



# Analysis of Correlation between Nutritional Behavior, Lifestyle and Symptoms of Depression, Anxiety among Students

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## Abstract

**Background:** Students making the transition from high school to university find it difficult to maintain good eating routines/lifestyles and mental health, due to time constraints and stress. The goal of the study was to analyse the correlation between previously mentioned topics.

**Methods:** We included 948 students, aged 18-27, at the Faculty of Medical Sciences in Serbia and the research was conducted in 2020. Chi-square was used for statistical analysis. Modified WHO questionnaire for lifestyle and eating habits was used, as well as standardized questionnaires for anxiety and depression.

**Results:** Respondents who had more prominent symptoms of depression (moderate or severe) and anxiety had a significantly higher percentage of eating less than three meals a day (47.7%, 35.7%), skipped breakfast (38.6%, 33.5%), consumed alcohol (11.4%, 3.8%), used energy drinks (38.6%, 31.7%), were on some type of diet (36.6%, 30.2%), were not satisfied with their appearance (66.7%, 53%) and not engaging in physical activity (43.2%, 33.1%). Significant predictors for severe depressive and anxiety symptoms were the consumption of alcoholic beverages, energy drinks, satisfaction with personal appearance and physical activity during a day.

**Conclusion:** The results suggest that some of the eating and lifestyle habits were linked to higher risks of developing depressive or anxiety symptoms.

**Keywords:** Eating habits; Lifestyle; Physical activity; Anxiety; Depression



## Introduction

All across the world, medical schools strive to develop qualified and compassionate doctors who can treat patients, benefit public health and improve medical knowledge. The commitment required of medical students to spend studying is significant, therefore stress has a severe impact on the psychological health of the students and can lead to depression and anxiety. Despite being as prevalent and potentially as incapacitating as depression, anxiety is frequently left undiagnosed and untreated (1). There is a significant global prevalence of anxiety and depressive symptoms among college students - 33.6% and 39.0%, respectively (2). A study amongst college students in China confirmed similar results, where 27.3% and 33.4% had mild to very severe symptoms of depression and anxiety (3). On the other hand, research from Bangladesh found that over 40% of students experienced extremely severe anxiety symptoms and over half of the students had mild and slightly over 7% of the students' severe depressive symptoms (4).

Numerous analyses of behaviour that have examined different eating behaviours have attempted to explain the connection between diet and mental illnesses in recent years. Results found in a cross-sectional study in Mexico showed that inadequate eating habits are associated with the occurrence of depressive symptoms (5). In addition, the prevalence of obesity and overweight among medical students was strongly correlated with certain dietary habits, such as low intake of fruits and vegetables, skipping breakfast or frequent fast-food consumption (6). The benefits of living a healthy lifestyle for one's wellbeing are widely acknowledged. A healthy lifestyle is defined by the WHO as eating healthy to avoid weight gain, consistent physical activity, limiting alcohol intake and quitting smoking (7). Due to a lot of obligations, healthy eating can be a major challenge for students (8).

A Pakistani study among medical students showed that those who were physically inactive had higher prevalence of depressive symptoms (9). Consistent physical activity has well-

established positive effects on health and has been shown to be successful in reducing the majority of chronic diseases (10). Furthermore, a study among Spanish university students, who partake in physical activity display better educational achievements (11). The WHO and American College of Sports Medicine (ACSM) currently recommend: "Limiting sedentary behaviour during the day and also suggest 150 min of moderate-intensity aerobic physical activity or 75 min of vigorous-intensity aerobic physical activity or an equivalent combination per week" (10).

Since eating patterns have been shown to persist over time, it is crucial for both physical and mental health to create appropriate eating habits while still in school (12). To have a beneficial effect and improve educational achievement, it is necessary to change the dietary patterns that stress has altered (13).

Considering that lifestyle, including eating habits and physical activity, was altered throughout the years, the purpose of this study was to evaluate anxiety and depressive symptoms related to these factors among medical students in Kragujevac, Serbia. Thereby it is necessary to determine and modify all possible causes that have the possibility of endangering the mental health of students.

## Material and Methods

### *Study Procedure and Participants*

In this cross-sectional study, 948 students (78% females and 22% males), aged 18-27, participated in the study. The study included students at the Faculty of Medical Sciences, University of Kragujevac, Serbia conducted in January of the 2020 until March of 2020. Questionnaires were handed out after the regular classes/lectures, with prior approval of the board of Faculty of Medical Sciences, University of Kragujevac. The questionnaires were in a paper form and students gave their consent to take part in an anonymous survey.

### ***Socio-Demographic Data***

There were several components to the questions: basic information – gender, age; anthropometric information - weight, height; information about eating/drinking habits; information about satisfaction with physical appearance and duration of physical activity.

### ***Symptoms of Depression***

To identify factors, the Beck Depression Inventory (BDI), self-assessment questionnaire with in-depth questions was used. The BDI-II scale was used to assess symptoms of depression. This scale consists of 21 questions, where each one receives a score between 0-3. It was intended to record a range of depression symptoms the person has encountered throughout the previous week. The rating scale was as follows: 0 to 13 - no/minimal symptoms; 14 to 19 - mild depressive symptoms; 20 to 28 - moderate depressive symptoms; 29 to 63 - severe depressive symptoms (14).

### ***Symptoms of Anxiety***

The Zung Self-Rating Anxiety Scale (SAS) is a 20-item self-report assessment tool designed to quantify anxiety levels. In response to the claims, a person should answer how much each one applies to them in the one to two weeks leading up to the test. Each query is graded from 0 to 4 using a Likert-type scale (based on these replies: "a little of the time", "some of the time", "good part of the time", "most of the time"). A raw score of 36 was the proposed cut-off point in 1980, according to recent studies (15,16).

### ***Statistical analysis***

Statistical analysis was performed using a commercial, standard software package SPSS, version 19.0 (IBM Corp., Armonk, NY, USA). Chi-square was used to determine the relationship between categorical data. The relationship between dependent variables and a series of independent variables was examined by univariate logistic regression. The risk was assessed using

the OR (odds ratio) size, with a 95% confidence interval.

## **Results**

In the current study, 948 students (78% females and 22% males), aged from 18-27 participated in the study.

The frequency of different levels of depressive and anxiety symptoms of the respondents is presented in Table 1 and 2, where 28.9% exhibit symptoms (mild, moderate or severe) of depression and almost half of the participants show symptoms of anxiety (42.3%).

Respondents who had more prominent symptoms of depression (moderate or severe) (Table 1) had a higher percentage of eating less than three meals a day (47.7%), skipped breakfast (38.6%), consumed alcohol on a daily basis (11.4%), used energy drinks (38.6%), were on some type of diet (36.6%), were not satisfied with their appearance (66.7%) and did not have any physical activity during a day (43.2%).

In the research, students who showed symptoms of anxiety (Table 2) had a significantly higher percentage of consuming less than three meals a day (35.7%), most often skipped breakfast (33.5%), were on some type of diet (30.2%), were not satisfied with their appearance (53.0%) and did not have any physical activity during a day (33.1%).

In the univariate regression model, significant predictors for severe depressive symptoms were the consumption of alcoholic beverages, number of meals per day, usage of energy drinks, satisfaction with personal appearance and physical activity during a day. In the univariate regression model the skipping meals, consumption of alcoholic beverages, usage of energy drinks, being on a diet, satisfaction with personal looks and physical activity during a day were singled out as significant predictors for severe anxiety symptoms (Table 3).

**Table 1:** Symptoms of depression associated with dietary patterns, BMI and physical activity

Variables	0-13 No/mini- mal symp- toms	14 to 19 Mild depres- sive symp- toms	20 to 28 Moderate de- pressive symp- toms	29 to 63 Severe depres- sive symptoms	P**
BDI-II	71.1	14.2	8.6	4.6	<0.001
Meals per day					
<3	25.0	34.1	39.0	47.7	0.016
3	34.3	22.7	29.3	25.0	
4	27.2	31.8	22.0	22.7	
5	12.6	10.6	9.8	4.5	
>5	0.9	0.8	0.0	0.0	
Consumption of fruit					
Every day	36.0	34.3	32.1	43.2	0.670
2,3 times a week	59.6	61.9	60.5	50.0	
Never	4.3	3.7	7.4	6.8	
Skipping meals					
Breakfast	30.1	37.3	39.0	38.6	0.005
Lunch	10.4	9.7	19.5	22.7	
Dinner	19.1	20.1	13.4	13.6	
Not skipping meals	38.1	29.1	23.2	20.5	
Skipping more than 1 meal	2.2	3.7	4.9	4.5	
Consumption of alcoholic beverages					
Every day	2.8	2.3	2.5	11.4	0.010
Few times a week	50.4	61.7	56.8	52.3	
No	46.7	36.1	40.7	36.4	
Usage of energy drinks					
Every day	3.0	4.5	8.5	0.0	0.019
Few times a week	23.7	30.1	25.6	38.6	
No	73.3	65.4	65.9	61.4	
Being on a diet					
Yes	21.6	26.9	36.6	34.1	0.007
No	78.4	73.1	63.4	65.9	
Satisfaction with personal looks					
Yes	61.4	44.8	33.3	40.9	<0.001
No	38.6	55.2	66.7	59.1	
Physical activity during a day					
>3h	4.6	2.2	3.7	4.5	0.005
1h to 3h	33.9	21.6	25.6	18.2	
<1h	23.1	20.9	17.1	27.3	
<30 min.	13.4	20.1	15.9	6.8	
Don't have it	24.9	35.1	37.8	43.2	

\*\* Chi-Square Test

**Table 2:** Symptoms of anxiety associated with dietary patterns, BMI and physical activity

Variables	≤36	>36	P**
SAS	52.0	42.3	<0.001
Meals per day			
<3	23.1	35.7	<0.001
3	35.7	25.6	
4	27.8	27.3	
5	12.7	10.6	
>5	0.8	0.8	
Consumption of fruit			
Every day	37.3	34.0	0.354
Few times a week	58.9	60.5	
No	3.9	5.5	
Skipping meals			
Breakfast	30.6	33.5	<0.001
Lunch	9.9	14.2	
Dinner	17.2	20.0	
Not skipping meals	40.8	27.5	
Skipping more than 1 meal	1.4	4.8	
Consumption of alcoholic beverages			
Every day	2.7	3.8	0.067
Few times a week	50.0	56.4	
No	47.3	39.8	
Usage of energy drinks			
Every day	2.2	4.8	0.07
Few times a week	24.6	26.9	
No	73.1	68.3	
Being on a diet			
Yes	20.5	30.2	<0.001
No	79.5	69.8	
Satisfaction with personal looks			
Yes	61.7	47.0	<0.001
No	38.3	53.0	
Physical activity during a day			
>3	4.3	3.8	<0.001
1 to 3	36.3	23.6	
<1	22.7	22.8	
<30 min	11.8	16.8	
Don't have it	24.9	33.1	

\*\* Chi-Square Test

**Table 3:** Univariate regression analysis of the relationship between physical activity, eating behavior and mental health of students in Serbia

Variables	Severe depressive symptoms			Severe anxiety (>36)	
		OR (95% CI)	P	OR (95% CI)	P
Meals per day	<3	1.143 (0.523–1.763)	<0.001	1.664 (0.365–4.586)	0.511
	3	0.506 (0.122–1.135)	0.114	0.770 (0.169–3.507)	0.735
	4	0.450 (0.190–0.831)	0.463	1.059 (0.232–4.832)	0.941
	5	0.343 (0.286–0.915)	0.373	0.903 (0.192–4.244)	0.897
	>5	1		1	
Consumption Of fruit	Every day	0.762 (0.213–2.733)	0.677	0.637 (0.332–1.224)	0.176
	2,3 times a week	0.533 (0.151–1.886)	0.329	0.717 (0.379–1.356)	0.307
	Never	1		1	
Skipping meals	Breakfast	0.628 (0.1322.978)	0.558	0.327 (0.133–0.802)	0.015
	Lunch	1.071 (0.213–3.400)	0.933	0.429 (0.166–1.105)	0.079
	Dinner	0.349 (0.065–1.885)	0.221	0.347 (0.138–0.869)	0.024
	Not skipping meals	0.263 (0.052–1.325)	0.105	0.202 (0.082–0.495)	<0.001
	Skipping more than 1 meal	1		1	
Consumption of alcoholic beverages	Every day	2.132 (1.698–5.506)	0.004	1.687 (0.781–3.643)	0.183
	Few times a week	1.331 (0.690–2.556)	0.393	1.342 (1.023–1.761)	0.034
	No	1		1	
Usage of energy Drinks	Every day	2.903 (0.705–4.345)	<0.001	2.280 (1.067–4.870)	0.033
	Few times a week	1.948 (1.035–3.668)	0.039	1.167 (0.861–1.582)	0.319
	No	1		1	
Being on a diet	Yes	1.877 (0.980–3.597)	0.058	1.679 (1.234–2.283)	0.001
	No	1		1	
Satisfaction with personal looks	Yes	0.435 (0.234–0.810)	0.009	0.550 (0.421–0.719)	<0.001
	No	1		1	
Physical activity during a day	>3h	0.567 (0.126–2.558)	0.461	0.660 (0.326–1.339)	0.250
	1h to 3h	0.310 (0.132–0.725)	0.007	0.488 (0.344–0.693)	<0.001
	<1h	0.680 (0.320–1.448)	0.318	0.758 (0.523–1.098)	0.142
	<30 min	0.293 (0.084–1.017)	0.053	1.068 (0.695–1.640)	0.765
	Don't have it	1		1	

## Discussion

We analysed the correlation between eating habits/physical activity and gender, as well as students' mental health. Considering the sedentary

lifestyle and inadequate eating habits among younger people, we were encouraged to investigate what correlation it can have with students and their mental health.

According to the current findings, depressive symptoms were prevalent in 27.9%, while anxiety symptoms were present in a higher percentage among medical students in our research (44.9%), in comparison to earlier findings from Mongolian university students (depressive and anxiety symptoms in percentage: 24.43% and 10.36%, respectively), while a study in Spain showed that symptoms of anxiety (23.6%) and depression (18.4%) were present in these particular percentages among university students (17). Examining our results, anxiety was present in male students in 28.8%, and in female students in a significantly higher percentage (49.3%), which is in agreement with research in Spain (male students - 14.5%, female students -27.4%), (18). Additionally, we deduced that in the current study, depressive symptoms were once again more prevalent in female students (20.6%) than in male students (18.5%), in contrast to the previous study, which found the opposite (male students -19.3%, female students -18.1%).

Regarding eating patterns in the conducted study, there had been a recognisable distinction in responders who had used meat few times a week (49.2%), where female students (53.90%) consumed it in a much larger fraction than male students (32.50%). Results in a higher percentage were found in research carried out in Spain, where 80.9% of respondents reported they consumed meat *few times a week*. Additional findings regarding the intake of leguminous plants *few times a week* (80.2%) and daily intake of vegetables (50.8%), fruits (36%), and milk (47.1%) did not demonstrate a significant difference between genders in this research. Unlike the Spanish research, where the identical components revealed statistical difference (19). We concluded as well that the highest frequency of the high-calorie drinks (such as juices and soda drinks), fruit and meat intake was *few times a week* which is in agreement with research in An Extensive Population-Based Survey in China (3).

The European Society of Cardiology and American Heart Association have both reaffirmed a position on the use of fruits and vegetables in diet (20,21). Fruits and vegetables may provide

health benefits due to their high levels of micro-nutrients or a lower overall calorie intake. There is substantial evidence supporting the claim that the antioxidants, as well as flavonoids (22) and a range of phytochemicals (23), contained in high concentrations in fruits and vegetables (24), consequently have health advantages.

Results regarding physical inactivity observed in our research (where 28% of students did not have enough physical activity) were in correspondence with lack of physical activity recorded in 32.7% of Sudanese medical students (25).

Additionally, we were curious to learn whether and how daily diet and physical activity were connected to the level of anxiety and depression. From our research we concluded that lifestyle habits, such as unhealthy diet and physical inactivity could be of an incredible importance when it comes to managing depressive and anxiety symptoms. Similarly, a study by Paans NPG, Gibson-Smith D, Bot M, et al (26) identified that severity of depressive symptoms could be related to poorer dietary quality. Correspondingly, encouraging altering people's eating and physical activity habits may be extremely useful in decreasing depressive symptoms (27). In our research, female respondents with severe depressive and anxiety symptoms showed a higher level of dissatisfaction with their appearance, which is in correspondence with the fact that eating habits are also influenced by sociocultural factors - compared to eastern cultures, western societies are more likely to accept and promote thinner physique, especially in women (28,29).

Eating patterns have been shown to persist over time, that's why it is crucial for both physical and mental health during academic years to create appropriate eating habits. Due to their persistent failure to follow nutritional guidelines, students were regarded as a vulnerable category. Compared to the general population, students had stress, worse eating habits, and poorer dietary habits. According to studies, medical students engaged in less healthy habits and consume more harmful foods than non-medical students (12).

### Strengths and Limitations

The significance of our study is that it was focused on a large sample of students, who represent a very sensitive population, especially regarding their mental health, correlated with their lifestyle. Purposefully, we selected medical educational profile, expecting that students in the healthcare might be better suited to cope with modifying their eating habits to enhance their mental status. Lastly, having students self-report is the most cost-effective and reasonable way of collecting information for research. Certain limitations must be acknowledged. Firstly, using self-reported questionnaires, there could be reporting or recollection bias. Furthermore, the medical students had been recruited from a single university and the findings cannot be applied to the entire Serbian medical student population. In addition, because of the cross-sectional nature of this study, causal correlations could not be established.

### Conclusion

The study provided evidence of a strong correlation between dietary habits and mental health issues in a large sample of Serbian students. Some of the eating products and lifestyle habits were linked to higher risks of developing depressive or anxiety symptoms. Subsequently, these findings encourage implementation of health education programs and creating precise college programs with well-planned and funded resources.

### Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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### Conflicts of Interest

The authors declare that no conflicts of interest exist.

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