

# Impact of stress and anxiety on dietary habits and academic performance among pharmacy students

Zana Ibraimi<sup>1</sup>, Shpend Voca<sup>2</sup>, Nexhibe Nuhii<sup>3</sup>, Ardiana Murtezani<sup>4,5\*</sup>

<sup>1</sup>Department of Pharmacy, Faculty of Medicine, University of Prishtina, Prishtina, Kosova; <sup>2</sup>Faculty of Psychology, AAB College, Prishtina, Kosova; <sup>3</sup>Department of Pharmacy, Faculty of Medicine, State University of Tetovo, Tetovo, North Macedonia; <sup>4</sup>Department of Physical Medicine and Rehabilitation, Faculty of Medicine, University of Prishtina, Prishtina, Kosova; <sup>5</sup>Physical Medicine and Rehabilitation Clinic, University Clinical Center of Kosova, Prishtina Kosova

**Abstract.** *Background and aim:* Most students experience stress and anxiety during their studies. The rigorous academic schedule of coursework and exams, financial challenges, family problems, may increase the stress and anxiety even more, resulting in poor academic performance. The purpose of this study was to examine levels of stress and anxiety among students during the exam period and to analyze whether they consume more (or not) food under stress, the types of food they consume under stress, types of stressors and coping strategies, and also the impact of stress on academic performance. *Methods:* A cross-sectional study was conducted from June to July 2024, in a random sample of 165 undergraduate pharmacy students of the University of Prishtina. A self-administered questionnaire was employed with the sociodemographic data, anthropometric and medical data, items regarding their stress and anxiety level, and dietary habits under stress and anxiety. *Results:* About 83% of students were female and 17% were male. The mean age of students was 22 years. Most of them (61.8%) reported that they have entered more than 3 exams in the last month, 33% entered 1-3 exams, and 8 students did not enter any exam. The average grade of the students up to the time the questionnaire was administered was 8.14 (8.13 of female students and 8.18 of male students) in a scale from 5 (failure) to 10 (excellent). Sweets were among the most frequently consumed foods, followed by salty and fast food. *Conclusions:* Pharmacy students reported experiencing stress and anxiety during exam time at a moderate level than normal, and during this time they practiced unhealthy eating habits. There was a negative correlation between stress/anxiety and average grade and a positive correlation between stress/anxiety and sweets, salty foods, and fast food. Stress/anxiety were negatively correlated with body weight.

**Key words:** stress, anxiety, pharmacy students, dietary habits, academic performance, emotional eating, eating behavior, stress-induced eating, student health

## Introduction

In recent years, stress and anxiety among medical students has been studied widely due to its negative effect on mental and physical health. Most students experience stress and anxiety through their years of college, especially during the transition from adolescence to adulthood, and especially, if they live away from their families (1). The heavy academic load affects the

increase of stress and anxiety even more. It has been reported that pharmacy students seem to experience stress and anxiety more than students of other professions (2). Stress is defined as our body's non-specific response to pressure and can be classified into three types: physical, psychosocial and metabolic. Stress often arises when we encounter something new or when we feel that we're losing control over a situation. It has been observed that psychosocial stressors have more

impact on students loaded with the rigorous academic schedule of coursework and exams (3, 4). Other stressors for university students can relate to financial challenges, family problems, negative relationships, known as bad stress which is detrimental to body and often impedes performance (5, 6). In these situations, stress and anxiety have a negative effect on mental health of students, resulting in diminished quality of life, and poor academic performance (7). To overcome this situation, students very often undertake some coping strategies, which in many times may not be useful (8). They usually resort to unhealthy eating habits and maintain an improper lifestyle, including alcohol and tobacco use, difficulties with sleep and physical inactivity, which may increase the risk of many ill effects on the well-being of these students and can even be a significant factor in weight gain or weight loss (9, 10). Additionally, high levels of academic stress from exams and faculty obligations have not only been associated with changes in appetite, difficulty sleeping, and poorer academic performance, but have been observed to lead to chronic anxiety and depression (11, 12). Researchers have mentioned that stress reduces hunger, but increases external signals related to food and this affects people in general to eat more in stressful situations (12, 13). Besides the increased food consumption, stressed students also eat more snacks and foods rich in fat and sugar, which may lead to weight gain and obesity, and which can also affect attention in school and learning (14-16). Based on the above-mentioned research, the purpose of this study was to examine the levels of stress and anxiety among students during the exam period and to analyze whether they consume more (or not) food under stress/anxiety, the types of food they consume under stress/anxiety, types of stressors and coping strategies, and also the impact of stress/anxiety on academic performance.

## Materials and Methods

### *Study design*

This is a cross-sectional study where data was collected during a four-week time period, between June

and July of 2024, at the University of Prishtina, which is the largest public university in Kosovo.

### *Participants*

The participants were undergraduate students studying at the University of Prishtina, Faculty of Pharmacy. First, they were informed about the aim of the study and informed that they could withdraw or refuse to participate without any negative consequences. After agreeing to participate in the study, they filled out a self-report questionnaire about their stress and anxiety levels during the examination period and their eating habits during that period. Items about stress and anxiety were adapted from the DASS 21 questionnaire. The answer options for the stress and anxiety questions were the same as in the DASS 21 questionnaire (17). It has been translated into Albanian language for better understanding by students. Questions about food choices under stress were modified from various published studies in this field (18-20). In the end, before sharing the questionnaire, it was corroborated by all the authors of this study. A random sample of 165 Pharmacy students (both female and male), aged approximately 18-26, finished the questionnaire and engaged in the survey, which included questions about stress and anxiety level, types of food they consume under stress, types of stressors and coping strategies, year of study, the number of exams entered during last month, and academic performance by the average grade achieved so far. To gain comprehensive results, students from all five academic years, from first to the fifth year, were involved in the study. The five-year Pharmacy course at the University of Prishtina has a total estimated number of 220 to 230 students. About 70% of these students participated in the study, on a fully voluntarily basis.

### *Data collection*

The survey was set up in an online format and pre-set for self-administration so pharmacy students could easily view the questions and voluntarily respond over a four-week period between June and July 2024. All data gathered were in an anonymous form, which

means grouped only. The purpose of the survey and the handling of their responses were clearly explained to the students, who were informed that all responses would be treated confidentially.

#### *Research instruments*

The questionnaire consisted of 35 questions aimed at academic stress and anxiety, as well as the eating habits throughout the period of interest and the average grade obtained up to date. The questionnaire was designed with four distinct categories. The first category included a question regarding gender, age, weight, height, home address, socio-economic status, sleeping hours, and smoking habit. The following section gathered information on the academic year, the average grade obtained so far, and the number of exams entered during last month. In the third section, there were questions about stress and anxiety adopted from the DASS 21 questionnaire (17). The fourth part contains questions about the types of food that students consume under stress, frequency of consumption, and questions about types of stressors and the coping strategies to overcome this condition.

#### *Selection criteria*

The study participation was limited to full-time undergraduate students registered at the Faculty of Pharmacy, University of Prishtina, regardless of the academic year.

#### *Sociodemographic data*

The sociodemographic data collected included age, gender (female/male), place of residence (urban/rural), and economic status which was grouped into three: low (200–449 Euro), middle (450–699 Euro), and high (above 700 Euro). Moreover, data on year of study (1–5) and average grade achieved until now (6–10) were also included.

#### *Anthropometric and medical data*

Anthropometric and medical data that were collected included weight, height, and body mass index

(BMI). BMI, weight, and height data were compared using the World Health Organization (WHO) standards for the European population (21).

#### *Academic stress and anxiety data*

In total, there were 7 questions about stress and 7 questions about anxiety. Based on these questions, we analyzed the levels of stress and anxiety experienced by students during the exam period in the months of June–July, which is one of the biggest exam periods in the University of Prishtina and as such a very stressful period for all students. There were four response options scored as 0, 1, 2 and 3. 0 means it didn't apply to me at all, 1 means applied to me to some extent (several times), 2 means applied to me to a considerable degree (a good part of the time), and 3 means applies to me a lot (most of the time) (17). The question about the number of exams entered during last month is also related to the stress and anxiety of students during the exam period. Responses were scored as none, 1–3, more than 3, where the more exams mean a higher level of stress and anxiety. In the question about the types of stressors which means the reasons that make students feel stressed and anxious, the answer options were exams, academic assignments and projects, practical/laboratory work, caseload, other. The last option "other" can mean family or financial problems, and/or problems in love or social relationships. A comparison in data was bound by prescriptions of the American Academy of Sleep Medicine and prescription from the Sleep Research Society. Adults need 7 to 9 hours every night to help maintain proper body and mind health. Sleeping more than 7 hours nightly can risk increased sleeping problems, resulting in possibly serious health consequences, beginning with irritability and mood swings, weakening of the immune system, and an impaired ability to handle stress. Conversely, sleeping more than 9 hours per night may negatively affect mental and heart health, potentially leading to chronic diseases (22).

#### *Dietary habits data*

Dietary habits data included information regarding the amount of food consumption under stress and

anxiety compared to normal. The answers were as less than usual, same as usual, more than usual, where both the answers as “less and more” mean that the students were stressed and anxious.

Responses about types of food more consumed during stress and anxiety were as sweets (chocolate, ice cream, bonbons, etc.), fast food (fries, hamburgers, pizza, pasta, etc.), salty food (chips, snacks, nuts, etc.), healthy food (fruits, vegetables, meat, dairy products, etc.), alcohol, pastries, while responses to the question about frequency of consumption of these foods in the last month were as never, 1-4 times a month, several times a week, every day, several times a day, where less consumption means healthier dietary practices. As a coping strategy beside consuming food, students were asked about who they can talk to more freely when they are stressed and anxious, where the answer options were colleagues, friends, family, boyfriend/girlfriend, other. The response “other” here means a psychotherapist, a teacher, or any other person more distant.

#### *Statistical analysis*

We employed descriptive, correlational, factor, and mediation analyses to analyze our data. A mean  $\pm$  standard deviation (SD) is used to summarize continuous variables, while a frequency (n) and percentage (%) is used to summarize categorical variables. The Pearson correlation test is used to analyze the correlation between continuous variables, and mediation analysis is used to evaluate the association between independent variables, stress and anxiety, and the dependent variable, body weight. Statistical analyses were performed using SPSS version 21 software and PROCESS Macro.

#### *Ethical clearance*

The study protocol received approval from the Ethics Committee of the Faculty of Medicine at the University of Prishtina “Hasan Prishtina” and adheres fully to the Helsinki Declaration’s guidelines on research involving human participants.

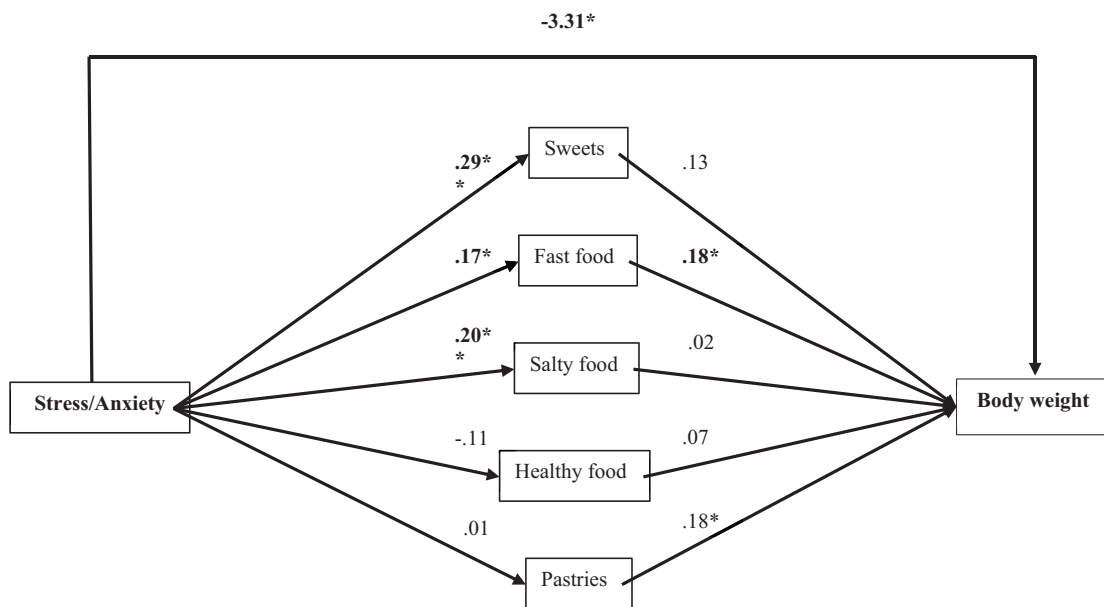
## **Results**

From 165 participants of this study, 137 or about 83% were female, while 28 or about 17% were male. The mean age of the participants was 22 years. Most of the students, about 73%, were living in urban areas and about 62% had a middle economic status. The average BMI of female students was 22.65, which is within normal limits of ideal weight, while the average BMI of male students was 25.2, which is at the beginning of the overweight limit. Most of the students 37%, who participated in this study were in the fifth year of studies, 24% were in the fourth year, 29% were in the third year, 7% were in the second year and 3% were in the first year, and the average grade of the students was 8.14 (8.13 of female students and 8.18 of male students). Students declared that they slept an average of 6.71 hours a day. Around 82% of students declared that they do not smoke, while about 17.6% do smoke. In the last month, 62% of the students entered more than 3 exams, 33% have entered 1-3 exams, while only 8 students did not enter any exams. We first applied factor analysis to understand whether anxiety and stress constitute two different scales. The results of this analysis showed that almost all items loaded on the first factor, ranging from .38 (the item ‘I was aware of my dry mouth’) to .83 (the item ‘I felt close to panic’). With the exception of the item ‘I was aware of dry mouth’ which, although it had a better loading on factor 2 with a value of .84, all other items had a better value on factor 1. The correlation coefficient between anxiety and stress was .83, a value which indicates that anxiety and stress measures should be merged and not be considered as two different instruments. Based on these we created a single ‘anxiety and stress’ instrument and applied it in the correlational analyses. Mean scores indicate that our sample showed normal and moderate levels of stress and anxiety (Table 1, Figure 1 and Figure 2). Sweets (chocolate, ice cream, candy, etc.) were among the most frequently consumed foods, followed by salty foods (chips, snacks, etc.), fast foods, pastries and healthy foods (fruits, vegetables, etc.; Table 2). Students also reported that they either eat less than usual or more than usual when they are

**Table 1.** Correlations between the main variables in the study

	1	2	3	4	5	6	7	8
1. Stress/Anxiety	-							
2. Sweets	.29***	-						
3. Fast food	.17*	.35***	-					
4. Salty food	.20*	.25***	.25***	-				
5. Healthy food	-.11	.09	-.23**	-.10	-			
6. Pastries	.01	.27**	.21*	.07	.13	-		
7. Weight	-.17*	-.04	.14	.01	-.06	.20**	-	
8. Average grade	-.32**	-.13	-.07	-.05	.02	-.14	.13	-
M	1.45	3.39	2.96	3.02	3.07	2.61	66.56	8.14
DS	.63	1.05	.84	.86	.91	.91	13.01	.69

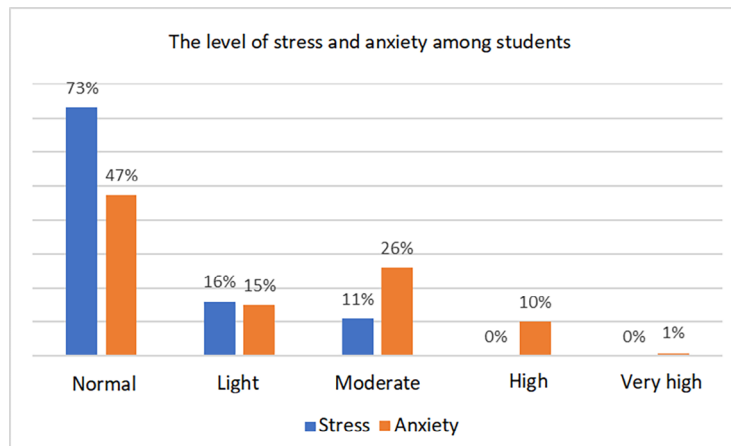
\*p < .05, \*\*p < .01, \*\*\*p < .001.



**Figure 1.** The prevalence of the relationship between stress/anxiety, food types, and body weight. Standardized regression coefficients are reported. \*p<.05, \*\*p<.01.

in stress or in anxiety (Figure 3). The types of stressors that made students experience more stress and anxiety were exams followed by the caseload (Figure 4). While in order to overcome this situation, apart from food consumption, as a coping strategy they also preferred to talk with friends more, then with family and boyfriend/girlfriend (Figure 5).

The correlation table shows that there is a negative correlation between stress/anxiety and average grade and a positive correlation between stress/anxiety and sweets, salty foods, and fast food. Stress/anxiety is negatively correlated with body weight. These results indicate that participants experiencing more stress/anxiety report lower average grades, more consumption



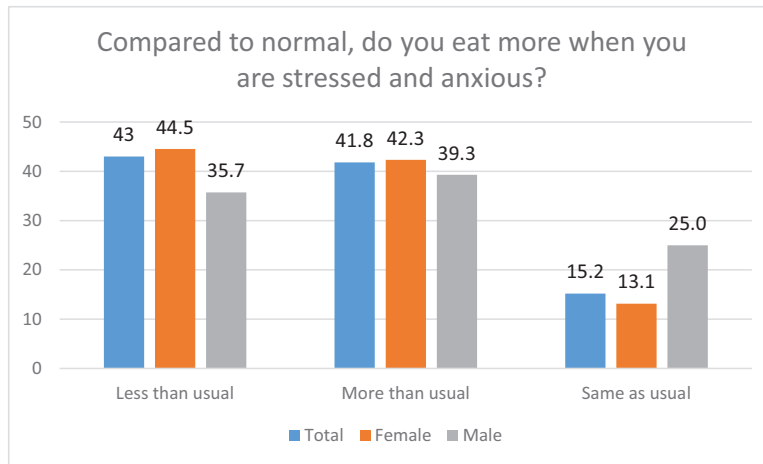
**Figure 2.** The prevalence of stress and anxiety (%).

**Table 2.** Type of food consumed when stressed/anxious

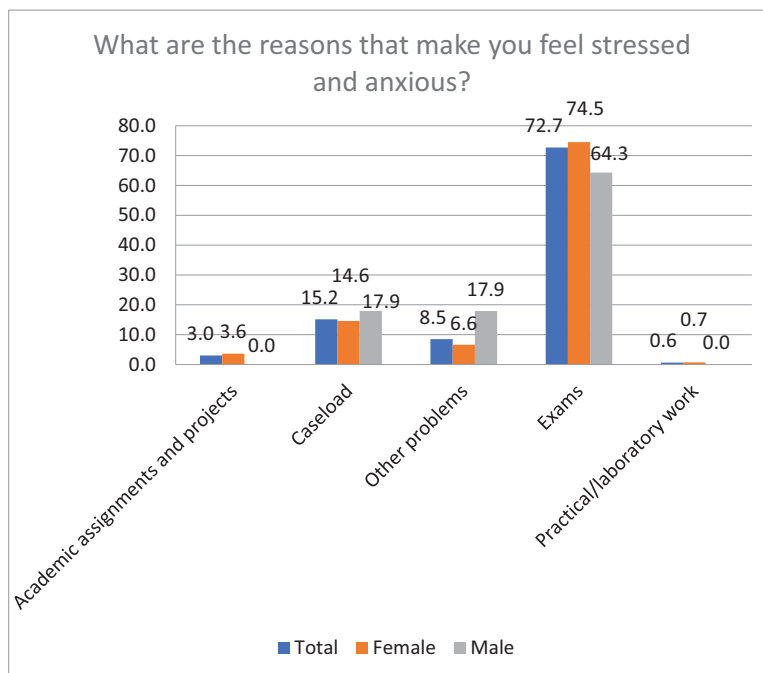
What foods do you eat most when you are stressed and anxious?	Never	1-4 times a month	Several times a week	Every day	Several times a day
Sweets (chocolate, ice cream, candy, etc.)	5(3.0)	29(17.6)	54(32.7)	51(30.9)	26(15.8)
Fast food (fries, hamburger, pizza, pasta, etc.)	5(3.0)	40(24.2)	83(50.3)	31(18.8)	6(3.6)
Salty food (chips, snacks, nuts, etc.)	7(4.2)	34(20.6)	75(45.5)	46(27.9)	3(1.8)
Healthy food (fruits, vegetables, meat, dairy products, etc.)	8(4.8)	30(18.2)	79(47.9)	39(23.6)	9(5.5)
Alcohol	137(83.0)	21(12.7)	7(4.2)	0(0.0)	0(0.0)
Pastries	16(9.7)	62(37.6)	60(36.4)	24(14.5)	3(1.8)

of sweets, salty foods, and fast foods. Surprisingly, participants who reported more anxiety/stress also reported less body weight. There is a positive correlation between pastries and body weight, meaning that the more pastries they consume, the more weight they report. Although average grade was correlated only to stress/anxiety and not correlated with other variables, our sample most commonly reported consuming less food than usual (43%), and more food than usual (42%) at the exams time (Table 2). Therefore, understanding their diet and weight can help us better understand their anxiety/stress driven behaviors around exams time. To better understand the relationship between stress/anxiety, food types, and body weight,

we performed mediation analysis. In other words, we tested whether students who experience anxiety/stress are more inclined to consume fast food which can have an impact on increasing body weight. As can be seen from Figure 1, there is a direct and negative correlation between stress/anxiety and body weight, similar to the correlation coefficient. This indicates that students who experience anxiety/stress around exam time may have decreased body weight. However, this effect seems to be hindered by their diet, since there is a significant association between stress/anxiety and sweets and salty foods. These, in turn, however, do not relate significantly to body weight, which suggests that there is no indirect effect of stress/anxiety on body weight



**Figure 3.** The prevalence of consuming food when stressed/anxious compared to normal (%).



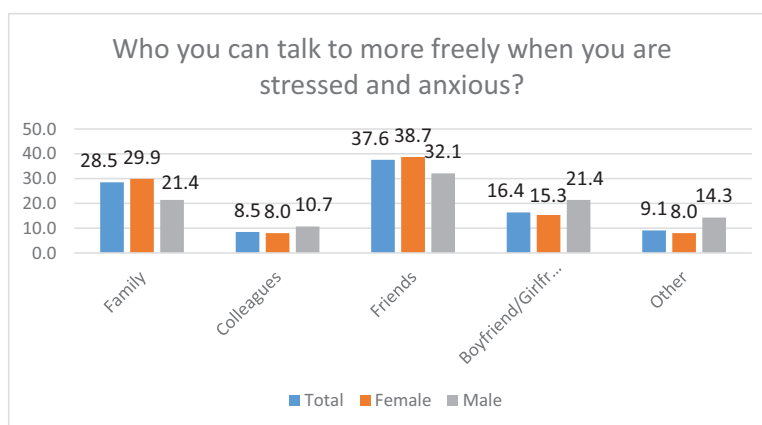
**Figure 4.** The prevalence of type of stressors (%).

through different foods. The lack of indirect effect, however, is likely due to the small sample size.

### Discussions

In this study, we aimed to assess the levels of stress and anxiety of pharmacy students during the

exam period, and to identify whether they consume more food when stressed/anxious, types of food, types of stressors and coping strategies, as well as to analyze the impact of stress/anxiety on academic performance through their average grade achieved so far. We found that stress was at a normal to moderate level, while anxiety was always higher than stress (1, 4, 12). According to gender, we found out that female students



**Figure 5.** The prevalence of coping strategies (%).

were more stressed and anxious compared to male students. Our findings are similar to other findings that show that female students experience more stress compared to males (23–27), but due to the very large gender difference evident in our sample, with small number of male participants compared to female participants, this was not very significant. We evaluated the academic performance through the average grade during the most stressful period for students, the exam period, to find out if stress/anxiety affects their academic success. Our findings reveal a negative correlation between stress/anxiety and average grade. This demonstrate that students with higher levels of stress and/or anxiety tend to have lower average grade. Our results are similar to the findings of other studies too (28, 29). We are dealing with a paradox in this case, because one of the main reasons that increase stress/anxiety are the exams themselves, while on the other hand, stress/anxiety has a negative effect on academic performance, and this makes us think that students are getting tired of extra lessons throughout the year and in the exam period they are just trying to pass them, not worrying too much about grades. Possible reasons why students do not perform well in GPA include the heavy workload of studying in college and at home and the long time they spend during the day at university. Other reasons are also the lack of suitable environments for relaxation, high prices in sports facilities, the spread of computers, smart phones, internet services that students often use to reduce stress/anxiety, but

which is also reducing their interest and time for studying (30, 31). Students who reported higher stress and anxiety also reported less hours of sleep. This finding of ours is consistent with other findings, which show that stress and anxiety are factors which affects a bad short-term sleep (32–34). We noticed that during the stressful/anxious period, food consumption is changing. Our findings show that students are almost divided into two groups, those who consume less food than usual in stressful/anxious periods (43%) and those who consume more than usual during these periods (42%), which in both cases indicate their irregular unhealthy habits. Similar to our findings, some studies have shown that students in stressful/anxious phases have consumed less food than usual, while some other studies, on the contrary, have shown that during this period students have consumed more food than usual (20, 26, 35, 36). Rigorous academic schedule, course load and exams can lead to poor dietary choices and irregular eating habits among students (26, 37–39). Based on a study, students who experienced sadness consumed more food, while those who were anxious and angry consumed less food, and this shows how feelings and emotions can lead to changes in the amount of food consumption (40). These results are closely related to our findings that during stressful/anxious periods, pharmacy students do not adhere to healthy diets. From our results, we have found that there is a positive correlation between stress/anxiety and sweets, salty foods and fast food. The types of food that students



consumed the most were sweets, then salty foods and fast food with a high frequency from several times a week up to several times a day. Our findings are consistent with previous studies showing that students may consume more unhealthy foods in stressful/anxious periods (27, 41-43). Similar to our findings, some studies also concluded that students under stress/anxiety consumed more sweet foods (44-46). These studies even link food preference with gender, concluding that female students during stress/anxiety prefer to stay at home due to lack of energy and motivation, and to consume sweet foods and sweet snacks, compared to male students who tend more towards fast food with protein content (meat, chicken, fish) (46). Eating unhealthy food as the response to academic stress, can be explained as controlling negative emotions and feeling the relaxation of the body, by stimulating on the one hand the release of serotonin in the brain, which gives the feeling of pleasure and regulates the mood, while on the other hand, reducing negative emotions and stress (47, 48). During the stressful/anxious period, students may consume foods that they would not normally eat, especially palatable foods, regardless of the calorie content. This is due to the release of cortisol in metabolism, the stress hormone, which increases the appetite specifically for foods with a high content of carbohydrates and fats (49, 50).

The reasons that can lead to the appearance of stress/anxiety in our findings were mostly the exams, since this study was done just in period of exams. Apart from exams, other type of stressors was the heavy case-load, and academic assignments and projects, where this is in line with other studies (51-54). In our study the option "other" was explained to students as financial, family, or relationship problems, but some types of stressors could be also the high standards that students have set for themselves and/or pressure from parents to perform well in studies (55). We have found the ways in which students try to overcome this situation, as coping mechanism, apart from consuming food, and that is also talking with friends primarily as an important emotional support, then family, colleagues, and/or boyfriend/girlfriend as effective stress/anxiety reliever (56). In some students (17%), smoking was found to be used as a coping strategy. It is even interesting the connection here, how those students who smoked had

more stress/anxiety, but at the same time they also had the lowest consumption of food than usual, which shows that they try to cope with difficult moments by smoking. Similar findings are also observed in some works (56, 57). Stress and anxiety in students can lead to increases and decreases in BMI, depending on how they deal with these emotions. BMI indicate health habits, where higher or lower BMI represent poor dietary habits, and this can negatively affect mood and mental health of students. An increased BMI is often the result of emotional and irregular eating, while a decreased BMI can occur as a loss of appetite from stress/anxiety emotions (58). In our study, stressed/anxious students during exams consumed less food than usual, and this could affect them in losing body weight, but due to the high consumption of unhealthy foods with high calories, such as sweets, salty foods, fast food and pastries, may not have led to weight loss. Some scientific research explains the link between academic stress and body weight in a very comprehensive way, demonstrating that in students with higher BMI, academic stress increases the desire to eat high-calorie fast food, which might further lead to substantial weight gain over time. The role of BMI is one of the important links that connects academic stress, unhealthy eating, and obesity. Moreover, academic stress could contribute to an unhealthy eating pattern that increases BMI and ultimately could become the main risk factor for obesity. High BMI could also increase the likelihood of stress and maintain the unhealthier behaviors, leading to a vicious cycle involving physical and mental health. From that understanding, it will help to prevent and treat obesity among students and the linked health risks (12, 15, 58, 59).

### **Strength and limitations of the study**

The uniqueness and distinctiveness from all research at the Faculty of Pharmacy at Kosovo before, and anywhere in the country, lent a very big strength to this study because it was the first ever conducted among the student population. Compared to what existed before, this was indeed a landmark study in its category because of its originality, relevance and impact. And, it has the potential to deliver a lot of value and wisdom

to this field both locally and internationally. During the research and gathering of this study, we knew some limitations. The first limitation is the imbalance of the sample, as we have a much larger representation of female students compared to male ones. This is because there are more female than male students in the Faculty of Pharmacy in Kosova. The second limitation is that the research included only students from the Faculty of Pharmacy at the University of Pristina, which is a public university. Students from other universities in Kosova, both public and/or private, were not included. Consequently, the results cannot be generalized to all pharmacy students in Kosova. A larger sample size would provide a more comprehensive understanding of their stress eating habits. These are limitations that should be addressed in future studies to get more accurate results.

## Conclusions

Pharmacy students reported experiencing stress and anxiety during exam time at a normal and moderate level, and during this time they practiced unhealthy eating habits. The study has found a negative correlation between stress/anxiety and average grade and a positive correlation between stress/anxiety and sweets, salty foods, and fast food. Based on this, we can conclude that students experiencing more stress/anxiety tend to have lower average grades, as well as more consumption of sweets, salty foods, and fast food. High consumption of these foods can have harmful effects on their overall health. Dealing with the stressed and anxious student is in itself an act of empathy, support, and practical strategies in creating a supportive academic and emotional environment, while teaching stress management techniques, promoting healthy habits such as physical activity, healthy diet, and self-care. By implementing these strategies, we can help the stressed and anxious students to manage their emotions more effectively and achieve success academically as well.

**Authors Contribution:** ZI and AM were observing this research project, had full access of this study's data, in the meantime they took responsibility to show integrity for the data. Study Design:

ZI, AM; Instruction on the use of instruments for the outcome measures used in this study: SV, NN; Analysis and interpretation of data: SV, AM; Manuscript preparation: ZI, NN; Statistical Analysis: SV, AM.

**Ethic Committee:** The study protocol received approval from the Ethics Committee of the Faculty of Medicine at the University of Prishtina "Hasan Prishtina" and adheres fully to the Helsinki Declaration's guidelines on research involving human participants.

**Conflict of Interest:** Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

**Availability of Data:** Data are available upon reasonable request from the corresponding author.

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### Correspondence

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Ardiana Murtezani, MD, PhD.

St. "Deshmoret e Kombit" nn. 10000 Prishtina, Republic of Kosova.

E-mail: ardiana.murtezani@uni-pr.edu

ORCID: 0000-0003-2124-1906