

# Eating Disorders Amid Coronavirus Anxiety among University Students

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**Received date:** June 08, 2023, Manuscript No. IPJPBS-23-16945; **Editor assigned date:** June 12, 2023, PreQC No. IPJPBS-23-16945 (PQ); **Reviewed date:** June 27, 2023, QC No. IPJPBS-23-16945; **Revised date:** December 27, 2023, Manuscript No. IPJPBS-23-16945 (R); **Published date:** January 03, 2024, DOI: 10.36648/IPJPBS.8.1.001

**Citation:** Asadabadi MHG, Aliakbari F (2024) Eating Disorders Amid Coronavirus Anxiety among University Students. J Psychol Brain Stud Vol:8 No:1

## Abstract

**Introduction:** Eating disorders are serious mental illnesses that are often influenced by a range of factors including low self-esteem, feelings of inadequacy and helplessness, social isolation, stress and anxiety. The COVID-19 pandemic has changed our lives and is associated with increasing rates of stress, anxiety and depression among university students. In this study, we aimed to explore the link between COVID-19 related anxiety and eating disorders in an Iranian university.

**Materials:** We conducted a cross sectional study on 360 students recruited by convenience sampling from the Shahrekord university of medical sciences, Shahrekord, Iran. Data were collected through a three part online questionnaire consisted of demographic items, Eating Disorder Diagnostic Scale (EDDS) and Corona Disease Anxiety Scale (CDAS). We performed data analysis using version 26 of SPSS software and used *Chi-square* test to compare the categorical data.

**Results:** The largest numbers of participants was female, single, aged 21-24 years, resided off campus, were in normal Body Mass Index (BMI) ranges, had a low to moderate family income and claimed that they have not experienced any changes in their monthly family income over the past 6 months. Furthermore, most of them were in bachelor educational level. We noted that total CDAS score is significantly associated with BMI in the participants ( $P<0.001$ ) and there was a strong association between age ( $P=0.011$ ), BMI ( $P<0.001$ ), COVID-19 related anxiety ( $P<0.001$ ) and EDDS diagnosis.

**Conclusion:** In this study, eating disorders were more prevalent among the students aged 21-24 years, who had higher levels of COVID-19 related anxiety and were in unhealthier BMI ranges. Accordingly, implementing educational interventions to deal with stress and anxiety in relation to COVID-19, promoting a healthy lifestyle and healthy eating habits in university students are recommended.

**Keywords:** Coronavirus anxiety; COVID-19; Eating disorders; University students

## Introduction

Eating disorders (e.g., anorexia nervosa, bulimia nervosa, binge eating disorder) are serious mental health conditions identified by abnormal eating behaviors [1]. Epidemiological studies have shown that eating disorders are more common in females and most often develop in adolescence and young adulthood [2-4]. Low self-esteem, feelings of inadequacy and helplessness, social isolation, stress and anxiety are among the most common potential contributing factors for developing eating disorders [5-8]. People may experience many historical events in their life time, such as rising and collapsing of superpowers, emerging of wars, proliferation of social media, leveling of artificial intelligence and widespread occurrence of an infectious disease over a wide geographic area (such as multiple continents or worldwide) which might have different impacts on their well-being and mental health. For instance, the COVID-19 pandemic that recently changed our lives is associated with a high prevalence of anxiety and depression and its impact on mental health is yet unknown in depth [9]. Previous studies have shown that the COVID-19 pandemic is linked to higher rates of depression, stress and anxiety among higher education students and effects their well-being [10,11]. In this study, we intended to look into the link between coronavirus anxiety and eating disorders in an Iranian university.

## Materials and Methods

### Design

We conducted a cross sectional survey with 360 students recruited by convenience sampling from the Shahrekord University of Medical Sciences, Shahrekord, Iran. Inclusion criteria included being (i) A university student (ii) Aged 18 years or older and (iii) Able to read and understand in Persian. Exclusion criteria was (iv) Students aged under 18.

### Data collection

The sample included 360 undergraduate, graduate, MBBS, BDS and PhD students at Shahrekord university of medical sciences. We collected data from January to April 2022 through a three part online questionnaire which was distributed using

Telegram, What's app, Instagram and other popular social media platforms among Iranian young adults and university students.

We included socio demographic items, like gender, age, education, income and location in the first part of the questionnaire. The second part was Eating Disorder Diagnostic Scale (EDDS) as a standardized 22 items self-report questionnaire. The response items consist of Likert, yes-no, frequency and open ended items to assess the presence of 3 eating disorders including anorexia nervosa, bulimia nervosa and binge eating disorder [12]. The scale is valid and has a good internal consistency ( $\alpha=0.89$ ). It was adapted by Stice, et al. in 2000 and translated to Persian and validated by Leila Khabir, et al., [13,14].

Corona Disease Anxiety Scale (CDAS) was in the third part of the questionnaire. The scale is internally consistent ( $\alpha=0.91$ ) and was designed and validated for measuring the prevalence of Coronavirus related anxiety in non-clinic Iranian population. It contains 18 items and 2 factors; the physical symptoms are measured by items 1-9 and the psychological symptoms are measured by items 10-18. The questionnaire is scored on a 4 point Likert type scale (never=0, sometimes=1, often=2 and always=3); hence the respondents minimum and maximum scores are between 0 and 54. In this scale, higher levels of anxiety are suggested by high scores [15].

### Statistical analyzes

No data were missing because answers in the online questionnaire were obligatory. We used IBM SPSS Statistics V26

to conduct the study's statistical analysis and estimated the cross-sectional associations between multiple independent variables, COVID-19 related anxiety and the risk of developing eating disorders. We summarized categorical data with frequency, count and percentage and used *Chi-square* for comparison. A p value below 0.05 was considered to be significant.

## Results

Table 1 presents our participants' general characteristics and socio demographic data. Most of the participants were female (n=203, 56.4%), single (n=311, 86.4%) and aged 21-24 years (n=149, 41.5%). We calculated each participant's Body Mass Index (BMI) based on the data we had gathered about their weights and heights in the EDDS questionnaire earlier and noted that the majority of our participants had normal Body Mass Index (BMI) (n=241, 66.9%). Also, most of them were in bachelor educational level (132, 36.7%), had a monthly family income of 100000000 to 200000000 Iranian Rials (n=242, 67.2%) and claimed that they have not had any changes in their monthly family income over the past 6 months (n=290, 80.6%), followed by the ones who claimed they have experienced a decrease in their monthly family income over the past 6 months (n=45, 12.5%). Furthermore, most of the participants were living off campus (n=199, 55.3%).

**Table 1:** General characteristics of study sample.

Overall n (%) Mean $\pm$ SD	
n (%)	360
<b>Gender</b>	
Female	203 (56.4%)
Male	157 (43.6%)
<b>Marital status</b>	
Single	310 (86.1%)
Married/ in a relationship	47 (13.1%)
Divorced	3 (0.8%)
<b>Age (in years)</b>	
18-21	78 (21.7%)
21-24	149 (41.5%)
24-27	84 (23.3%)
Older than 27	49 (13.6%)
<b>BMI (kg/m<sup>2</sup>)</b>	23.6 $\pm$ 5.0

<b>BMI categories</b>	
Obese	14 (3.9%)
Overweight	71 (19.7%)
Normal	241 (66.9%)
Under weight	34 (9.4%)
<b>Socio demographic</b>	
<b>Educational levels</b>	
Associates	14 (3.9%)
Bachelors	132 (36.7%)
Masters	43 (11.9%)
MBBS	128 (35.6%)
BDS	25 (6.9%)
PhD	18 (5.0%)
<b>Family monthly income</b>	
Less than 50,000,000 Iranian Rials	26 (7.2%)
50,000,000-10,000,000 Iranian Rials	54 (15.0%)
10,000,000-20,000,000 Iranian Rials	242 (67.2%)
>20,000,000 Iranian Rials	38 (10.6%)
<b>Change in family monthly income over the past 6 months</b>	
Yes, Decreased	45 (12.5%)
No	290 (80.6%)
Yes, Increased	25 (6.9%)
<b>Area of residency</b>	
Living on campus/in dorms	161 (44.7%)
Living off campus	199 (55.3%)

Table 2 demonstrates the total scores of Corona Disease Anxiety Scale (CDAS) of our study's participants by several factors. We realized that total CDAS score is significantly associated with BMI in the participants ( $P=0.000$ ). Most of the participants with normal BMI showed lower than average scores in the CDAS questionnaires ( $n=204$ , 56.7%) while, a significant

number of the participants who were either under-weight ( $n=12$ , 3.3%) or over weight ( $n=18$ , 5.0%) had higher than average scores. Also, among those who had obesity, the majority had higher than average scores ( $n=8$ , 2.2%).

**Table 2:** Total CDAS score by multiple factors.

Factors	Total CDAS score		P-value
	Lower than average score	Higher than average score	
Gender			
Male	121 (33.6%)	36 (10.0%)	0.389
Female	164 (45.6%)	164 (45.6%)	
Marital status			
Single	246 (68.3%)	64 (17.8%)	0.862
Married/in a relationship	37 (10.3%)	10 (2.8%)	
Divorced	2 (0.6%)	1 (0.3%)	
Age			
18-21	63 (17.4%)	15 (4.2%)	0.717
21-24	121 (33.6%)	28 (7.8%)	
24-27	59 (17.2%)	22 (6.0%)	
27 and older	39 (10.4%)	22 (6.0%)	
BMI			
Under weight	22 (6.1%)	12 (3.3%)	0.000*
Normal	204 (56.7%)	37 (10.3%)	
Over weight	53 (14.7%)	18 (5.0%)	
Obese	6 (1.7%)	8 (2.2%)	
Educational levels			
Associates	11 (3.1%)	3 (0.8%)	0.621
Bachelors	109 (30.3%)	23 (6.4%)	
Masters	34 (9.4%)	23 (6.4%)	
MBBS	98 (28.2%)	30 (8.3%)	
BDS	21 (5.8%)	4 (1.1%)	
PhD	12 (3.3%)	4 (1.1%)	
Family monthly income			
Less than 50,000,000 Iranian Rials	20 (5.6%)	6 (1.7%)	0.542
50,000,000-10,000,000 Iranian Rials	39 (10.8%)	15 (4.2%)	
10,000,000-20,000,000 Iranian Rials	196 (54.4%)	15 (4.2%)	

>20,000,000 Iranian Rials	30 (8.3%)	8 (2.2%)	
Change in family monthly income over the past 6 months			
Yes, Decreased	34 (9.7%)	229 (63.6%)	0.813
No	229 (63.6%)	229 (63.6%)	
Yes, Increased	21 (5.8%)	4 (1.1%)	
Area of residency			
Living on campus/in dorms	129 (35.8%)	32 (8.9%)	0.687
Living off campus	Living off campus	43 (11.9)	

Table 3 shows EDDS diagnosis by various factors including COVID-19 related anxiety, measured by Corona Disease Anxiety Scale (CDAS). We noted a strong association between age ( $P=0.011$ ), BMI ( $P=0.000$ ), COVID-19 related anxiety ( $P=0.000$ ) and EDDS diagnosis. A higher rate of the participants aged 21 to 24 years old were diagnosed with some types of eating disorders compared to the other age groups in the study (anorexia nervosa:  $n=8$  (2.3%), bulimia nervosa:  $n=2$  (0.6%), binge eating disorder:  $n=10$  (2.8%), sub threshold AN:  $n=1$  (0.3%), sub threshold BN:  $n=2$  (0.6%), sub threshold BED:  $n=1$  (0.3%)). Not only most of the participants with normal BMI had lower than average scores in CDAS ( $n=204$ , 56.7%) but also, they were not diagnosed with any type of eating disorders ( $n=213$ , 59.2%). Anorexia Nervosa

was more common among the under-weight participants ( $n=8$ , 2.2%) and binge eating disorder was more common among the over-weight participants ( $n=7$ , 1.9%) and the obese ones ( $n=6$ , 1.7%). Regarding COVID related anxiety, of those diagnosed with some types of eating disorders, most had higher than average scores in CDAS and as a result, higher COVID-19 related anxiety (anorexia nervosa:  $n=15$  (4.2%), bulimia nervosa:  $n=3$  (0.8%), binge eating disorder:  $n=11$  (3.1%), sub threshold AN:  $n=1$  (0.3%), sub threshold BED:  $n=3$  (0.8%). Based on the presented data, anorexia nervosa was the most common eating disorder among the participants ( $n=22$ , 6.1%), followed by binge eating disorder ( $n=19$ , 5.3%) and bulimia nervosa ( $n=7$ , 1.9%).

**Table 3:** EDDS diagnosis by multiple factors.

Factors	EDDS diagnosis							P-value
	No diagnosis	Anorexia nervosa	Bulimia nervosa	Binge nating disorder	Subthreshold AN	Subthreshold BN	Subthreshold BED	
Gender								
Male	132 (36.7 %)	8 (2.2%)	4 (1.1%)	7 (1.9%)	2 (0.6%)	2 (0.6%)	2 (0.6%)	0.848
Female	169 (46.9%)	14 (3.9%)	3 (0.8 %)	12 (3.3%)	1 (0.3%)	1 (0.3%)	3 (0.8%)	
Marital status								
Single	262 (72.8%)	18 (5.0%)	4 (1.1 %)	16 (4.4%)	3 (0.8%)	3 (0.8%)	4 (1.1%)	0.427
Married/in a relationship	37 (10.3 %)	4 (1.1%)	3 (0.8 %)	2 (0.6%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
Divorced	2 (0.6%)	0 (0.0%)	0 (0.0 %)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Age								
18-21	64 (17.7%)	5 (1.4%)	2 (0.6 %)	2 (0.6%)	2 (0.6%)	1 (0.3%)	2 (0.6%)	0.011*
21-24	125 (34.7%)	8 (2.3%)	2 (0.6 %)	10 (2.8%)	1 (0.3%)	2 (0.6%)	1 (0.3%)	

24-27	69 (19.1%)	6 (1.7%)	2 (0.6 %)	6 (1.7%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
27 and older	43 (11.8%)	3 (0.9%)	1 (0.3 %)	1 (0.3%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
BMI								
Under weight	25 (6.9%)	8 (2.2%)	0 (0.0 %)	0 (0.0%)	0 (0.0%)	1 (0.3%)	0 (0.0%)	0.000 *
Normal	213 (59.2%)	11 (3.1%)	2 (0.6 %)	6 (1.7%)	3 (0.8%)	2 (0.6%)	4 (1.1%)	
Over weight	56 (15.6%)	3 (0.8% )	4 (1.1 %)	7 (1.9%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
Obese	7 (1.9%)	0 (0.0 %)	1 (0.3 %)	6 (1.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Educational levels								
Associates	12 (3.3%)	0 (0.0%)	2 (0.6 %)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.084
Bachelors	114 (31.7%)	4 (1.1%)	0 (0.0 %)	6 (4.5%)	2 (0.6%)	3 (0.8%)	3 (0.8%)	
Masters	37 (10.3%)	2 (0.6%)	0 (0.0 %)	3 (0.8%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
MBBS	106 (29.4%)	11 (3.1%)	3 (0.8 %)	7 (1.9%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	
BDS	19 (5.3%)	2 (0.6%)	1 (0.3 %)	3 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
PhD	13 (3.6%)	3 (0.8%)	1 (0.3 %)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
Family monthly income								
Less than 50,000,000 Iranian Rials	19 (5.3 %)	2 (0.6%)	1 (0.3 %)	2 (0.6%)	0 (0.0%)	1 (0.3%)	1 (0.3%)	0.907
50,000,000-10,000,000 Iranian Rials	46 (12.8 %)	5 (1.4 %)	0 (0.0 %)	2 (0.6%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	
10,000,000-20,000,000 Iranian Rials	203 (56.4 %)	13 (3.6 %)	5 (1.4 %)	13 (3.6%)	3 (0.8%)	2 (0.6%)	3 (0.8%)	
>20,000,000 Iranian Rials	33 (9.2 %)	2 (0.6 %)	1 (0.3 %)	2 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Change in family monthly income over the past 6 months								
Yes, Decreased	36 (10.0 %)	5 (1.4 %)	2 (0.6 %)	2 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.815
No	243 (67.5 %)	16 (4.4 %)	4 (1.1 %)	16 (4.4%)	3 (0.8%)	3 (0.8%)	5 (1.4%)	
Yes, Increased	22 (6.1 %)	3 (0.8 %)	3 (0.8 %)	3 (0.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Area of residency								
Living on campus/in dorms	133 (36.9 %)	11 (3.1 %)	4 (1.1 %)	10 (2.8%)	1 (0.3%)	0 (0.0%)	2 (0.6%)	0.7

Living off campus	168 (46.7 %)	11 (3.1 %)	3 (0.8 %)	9 (2.5%)	2 (0.6%)	3 (0.8%)	3 (0.8%)	
<b>COVID-19 related anxiety</b>								
Lower than average scores	259 (71.9 %)	7 (1.9 %)	4 (1.1 %)	8 (2.2%)	2 (0.6%)	3 (0.8%)	2 (0.6%)	0.000*
Higher than average scores	42 (11.7 %)	15 (4.2 %)	3 (0.8 %)	11 (3.1%)	1 (0.3%)	0 (0.0%)	3 (0.8%)	

## Discussion

Perhaps, this is the first study on Iranian university students that focuses on the link between COVID-19 related anxiety and eating disorders. Previous studies have demonstrated that the prevalence of psychiatric disorders and the COVID-19 pandemic among university students and other population groups are related [16]. Our study indicates some of the long term impacts of the COVID-19 pandemic on mental health and dietary habits among the university students, almost two years after the coronavirus upended life in Iran. It is potentially able to accentuate the university management boards, clinicians and caregivers and raise awareness as a key component of a comprehensive global strategy to prevent such impacts from the future pandemics on mental health, quality of life and consequently academic performance among university students [17,18]. In this study, we noted a significant volume of the participants with eating disorders and Anorexia Nervosa was the most prevalent eating disorder among them. Moreover, multiple factors such as age, BMI and COVID-19 related anxiety were found strongly connected to a risk of eating disorder. Sever anxiety was also significantly associated with alarming BMI ranges. Regarding age, most of the participants at risk of developing eating disorders were aged 21 to 24 years old. One explanation is that eating disorders are more common among younger generations. As in our study, studies have shown that eating disorders have a higher prevalence among younger people [19,20]. Regarding BMI and weight status among the participants, our results revealed that the participants in unhealthier BMI ranges were at higher risk of developing eating disorders and the prevalence of COVID-19 related anxiety was substantially higher in those BMI ranges. Hacı Omer Yilmaz and Tuba Eda Arpa Zemzemoglu found that there's a relationship between BMI and eating disorder risk and intuitive eating among young adults. Ramona S. DeJesu, et al. found that anxiety diagnosis is more prevalent among underweight and obese individuals compared to normal weight individuals. We can explain this by the fact that psychiatry disorders during the time of crisis could lead to unhealthy dietary patterns, higher amounts of sedentary behaviors and possibly not getting enough physical activity or distorted body image and lower self-esteem. Regarding COVID-19 related anxiety, eating disorders often develop when someone can't cope to exceed life challenges and anxiety is a common problem during this time. Also, stress and anxiety are notably connected with appetite. Chang won Son, et

al. found that the COVID-19 pandemic negatively impacted the mental health of college students. In a similar study, Wenjun Cao, et al., found that economic effects, effects on daily life and delays in academic activities during the COVID-19 pandemic were linked with the level of anxiety and the mental health of college students. In another study, Paula Odriozola-Gonzalez, et al., found that the mental health of university students has been impacted during the COVID-19 pandemic. Our results are consistent with these findings. However, we didn't find any statistically significant correlation between economic effects and COVID-19 related anxiety or eating disorders.

A limitation of this study is that we have provided evidence regarding eating disorders in relation to worries and stress amid COVID-19 pandemic in an Iranian medical university and our results are not representative of university students across Iran. Moreover, we used self-reported data to investigate health behaviors and calculate BMI which may cause some concerns as there might be shifts in understanding how active and healthy individuals are or how body weight is perceived by them. Another limitation of this study is that we used convenience sampling method to recruit our study's participants and voluntary participations could have led to selection bias as we had more females in our sample.

## Conclusion

We aimed to investigate the link between anxiety related to COVID-19 and eating disorders in an Iranian university when the end of COVID-19 pandemic was in sight but risks persisted. The findings of our study showed higher levels of COVID-19 related anxiety among the students who had eating disorders and were in unhealthier BMI ranges. Furthermore, we noted that eating disorders are more prevalent in the students aged 21-24 years old. Considering the importance of COVID-19 anxiety in students and its role in unhealthy eating behaviors and developing eating disorders, we recommend implementing educational interventions to help prevent mental or physical health problems regarding stress and anxiety in relation to COVID-19, promoting a healthy lifestyle and healthy eating habits in students.

## Research Activities

- Supportive care
- Family caregiver



- Family centered care
- Nursing
- Education

## Ethics Statement

The research ethics committees of Shahrekord University of Medical Sciences approved this study (IR.SKUMS.REC.1400.212) and all participants provided written informed consent in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

## Authors Contributions

All authors contributed equally to the study.

## Funding

This study received a grant from the vice chancellor of research and technology in Shahrekord University of medical sciences. There has been no significant financial support for this work that could influence its outcome.

## Acknowledgements

We would like to thank Carley Wright, The University of Queensland, for her help in editing the manuscript.

## Conflict of Interests

The authors declare no conflict of interest.

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