

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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ABSTRACT

OBJECTIVE

To assess the presence of Orthorexia Nervosa among students of 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 result from the attempt to control weight but are independent of dissatisfaction about one's appearance or uncontrolled consumption, and it also suggested 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 papers have introduced certain clinical characteristics of this disorder.⁵

Research linked Orthorexia Nervosa (ON) to several factors, including perfectionism, obsessive-compulsive behaviour, 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 explored 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 theorised that anxiety is inversely related to ON, while eating attitudes have a positive connection with ON. The findings of this study may guide 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 OpenEpi 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 standardised 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 analysed. 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 It comprises 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

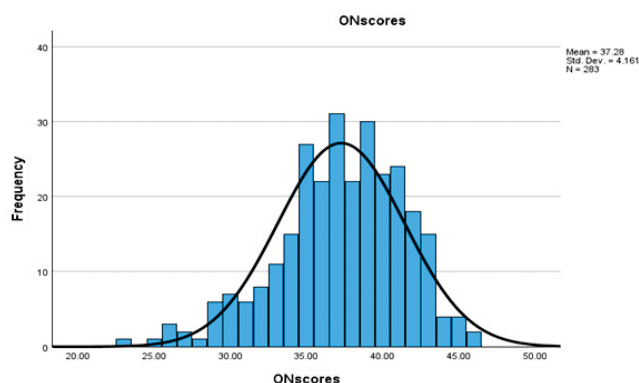
There were 283 participants, out of which 177 (57.7%) were females and 106 (34.5%) were males. The mean in age was 20.12 ± 1.5 years. Body mass index was 22.85 ± 3.6 kg/m² in males, while 19.82 ± 3.7 kg/m² in females. According to BMI, 80 (26.1%) were underweight, 170 (55.4%) were healthy weight, 24 (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 Attitudes 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 revealed 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 confirmed non-normality with p-values less than 0.001 (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 did 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-wilk		
	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 ($p < 0.05$), which indicated 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
Mean Scores of the ORTO-15, the Hamilton Anxiety Rating Scale, and the Eating Attitudes Test 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

A 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 suggested that anxiety and eating attitudes were consistent across different levels of ON severity, as quantified by the ORTO-15 scale (Table 3).

Table 3
Mean Scores of the Hamilton Anxiety Rating Scale and the Eating Attitudes Test 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

The Spearman's Rank Correlation test was used 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's Rank Correlation Test Between Individual Factors and Orthorexia Nervosa (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 research has been conducted to investigate the occurrence of Orthorexia Nervosa (ON) among various groups in recent times, and revealed wide variations. Previous studies 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 were higher socio-economically and more educated, like medical professionals and college students, were viewed to be more prone to developing ON based on the literature.¹⁴⁻¹⁵

There are past studies where the health professionals' involvement had helped gain an understanding of surveying how Orthorexia Nervosa (ON) developed and who ordinarily develops it. It has been concluded that it is a resultant of the persistent interaction of natural, mental, and social elements.¹⁶ Compulsiveness, psychopathology, disordered 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 literature showed that gender had no relationship to ON tendencies, but other research indicated that women were 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's rank correlation and Mann-Whitney U test in this study supported the null hypothesis. Thus, showed that anxiety was not an aetiological factor in ON. Young adults, particularly student-athletes, may believe that thinness enhanced performance, which made 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 did not significantly influence the risk of developing ON.

Research by Godefroy et al suggested that Body Mass Index (BMI) was not directly linked to Orthorexia Nervosa (ON), while higher BMI may contribute to orthorexic behaviour when combined with disordered eating and obsessive-compulsive traits. Therefore, studies found no strong correlation between Orthorexia Nervosa 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.

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CONFLICT OF INTEREST

The authors declare no conflict of interests.

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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.

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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.

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