



Depression, Anxiety, Stress, and Associated Factors among Pharmacy Students Following the COVID-19 Pandemic

COVID-19 Salgını Sonrası Eczacılık Öğrencilerinde Depresyon, Kaygı, Stres ve İlişkili Faktörler

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ABSTRACT

COVID-19, which initially originated in the city of Wuhan, China at the end of 2019, caused millions of cases and deaths worldwide. Considering the conditions that arose during the pandemic, the psychological well-being of the students was affected by many factors related to COVID-19. This study has aimed to investigate the prevalence of depression, anxiety, and stress related to the COVID-19 and possible factors affecting depression, anxiety, and stress among pharmacy students. The mental health status of participants was examined using the Depression, Anxiety, and Stress Scale (DASS-21). Association analysis using non-parametric tests was performed for categorical, ordered, and dichotomous predictors. Logistic regression analysis was applied to investigate the effects of explanatory variables on the mental health of the students. Based on the findings, the prevalence of severe/extremely severe depression, anxiety, and stress were found to be 16.6%, 28.2%, and 12.0%, respectively. We also found significant effects of investigated factors, e.g., having a psychiatric disease, relationship with the family or friends, having anyone in the family who lost his/her job during the pandemic, having a need for psychiatric support, having anyone in the family diagnosed with COVID-19, on the depression, anxiety, and stress levels of the students. Our findings showed that the factors related to COVID-19 might have led to an increase in depression, anxiety, and stress levels among the students. These parameters must be taken into consideration both for the protection of students' psychological well-being and for the guidance of their education and training activities.

Keywords: COVID-19, Mental health, Pharmacy students, Logit regression model

ÖZ

İlk olarak 2019 yılı sonunda Çin'in Wuhan şehrinde ortaya çıkan COVID-19, dünya çapında milyonlarca vakaya ve ölüme neden oldu. Pandemi sürecinde ortaya çıkan koşullar göz önüne alındığında öğrencilerin psikolojik iyilik hallerinin Covid-19 ile ilgili birçok faktörden etkilendiği görülmüştür. Bu çalışma, eczacılık öğrencileri arasında COVID-19'a bağlı depresyon, anksiyete ve stresin yaygınlığını ve depresyon, anksiyete ve stresi etkileyen olası faktörleri araştırmayı amaçlamıştır. Katılımcıların ruh sağlığı durumları Depresyon, Kaygı ve Stres Ölçeği (DASS-21) kullanılarak incelendi. Kategorik, sıralı ve ikili değişkenler arasındaki anlamlılık ilişkisi parametrik olmayan testler kullanılarak analiz edilmiştir. Açıklayıcı değişkenlerin öğrencilerin ruh sağlığı üzerindeki etkilerini araştırmak amacıyla lojistik regresyon analizi uygulanmıştır. Bulgulara göre şiddetli/aşırı şiddetli depresyon, anksiyete ve stres yaygınlıkları sırasıyla %16,6, %28,2 ve %12,0 olarak bulunmuştur. Psikiyatrik bir hastalığın olması, aile veya arkadaşlarla ilişki, ailede pandemi sırasında işini kaybeden birinin olması, psikiyatrik desteğe ihtiyaç duyulması, ailede herhangi birinin salgın sırasında işini kaybetmesi gibi faktörler ile anlamlı ilişki bulunmuştur. Bulgularımız, COVID-19 ile ilgili faktörlerin öğrencilerde depresyon, kaygı ve stres düzeylerinde artışa yol açmış olabileceğini göstermiştir. Hem öğrencilerin psikolojik iyiliklerinin korunması hem de eğitim-öğretim faaliyetlerinin yönlendirilmesi açısından bu parametrelerin dikkate alınması gerekmektedir.

Anahtar Kelimeler: COVID-19, Ruh sağlığı, Eczacılık öğrencileri, Logit regresyon modeli

INTRODUCTION

By the end of 2019, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which had its origins in Wuhan, China had spread over the world and resulted in millions of cases and deaths. People have witnessed substantial changes in many fields, including health, socio-economic, education, and social life, as a result of the global pandemic caused by the COVID-19 virus (1). Besides, given the conditions that arose during the pandemic, many factors related to COVID-19 had an impact on psychological well-being globally (2). College students were more susceptible to mental health problems due to pandemic-related stressors and constraints, which could have an adverse effect on their educational performance and social relationships (3).

Unexpected changes in conditions have a negative effect on human psychology, which is an unavoidable reality (4). According to the World Health Organization, the COVID-19 pandemic increased the prevalence of anxiety and depression by 25% worldwide, with more women and young people experiencing these conditions (5). It is well known that changes to daily routines, anxiety about COVID-19 infection, lockdowns, online learning, and social distancing caused by the pandemic had an impact on university students' mental health (6). Several studies have examined the effect of pandemic on college students' mental health and the drivers of greater levels of depression, anxiety, and stress (7-9). For example, a study conducted in Spain, one of the countries hardest hit by the outbreak, discovered that 44.7% of university students had severe anxiety and 31.6% had moderate anxiety (10). Alateq et al., (2020) concluded that 30.2% of students in Saudi Arabia were experiencing significant levels of stress due to the outbreak (11). Another study on college students was conducted by the Higher Education Policy Institute in UK. Accordingly, it has been reported that the rate of worsening mental health after the pandemic among students was 58% (12). Similarly, in a study on university students in France, the rate of students experiencing high levels of anxiety was found to be 16.1% (13), while this rate was found to be 27.7% in Germany (14) and 35% in Poland (15). In line with previous studies conducted in different countries, it was also found that 71.9% of college students reported having significant levels of anxiety due to the COVID-19 pandemic in Türkiye (16). It is noteworthy to add that educating health care students about pandemics in universities can benefit both the students and society as a whole (17).

In many studies, a variety of factors that affected university students' mental health related to the COVID-19 pandemic conditions were examined. These factors include gender, financial loss, inadequate housing, past history of psychiatric follow-up, COVID-19-compatible symptoms, lack of social support, poor social interaction, poor information quality received (18,19), self-emotion evaluation, family relations, reporting worry about COVID-19 caused by the news on social media (20), changes in daily routines, eating habits, and sleeping problems due to the pandemic (21).

There are 23 universities located within the borders of the Turkish Republic of Northern Cyprus , with the Eastern Mediterranean University being the biggest and oldest of all of them. Following the determination of the first case of COVID-19 in Northern Cyprus on March 10, 2020, education was moved online. This unexpected rapid change in education and social life may have resulted in anxiety and depression among students. As per the researchers' knowledge, there are no studies on this field with pharmacy students in Northern Cyprus. In line with previous studies on the mental health of university students following the COVID-19 pandemic, we examined the effects of possible risk factors on depression, anxiety, and stress levels of students. Considering the mental state of university students in the post-pandemic period, it is significant to reach a conclusion that will aid and guide the education and training activities for the students. The present study aimed to investigate the effects of possible factors such as age, gender, the origin of the region, Body Mass Index (BMI), tobacco use, having chronic or psychiatric diseases, relationships with family or friends, anyone diagnosed with COVID-19 in the family, etc., affecting depression, anxiety, and stress levels of pharmacy students at Eastern Mediterranean University.

MATERIAL and METHOD

Sample Population and Questionnaire

A total of 301 pharmacy students who were aged above 18 were included in the study. To achieve the study's aims, a questionnaire was used to conduct a cross-sectional study. Pharmacy students were given a questionnaire with three sections-about their demographics, potential risk factors, and the DAS-21 scale-as part of the research collecting data process. Since English is the primary language for education at the university, the investigators employed an English version of the questionnaire. The survey, which was employed between April and June, 2022, included questions about demographic data (including age, gender, weight, height, the origin of the region, type of pharmacy education, and the semester the students were in), the possible risk factors for depression, anxiety, and stress following the COVID-19 pandemic and the mental health status (i.e., depression, anxiety, and stress) of the participants. Based on the previous studies that examined the factors affecting depression, anxiety, and stress, we included tobacco use, BMI, physical activity, chronic or psychiatric diseases, diagnosis with COVID-19, the severity of the disease, anyone diagnosis with COVID-19 in their family, relationships with family members or friends as the possible risk factors (22-27). Using information from self-reports, we calculated BMI (kg/m²). The mental health status of participants was examined using the Depression, Anxiety, and Stress Scale (DASS-21), which measures three domains (i.e., depression, stress, and anxiety) (21). Each subscale of DASS-21 includes 7 items. Scores for depression, anxiety, and stress subscales of DASS 21 are determined by summing the scores of each item and multiplying the total scores by 2.

Statistical Analysis

Data analysis was employed using the SPSS Statistic 21.0 (IBM SPSS, New York, NY, USA). Frequency and percentage values were used to describe explanatory and outcome variables. Association analysis between groups (e.g., age-depression, tobacco use-anxiety, chronic disease-depression) using non-parametric tests, i.e., Kruskal Wallis, Wilcoxon, and Spearman Correlation tests, were performed for categorical, ordered, or dichotomous variables. When there are several explanatory variables, the odds ratio can be obtained using logistic regression (28). Therefore, Logistic regression analysis was applied to investigate the effects of explanatory variables on the mental health of the students. For the analysis, cut-off categories for severity labels of the depression, anxiety, and stress subscales were classified as follows: 1) normal/mild 2) moderate and 3) severe/extremely severe (29). The significance level for this study was set to 10%, however different significance levels were presented under the tables related to the results.

This study was approved by the Research and Publication Ethics Board of the Eastern Mediterranean University (ETK00-2022-0105). Each participant provided their consent in the study and was fully informed that they might leave the survey at any time without providing a reason.

RESULTS

Descriptive Statistics

A total of 301 respondents who were aged above 18 participated in the survey. Table 1 presents the descriptive statistics of the characteristics of the sample population. The mean age was 22.55±2.57. The majority of the participants were female (66.4%), from the Middle East region (81.1%), and studying in Pharm B (56.1%). The mean semester the students were in was 6.23±2.57. Descriptive statistics of sample characteristics and risk factors of depression, anxiety, and stress following the COVID-19 pandemic are shown in Table 1 and Table 2, respectively.

Accordingly, the majority of the students identified as non-tobacco users (73.1%), had healthy weight (60.5%), and had no chronic (96.0%) or psychological diseases (96.3%). More than half of those surveyed (59.5%) stated that they think COVID-19 is not a scary disease. 60.1% reported that they were not diagnosed with COVID-19, and 20.9% stated that they experienced COVID-19 with mild symptoms. The rate of students whose families were diagnosed with COVID-19 was 68.4%. The mean physical activity duration of the students during the pandemic was reported as 47.58 minutes.

Table 1: Descriptive Statistics of Sample Characteristics

Sample Characteristics	N	Mean	Std.dev.	%
Age	300	22.55	2.571	
Gender	301			
Female	200	.34	.473	66.4
Male	101			33.6
Origin of Region	301			
Middle East	244	.19	.406	81.1
Africa	51			16.9
South Asia	2			.7
Type of pharmacy	301			
Pharm B	169	.44	.497	56.1
Pharm D	132			43.9
What semester are you in?	300	6.23	2.573	

Table 2: Descriptive Statistics of Factors Affecting Depression, Anxiety and Stress

Possible affecting factors	N	Mean	Std.dev.	%
Tobacco use	301			
Yes	81	.73	.444	26.9
No	220			73.1
BMI				
Underweight	32			60.5
Healthy	182	.71	1.023	10.6
Overweight	52			17.3
Obese	23			7.6
Physical Activity	300	47.58	38.84	
Do you have any chronic diseases?	301			
Yes	12	.96	.196	4.0
No	289			96.0
Do you have a psychiatric disease?	301			
Yes	11	.96	.188	3.7
No	290			96.3
Do you think that covid-19 is a very scary disease?	301			
Yes	122	.59	.492	40.5
No	179			59.5
Have you been diagnosed with COVID-19?	301			
Yes	120	.60	.490	39.9
No	181			60.1
What was the severity of your disease?	301			
Hospitalized	4			1.3
Severe	23	1.28	1.584	7.6
Mild	63			20.9
Asymptomatic	36			12.0
Have you had anyone diagnosed with COVID-19 in your family?	301			
Yes	206	.32	.466	68.4
No	95			31.6
Do you have any family members who died due to COVID-19?	301			
Yes	45	.85	.357	15.0
No	256			85.0
How was your relationship with your family during the COVID-19 pandemic?	300			
Very bad	3			1.0
Somewhat bad	37			12.3
Same	141	2.51	1.036	46.8
Somewhat good	42			14.0
Very good	77			25.6

Table 2: Descriptive Statistics of Factors Affecting Depression, Anxiety And Stress (Cont.)

Possible affecting factors	N	Mean	Std.dev.	%
How was your relationship with your friends during the COVID-19 pandemic?	300			
Very bad	18			6.0
Somewhat bad	64	2.16	1.134	21.3
Same	124			41.2
Somewhat good	40			13.3
Very good	54			17.9
Have you had anyone in your family who lost his/her job during COVID-19 pandemic?	301			
Yes	52	.83	.379	17.3
No	249			82.7
Do you think that you need psychiatric support due to COVID-19 pandemic?	301			
Yes	57	.81	.392	18.9
No	244			81.1
DASS-21 Scales				
Depression	300			61.8
Normal/Mild	186			21.3
Moderate	64	.55	.764	16.6
Severe/Extremely severe	50			
Anxiety	301			
Normal/Mild	148			49.2
Moderate	68	.79	.856	22.6
Severe/Extremely severe	85			28.2
Stress	301			
Normal/Mild	234			77.7
Moderate	31	.34	.683	10.3
Severe/Extremely severe	36			12.0

15.0% of those had anyone who died due to COVID-19 disease in their family. The majority of the students indicated that their relationship with their family (46.8%) or friends (41.2%) did not change. According to 81.1% of those polled, no one in their family lost their job as a result of the COVID-19 pandemic. The rate of those who stated that they needed psychiatric support was 18.2%.

The means of the depression, anxiety, and stress subscale levels, measured using the DASS-21 scale, were found to be 11.46, 10.75, and 11.75, respectively. Furthermore, 16.6%, 28.2%, and 12.0% of those surveyed were found to experience severe/extremely severe depression, anxiety, and stress, respectively.

Logit Estimates for Depression, Anxiety, and Stress Among Pharmacy Students Following The COVID-19 Pandemic

Table 3 and 4 tabulates the logit estimates results of depression, anxiety, and stress among pharmacy students following the COVID-19 pandemic. The results are presented with β , standard errors, and odds ratios. For the depression subscale, having a psychiatric disease was a significant positive predictor of severe/extremely severe depression. The odds of students having a higher level of depression were 5.87 times higher for those who had the psychiatric disease as compared to those who did not have the disease. The relationship with family members or friends during the COVID-19 pandemic was also found to be a significant positive predictor of depression.

Accordingly, the log odds of being in a higher level of depression were 3.96 times greater for those who had a somewhat bad relationship with the family members, 2.46 times greater for those who had the same relationship with the family members, and 2.58 times greater for those who had a somewhat good relationship with the family members

Table 3: Logit Estimates for Depression, Anxiety, Stress

<i>(1) Severe/Extreme</i>						
<i>Sample characteristics:</i>	<i>Depression</i>		<i>Anxiety</i>		<i>Stress</i>	
	β (SE)	OR	β (SE)	OR	β (SE)	OR
Age	-.91 (.068)	.913	-.036 (.058)	.965	.019 (.072)	1.019
Gender ^a						
Female	.545 (.331)	1.72	.509 (.300)*	1.664	-.032 (.416)	.968
Origin of Region ^b						
Middle East	-1.603 (1.564)	.201	.004 (1.392)	1.004	-2.106 (1.482)	.122
Africa	-1.990 (1.610)	.137	-.256 (1.422)	.774	-2.031 (1.526)	.131
Type of pharmacy education ^c						
Pharm B	-.025 (.316)	.975	.632 (.309)**	1.881	-.163 (.403)	.849
What semester are you in?	-.106 (.065)	.900	-.119 (.062)*	.888	-.230 (.082)***	.795

Note: Reference categories of explanatory variables are (a) male; (b) South Asia; (c) Pharm D. Response variables were categorized as (a) normal/mild, (b) moderate, (c) severe/extreme.

*** p<0.01; ** p<0.05; * p<0.1.

Table 4: Logit Estimates for Depression, Anxiety, Stress

<i>Possible risk factors:</i>	<i>(1) Severe/Extreme</i>		<i>Anxiety</i>		<i>Stress</i>	
	<i>Depression</i>					
	β (SE)	OR	β (SE)	OR	β (SE)	OR
Tobacco use ^d						
Yes	.221 (.346)	1.247	.634 (.319)**	1.884	.912 (.404)**	2.488
BMI ^e						
Underweight	.030 (.579)	1.031	-.429 (.525)	.651	-1.246 (.578)**	.288
Healthy	.036 (.693)	1.037	-1.294 (.656)**	.274	-1.453 (.771)*	.234
Overweight	-.060 (.653)	.942	-.589 (.587)	.555	-2.230 (.710)***	.108
Physical Activity chronic diseases ^f	.003 (.004)	1.003	-.001 (.004)	.999	.004 (.005)	1.004
Yes	-.923 (1.084)	.398	1.015 (.725)	.2760	-1.542 (1.208)	.214
psychiatric disease ^g						
Yes	1.770 (.849)**	5.870	2.065 (.946)**	7.888	3.387 (.941)***	29.58
COVID-19 is a very scary disease ^h						
Yes	.459 (.279)	1.582	.366 (.268)	1.442	.216 (.358)	1.241
diagnosed with COVID-19 ⁱ						
Yes	.424 (1.220)	1.528	1.254 (1.006)	3.506	.666 (1.425)	1.945
the severity of your disease ^j						
Hospitalized	-1.150 (1.445)	.317	-1.355 (1.21)	.258	-.508 (1.608)	.602
Severe	.354 (.6446)	1.424	-.023 (.586)	.977	.236 (.715)	1.266
Mild	.032 (.5446)	1.032	-.108 (.469)	.898	-.510 (.647)	.601
anyone diagnosed with COVID-19 in your family ^k						
Yes	.377 (.3407)	1.457	.990 (.317)***	2.692	.587 (.423)	1.799
any family members who died due to COVID-19 ^l						
Yes	.272 (.393)	1.312	.210 (.388)	1.234	.279 (.484)	1.322

Note: Reference categories of explanatory variables are (d) no; (e) obese; (f-i) no; (j) asymptomatic (k-l) no. Response variables were categorized as (a) normal/mild, (b) moderate, (c) severe/extreme.

*** p<0.01; ** p<0.05; * p<0.1.

Table 4: Logit Estimates for Depression, Anxiety, Stress (Cont.)

Possible risk factors:	(1)Severe/Extreme					
	Depression		Anxiety		Stress	
	β (SE)	OR	β (SE)	OR	β (SE)	OR
Relationship with family during the COVID-19 pandemic ^m						
Very bad	2.09 (.199)	1.22	.098 (1.594)	1.103	1.517 (1.676)	4.56
Somewhat bad	1.378 (.633)**	3.966	1.025 (.554)*	2.787	2.046 (.779)***	7.73
Same	.900 (.492)*	2.460	.119 (.422)	1.126	.711 (.614)	2.035
Somewhat good	.951 (.513)*	2.587	.387 (.458)	1.473	.688 (.627)	1.989
Relationship with friends during the COVID-19 pandemic? ⁿ						
Very bad	-.478 (.793)	.620	-1.064 (.825)	.345	-1.303 (.986)	.272
Somewhat bad	-.927 (.584)	.396	-.475 (.529)	.622	-1.645 (.756)**	.193
Same	-.651(.540)***	.192	-.379 (471)	.684	-1.513 (.691)**	.220
Somewhat good	-.558 (.506)	.573	.248 (.478)	1.282	.048 (.614)	1.050
Anyone in the family who lost his/her job during COVID-19 pandemic ^o						
Yes	.981 (.370)***	2.666	1.190 .366)***	3.287	1.012 (.456)**	2.752
need psychiatric support due to COVID-19 pandemic? ^p						
Yes	1.314(.342)***	3.721	.969 (.347)***	2.636	1.405 (.420)**	4.076
Pseudo R2		.166		.158		.219
N		301		301		301

Note: Reference categories of explanatory variables are (m-n) very good; (o-p) no. Response variables were categorized as (a) normal/mild, (b) moderate, (c) severe/extreme.

*** p<0.01; ** p<0.05; * p<0.1.

The relationship with the friends during COVID-19 was a significant negative predictor of depression. The odds of being at a higher level of depression were 0.192 times less for those who had the same relationship with their friends during COVID-19 pandemic. Students who had a family member who lost his or her job during the pandemic were 2.67 times more likely to have a higher level of depression as compared to those who did not have a family member who lost his or her job. A need for psychiatric support due to the COVID-19 pandemic was found to be a significant positive predictor of depression. The odds of having a higher level of depression were found to be 3.72 times greater for those who needed psychiatric support as compared to those who did not. However, any other variables that were included in the analysis were found to be insignificant predictors of depression.

As shown in Table 3, the findings revealed that gender was a significant factor affecting the level of anxiety among students. The odds of a student identified as female being at a higher level of anxiety was 1.66 times that of a student identified as male. Moreover, the odds of being in a higher level of anxiety were found to be 1.88 times higher among students who were Pharm B (5 years undergraduate program) as compared to those students who were Pharm D (6 years undergraduate program). It was discovered that the semester the students were in was a significant and negative predictor of anxiety. Accordingly, the odds ratio indicates that the odds of being in a higher category on anxiety decrease by a factor of .888 for every one-unit increase in the number of semesters. Lifestyles, e.g., tobacco use and BMI, of the students were significant predictors of anxiety. The results showed that students who were tobacco users were 1.88 times more likely to be in a higher level of anxiety as compared to the students who were non-tobacco users. A healthy weight is also a significant negative factor affecting the level of anxiety. The odds of a student identified as healthy having a higher level of anxiety were .274 times higher than those of a student identified as obese. Having a psychiatric disease is a crucial factor for anxiety similar to depression. The odds of being at a higher level of anxiety were 7.89 times greater among students who indicated that they had a psychiatric disease. Students who had a family member diagnosed with COVID-19 had 2.69 times the odds of having a greater level of anxiety than those who did not have anyone diagnosed with COVID-19 in their family. The odds of having a greater level of anxiety were 2.79 times higher for students who had a relatively negative relationship with their family than those who had a very good relationship. Students who had a family member who lost his or her job during the pandemic were 3.29 times more likely to be anxious than those who did not have a family member who lost his or her job. The requirement for psychiatric support in the context of the COVID-19 pandemic was discovered to be a significant positive predictor of anxiety. Accordingly, the odds of having a higher degree of anxiety were found to be 2.64 times higher for individuals who needed psychiatric support than those who did not.

The logit estimates for stress are presented in Tables 3 and 4. Accordingly, the semester students were in was found as a significant negative predictor of stress. The odds ratio indicates that the odds of being in a higher category on stress decrease by a factor of .888 for every one-unit increase in the number of semesters. Similar to the anxiety subscale, students who were tobacco users were 2.48 times more likely to be in a higher level of stress as compared to the students who were non-tobacco users. A healthy weight is also a significant negative factor influencing stress levels. For each unit increase in BMI category (from underweight to obese), the log odds of being stressed decrease by .288, .234, and .108, respectively. We also observed that students who stated that they had a psychiatric disease were 29.58 times more likely to experience stress. The odds of being in a higher level of stress were 7.73 times higher for those students whose relationship with their family was somewhat bad as compared to those students whose relationship was very good. On the other hand, for one unit increase in the relationship with the friends' categories, we expect a .193 and .220 decrease in the ordered log odds of being in a higher level of stress, respectively. Students who had a family member who lost his/her job during the pandemic were 2.75 times more likely to feel stressed than those who did not have a family member who lost his/her job. Psychiatric support due

to the COVID-19 pandemic was found to be another important predictor of the stress subscale. Accordingly, it was found to lead to 4.08 times more stress for those students who needed psychiatric support compared to those who did not need it.

DISCUSSION

Concerning the COVID-19 pandemic's psychological and environmental effects on students' educational experiences, there are still many undetermined issues (8). By conducting a survey among 301 pharmacy students, the current study examined the prevalences of depression, anxiety, and stress and the effects of possible risk factors on their psychological health following the COVID-19 pandemic. Based on the findings, the main results of the present study showed that the prevalences of severe/extremely severe depression, anxiety, and stress were found to be 16.6%, 28.2%, and 12.0%, respectively.

The effect of gender differences on the pharmacy students' depression, anxiety, and stress levels was only found to be significant for anxiety. Accordingly, female pharmacy students were more likely to have a higher anxiety level compared to male students. Parallel to these findings, previous studies on the subject reported that anxiety levels were higher among female university students than males (30). While students who are Pharm B students were more likely to feel anxious than their Pharm D counterparts, students with a higher academic year were found to be less anxious and stressed than those with a lower academic year. A study conducted on the academic stress of college students reported that freshmen and sophomores had higher mean stress levels than juniors and seniors (31). It is important to highlight that students with a higher academic year could have less academic pressure and, therefore, less anxiety and stress about the future.

The findings showed that tobacco use was a significant contributor to anxiety and stress among pharmacy students. Besides being one of the leading causes of death and morbidity in the world (32), smoking has also been linked in numerous studies to psychiatric disorders such as anxiety, depression, and stress (33). Three non-mutually exclusive models for the smoking-anxiety relationship were proposed by Moylan et al. (2012): (1) smoking may make people more likely to feel anxious; (2) anxiety may make people more likely to smoke; and (3) rates of both smoking and anxiety may be influenced by a common vulnerability variable (34).

In our study, people with psychiatric diseases were found to be significantly more likely to experience depression, anxiety, and stress. In line with these findings, other studies have also found similar results. A study conducted by Hao et al. (2020) showed that psychiatric patients were more likely to experience depression, anxiety, and stress due to the COVID-19 pandemic (35). These people with psychiatric diseases may not have visited psychiatrists as a result of the lockdown due to insufficient health services during COVID-19 in hospitals. People with psychiatric illnesses were more likely to experience higher levels of depression, anxiety, and stress, according to a different study using multiple regression analysis to examine the depression, anxiety, and stress levels among physicians during the COVID-19 pandemic (36).

One-fourth of those polled indicated that the COVID-19 pandemic strained relationships with their family members and/or their friends. The regression results showed that those students who reported a somewhat bad relationship with family or friends were found to be more susceptible to experiencing extremely severe and/or severe depression, anxiety, and stress. Possibly, increased stressors at home, a lack of communication with friends, and social isolation due to the COVID-19 pandemic may have caused the students to be more prone to have higher depression, anxiety, and stress levels (37).

We found a significant effect of family members' loss of jobs during the pandemic on having higher depression, anxiety, and stress levels among pharmacy students. The COVID-19 pandemic is well

known for having significantly increased unemployment rates across a number of countries globally (38). It has been challenging for people to access financial resources as a result of their loss of employment. Any family member's job loss during the pandemic may also play a significant role in the reporting of severe depression, anxiety, and stress symptoms among university students.

Our findings specifically indicate that students who had lower BMI values were less likely to have extremely severe and/or severe anxiety and stress levels compared to the students who were obese. Early data from the COVID-19 pandemic suggested that specific patient traits were linked to higher morbidity and mortality from SARS-CoV-2 (39). The most common recorded risk factors among these characteristics were older age, male sex, smoking, the existence of chronic medical disorders, and obesity (BMI 30 kg/m²) (40,41). A study conducted in France also showed a positive association between a higher BMI and the severity of COVID-19 infection (42). Therefore, it is inevitable for people with a higher BMI to feel more anxious and stressed about their health due to COVID-19. Moreover, it has also been shown that the death of a parent or a friend may have caused psychological distress, and research has indicated that those who are overweight may be more susceptible to such stresses than those who are of normal weight (43).

The results showed that students who had any family members diagnosed with COVID-19 were more likely to feel anxious than their counterparts who had no one diagnosed with COVID-19 in their family. A study conducted with 90 participants in Türkiye showed that the probability of anxiety and depression among COVID-19 patient relatives in the intensive care unit during the pandemic was much greater than that of patient relatives without COVID-19 (44). This outcome was also reflected in the current work, since our results also pointed out that the experience of a family member diagnosed with the disease negatively affected mental well-being without regard to gender. Since the breakdown of the family in various facets of life is caused by the death of a family member (45), fear of losing a family member might be among the reasons that can increase a person's anxiety level.

Those participants who need psychiatric support due to the COVID-19 pandemic were found to be more depressed, anxious, and stressed than participants who do not need any psychological support. It is undoubtedly helpful to discuss their experiences, psychological issues, and worries with a friend, a relative, or a health care practitioner. This can assist in lessening their feelings of depression, anxiety, and stress (37; 46).

CONCLUSION

College students and the general public have both been under stress as a result of the COVID-19 pandemic, which has been identified as a global public health crisis since the end of 2019. Due to these pandemic-related stresses and constraints in social life, it has been shown that university students are more likely to have mental health issues, which might have a negative impact on their academic performance and socialization. This study found that among pharmacy students, there were signs of stress, anxiety, and depression related to the COVID-19 pandemic. The study results have been found to be associated different lifestyles, demographics, and COVID-19-related variables. In line with previous studies on this subject, being female, academic year, tobacco use, Body Mass Index (BMI), history of psychological disease, any relatives diagnosed with COVID-19, relationship with family or friends, any relatives who lost their job during COVID-19, and need for psychological support were found to be factors associated with one or more mental health issues such as depression, anxiety, and stress that increased the risks of depression. The results obtained from our study are relevant not only in relation to the COVID-19 pandemic but also, more generally, in the response of college students in Northern Cyprus to COVID-19 and its effect on mental health.

The outcomes of this research study have been found to be in parallel with the literature's findings. Based on these, the change in depression, anxiety, and stress levels of college students following the

COVID-19 pandemic should be cross-checked to further observe the weakening of the negative effects of the pandemic. Moreover, the data provided is also valuable to be used at the earlier stages of possible world-wide pandemics to overcome similar negative effects.

Declaration of Ethical Code: In this study, we undertake that all the rules required to be followed within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" are complied with, and that none of the actions stated under the heading "Actions against Scientific Research and Publication Ethics" are not carried out.

This study was approved by the Research and Publication Ethics Board of the Eastern Mediterranean University (ETK00-2022-0105). Each participant provided their consent in the study and was fully informed that they might leave the survey at any time without providing a reason.

Conflict of interest: The authors declare that they have no conflict of interest.

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