram accounts, in cleansing or detoxing programs, and with nutrition “experts” claiming you MUST cut X, Y, and Z out of your diet. All of the above have standardised this obsession on idealising certain sorts of food,”¹⁸

Sociodemographic traits such as age, gender and educational level are likely to be the determinants of variations in the incidence of Orthorexia Nervosa (ON) in different regions. . Some research shows that gender has no relationship to ON tendencies, but other research has indicated that women are likely to be more susceptible to this disorder due to societal expectations and the need to preserve an ideal body shape.¹⁹ In our study, despite the higher percentage of women expressing ON tendencies, the difference was not statistically significant.

A few studies reported anxiety to be a risk factor for orthorexic tendencies.²⁰ Although higher anxiety scores correlated with greater ON tendencies, Spearman test and Mann-Whitney test in this study supported the null hypothesis, showing anxiety is not an aetiological factor in ON. Young adults, particularly student-athletes, may believe that thinness enhances performance, making them vulnerable to eating disorders.²¹ The Eating Attitude Test (EAT-26) measures abnormal eating behaviours, including social pressure, purging, and food awareness. Although the test can identify tendencies toward orthorexic behaviour, our study did not find a significant connection between Orthorexia Nervosa (ON) tendencies and eating attitudes, indicating that eating attitudes do not significantly influence the risk of developing ON.

Certain researches have suggested that Body Mass Index (BMI) is not directly linked to Orthorexia Nervosa (ON). While higher BMI may contribute to orthorexic behaviour when combined with disordered eating and obsessive-compulsive traits, studies have found no strong correlation between ON and BMI, with ON components poorly linked to BMI.²²

Strengths and Limitations

This study's strength lies in its sample of highly educated medical students knowledgeable about dietary patterns. However, limitations include a restricted sample age range and academic setting, making generalisability challenging. Additionally, uneven response distribution across academic years led to data inconsistency. A further limitation is the study's failure to examine the influence of family eating habits on Orthorexia Nervosa (ON) tendencies.

CONCLUSION

The research did not establish a significant connection between tendencies towards Orthorexia Nervosa (ON) and either anxiety or dietary habits, indicating these are not factors influencing ON in the studied context. Nonetheless, further studies involving more varied and extensive population samples are essential to pinpoint additional risk factors, enhancing our comprehension of ON and guiding more effective treatments.

ACKNOWLEDGMENT

We extend our heartfelt thanks to every medical student who took part in this research.

CONFLICT OF INTEREST

The authors declare no competing interests.

FUNDING

This research received no funding from public or commercial sectors.

TRANSPARENCY

The authors affirm the manuscript's accuracy, honesty, and transparency, with no important aspects omitted.

DATA AVAILABILITY

Data supporting the study's findings are available from the corresponding author, upon reasonable request.

REFERENCES

1. Koven NS, Abry AW. The clinical basis of orthorexia nervosa: emerging perspectives. *Neuropsychiatr Dis Treat*. 2015 Feb 18;11:385-94. doi: 10.2147/NDT.S61665. PMID: 25733839; PMCID: PMC4340368.
2. Donini LM, Barrada JR, Barthels F, et al. A consensus document on the definition and diagnostic criteria for orthorexia nervosa. *Eat Weight Disord*. 2022;27:3695-3711. doi: 10.1007/s40519-022-01512-5.
3. Gramaglia C, Brytek-Matera A, Rogoza R, et al. Orthorexia and anorexia nervosa: two distinct phenomena? A cross-cultural comparison of orthorexic behaviors in clinical and non-clinical samples. *BMC Psychiatry*. 2017;17(1):75. doi: 10.1186/s12888-017-1241-2.
4. Ginimole PC, Nair D, Agrawal T (2022) To Assess the Prevalence of Orthorexia Nervosa Among Young Adults. *J Comm Pub Health Nursing*, 8: 328. DOI: 10.4172/2471-9846.1000328
5. Pontillo M, Zanna V, Demaria F, Averna R, Di Vincenzo C, De Biase M, Di Luzio M, Foti B, Tata MC, Vicari S. Orthorexia Nervosa, Eating Disorders, and Obsessive-Compulsive Disorder: A Selective Review of the Last Seven Years. *J Clin Med*. 2022 Oct 18;11(20):6134. doi: 10.3390/jcm11206134. PMID: 36294454; PMCID: PMC9604819.
6. McComb SE, Mills JS. Orthorexia nervosa: A review of psychosocial risk factors. *Appetite*. 2019 Sep 1;140:50-75. doi: 10.1016/j.appet.2019.05.005. Epub 2019 May 7. PMID: 31075324.
7. Dunn TM, Hawkins N, Gagliano S, Stoddard K. Individuals who self-identify as having "orthorexia nervosa" score in the clinical range on the Eating Attitudes Test-26. *Eat Weight Disord*. 2019 Dec;24(6):1025-1030. doi: 10.1007/s40519-019-00651-6. Epub 2019 Feb 11. PMID: 30756311.
8. Villa M, Opawsky N, Manriquez S, Ananías N, Vergara-Barra P, Leonario-Rodriguez M. Orthorexia nervosa risk and associated factors among Chilean nutrition students: a pilot study. *J Eat Disord*. 2022 Jan 11;10(1):6. doi: 10.1186/s40337-022-00529-6. PMID: 35016711; PMCID: PMC8753887.
9. Roncero M, Barrada JR, Perpiñá C. Measuring Orthorexia Nervosa: Psychometric Limitations of the ORTO-15. *Span J Psychol*. 2017;20:e36. doi: 10.1017/sjp.2017.36.15
10. Yılmaz MN, Dundar C. The relationship between orthorexia nervosa, anxiety, and self-esteem: a cross-sectional study in Turkish faculty members. *BMC Psychol*. 2022;10:82. doi: 10.1186/s40359-022-00796-7.
11. <https://dcf.psychiatry.ufl.edu/files/2011/05/HAMILTON-ANXIETY.pdf>
12. <https://www.eat-26.com/interpretation/>
13. Bağcı Bosi AT, Camur D, Güler C. Prevalence of orthorexia nervosa in resident medical doctors in the faculty of medicine (Ankara, Turkey). *Appetite*. 2007 Nov;49(3):661-6. doi: 10.1016/j.appet.2007.04.007. Epub 2007 May 13. PMID: 17586085.

14. Hafstad SM, Bauer J, Harris A, Pallesen S. The prevalence of orthorexia in exercising populations: a systematic review and meta-analysis. *J Eat Disord.* 2023 Feb 6;11(1):15. doi: 10.1186/s40337-023-00739-6. PMID: 36747235; PMCID: PMC9903632.
15. Depa J, Schweizer J, Bekers SK, Hilzendegen C, Stroebele-Benschop N. Prevalence and predictors of orthorexia nervosa among German students using the 21-item-DOS. *Eat Weight Disord.* 2017 Mar;22(1):193-199. doi: 10.1007/s40519-016-0334-0. Epub 2016 Oct 19. PMID: 27761853.
16. <https://www.healthline.com/health-news/orthorexia-the-new-eating-disorder-youve-never-heard-of-022415#Meet-Orthorexia,-the-Newest-Eating-Disorder>
17. Turner PG, Lefevre CE. Instagram use is linked to increased symptoms of orthorexia nervosa. *Eat Weight Disord.* 2017 Jun;22(2):277-284. doi: 10.1007/s40519-017-0364-2
18. Greville-Harris M, Smithson J, Karl A. What are people's experiences of orthorexia nervosa? A qualitative study of online blogs. *Eat Weight Disord.* 2020 Dec;25(6):1693-1702. doi: 10.1007/s40519-019-00809-2. Epub 2019 Nov 13. PMID: 31721111; PMCID: PMC7581603.
19. Gkiouleka M, Stavraki C, Sergentanis TN, Vassilakou T. Orthorexia Nervosa in Adolescents and Young Adults: A Literature Review. *Children (Basel).* 2022 Mar 4;9(3):365. doi: 10.3390/children9030365. PMID: 35327737; PMCID: PMC8947656.
20. Awad E, Salameh P, Sacre H, Malaeb D, Hallit S, Obeid S. Association between impulsivity and orthorexia nervosa / healthy orthorexia: any mediating effect of depression, anxiety, and stress? *BMC Psychiatry.* 2021 Dec 3;21(1):604. doi: 10.1186/s12888-021-03594-4. PMID: 34861836; PMCID: PMC8640965.
21. Barlow IU, Lee E, Saling L. Orthorexia nervosa versus healthy orthorexia: Anxiety, perfectionism, and mindfulness as risk and preventative factors of distress. *Eur Eat Disord Rev.* 2024;32(1):130-147. doi: 10.1002/erv.3032.
22. Godefroy V, Trinchera L, Dorard G. Optimizing the empirical assessment of orthorexia nervosa through EHQ and clarifying its relationship with BMI. *Eat Weight Disord.* 2021;26:649-659. doi: 10.1007/s40519-020-00909-4.

AUTHOR(S) CONTRIBUTION/UNDERTAKING FORM

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2	Saira Azhar	Rawalpindi Medical University	Study design, data collection, final approval and accountability of the manuscript.
3	Momina Rafique	Rawalpindi Medical University	Study design, data collection, final approval and accountability of the manuscript.
4	Manaam Omar	Rawalpindi Medical University	Study design, data collection, final approval and accountability of the manuscript.
5	Sidra Hamid	Department of Physiology, Rawalpindi Medical University	Study design, final approval and accountability of the manuscript.