

Impact of Covid-19 on the Mental Health of University Students

Sulhi A Alfakeh*

Assistant Professor, Child and Adolescent Psychiatrist, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

Corresponding author:
Sulhi A Alfakeh, MD,
Assistant Professor, Child and
Adolescent Psychiatrist, Faculty of
Medicine, King Abdulaziz University,
Jeddah, Saudi Arabia
Tel: +966554714410; Fax: 0126498315;
E-mail: salfakeh@kau.edu.sa

Abstract

Objective: To estimate the psychological impact of COVID-19 on university students in Saudi Arabia. **Method:** The Depression Anxiety Stress Scales 21 (DASS-21) questionnaire was distributed via the university students' emails. Of the 71,945 full-time undergraduate university students, 3,515 respondents completed the questionnaire. The questionnaire also included demographic information, such as age, gender, source of income, living arrangements, smoking status, and weekly physical exercise. **Results:** Nearly half of the participants experienced normal levels of stress (40.5%, n=1425) and anxiety (42.4%, n=1492). In terms of depression, nearly one-third were classified as normal (29.3%, n=1031); however, one-fourth were classified as extremely severe (23.8%, n=838). There were significantly higher levels of stress among female students. Additionally, a significantly higher rate of male students (50.4%, n=667) had normal anxiety levels compared to female students (37.7%, n=825). Finally, a significantly higher proportion of female students had symptoms of depression (72.66%, n=1,592) compared with the degrees of depression among male students (67.37%, n=892). **Conclusion:** We detected that stress, anxiety, and depression increased during the COVID-19 pandemic, and university students were at higher risk of developing mental health issues. An ongoing follow-up and monitoring of psychological consequences and their potential negative impact on academic performance and mental wellbeing are required.

Keywords: COVID-19; Anxiety; Stress; Depression; University students

Introduction

According to the World Health Organization's (WHO) World Mental Health Surveys International College Student Project, depression disorders are very common among respondents from 21 countries, with 21.2% lifetime prevalence and 18.5% 12 month prevalence. Generalized anxiety disorder was the second most prevalent mental health illness among college students, with a lifetime prevalence of 18.6% and a 12-month prevalence of 16.7%.^[1] The Saudi National Mental Health Survey showed that the rate of major depressive disorder was 6.0% and that the rate of generalized anxiety disorder was 1.9%.^[2] AMR et al. stated that 21.9% of undergraduate students at King Faisal University reported symptoms of depression or anxiety, with 9.9% reporting symptoms of major depression and 14.0% reporting symptoms consistent with generalized anxiety.^[3]

Coronavirus Disease (COVID-19) cases have been reported in 213 countries, areas, and territories globally. The increased spread of COVID-19 led the WHO to declare a pandemic. The main symptoms of COVID-19 are fever, shortness of breath, cough, and fatigue. As of April 27, 2020 there were 2810325 confirmed cases and 193825 confirmed deaths according to the official WHO website. According to the Ministry of Health in Saudi Arabia, there were 17522 confirmed cases as of April 26, 2020. Officials in Saudi Arabia have taken various actions to limit the spread of COVID-19, including closing all colleges, universities, and schools on March 9, 2020 and students were instructed to use distance learning tools to complete their courses.

The continuous reporting of the latest confirmed COVID-19 cases in Saudi Arabia and globally, with the concomitant social distancing measures and university closures, is likely to affect the mental wellbeing of many university students. There have been many reports on the psychological effects of the COVID-19 pandemic on the public, hospital staff, patients, children, and older adults.^[4,5] However, to date, only a few studies on the mental health effects of COVID-19 and the wellbeing of college students have been conducted during the pandemic.^[6]

This study aimed to estimate the mental health impact of COVID-19 on university students in Saudi Arabia. It was conducted to investigate the psychological status of university students during the pandemic for the following reasons: to evaluate the prevalence of stress, anxiety, and depression of university students during the pandemic; and to provide a basis for universities and governmental policies to support university students affected by COVID-19.

Materials and Methods

Study population and sample

The study population comprised undergraduate students of King Abdulaziz University. Using cluster sampling of the

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intended population, we examined the presence of stress, anxiety, and depression 3 weeks after the start of quarantine during the COVID-19 outbreak in Saudi Arabia. On April 2, 2020 questionnaires were distributed *via* the university students emails to ensure that only university students received them. By April 28, 2020 of the 71945 university students, a total of 3515 respondents completed the questionnaires. We included all full-time undergraduate students registered at King Abdulaziz University.

Study instrument

The Depression Anxiety Stress Scales 21 (DASS-21) is used to evaluate the severity of core symptoms of stress, depression, and anxiety over the preceding week. It was originally designed to be used in non-clinical settings, but it can also be utilized in studies with a main clinical application to detect an individual's state of emotional disturbance. [7] The DASS-21 provides a strong indication of the global severity of the psychological symptoms and is reasonably associated with other well-known scales. [7] It was developed for people aged 17 years or older and psychometrically validated for the Arabic culture by Taouk et al. [8] It is currently widely used in many Arabic cultures. [8] For these reasons, the current study used the DASS-21 Arabic version to assess the mental health of Saudi university students.

The Arabic version of the DASS-21 was converted to an electronic questionnaire and distributed to all undergraduate university students. Stress, anxiety, and depression are measured with three subscales, each having seven items, and the instrument was used to estimate symptoms of stress, depression, and anxiety during the past 2 weeks, with each of the 21 questions answered using a Likers-type scale from 0 ("Did not apply to me at all") to 3 ("Applied to me very much or most of the time"). The scores of the seven questions for each subscale were summed and multiplied by two, and then classified based on the severity of symptoms. For the depression subscale, scores between 0–9 were normal, 10–13 were mild, 14–20 were moderate, 21–27 were severe, and those >28 indicated extremely severe symptoms. For the anxiety subscale, scores between 0–7 were normal, 8–9 were mild, 10–14 were moderate, 15–19 were severe, and those >20 indicated extremely severe symptoms. For the stress subscale, scores between 0–14 were normal, 15–18 were mild, 19–25 were moderate, 26–33 were severe, and those >34 indicated extremely severe symptoms. [9] The study questionnaire also obtained demographic information, including age, gender, source of income, living arrangements, smoking status, and weekly physical exercise.

Ethical approval

The processes and contents of this research complied with the requirements of the Declaration of Helsinki concerning research involving human participants. The Unit of Biomedical Ethics of King Abdulaziz University, faculty of Medicine, approved this study (Reference No. 260-20). After being formally informed about the study purpose, all the participants voluntarily provided an electronic informed consent agreement to participate.

Statistical method

The study data were analyzed using the IBM SPSS version 23

(IBM Corp., Armonk, NY, USA) and visually presented using the Graph Pad Prism version 8 (Graph Pad Software, Inc., San Diego, CA, USA). A simple descriptive statistic was used to define the study variables through the forms of counts and percentages for the categorical and nominal variables, while continuous variables were reported by mean and standard deviations.

Using the DASS-21 scoring system, the stress, anxiety, and depression scores were calculated and categorized using the standard given in the scoring system. To establish relationships between the demographic data and stress, anxiety, and depression, a Chi-squared test was used. Finally, a conventional p-value <0.05 was the criterion to reject the null hypothesis.

Results

In our study, the psychological wellbeing of 3,515 students at King Abdulaziz University, Saudi Arabia, was evaluated in terms of their stress, anxiety, and depression levels. Demographic characteristics showed that most were aged 17–25 years (88.4%, n=3106), were female (62.3%, n=2191), non-smokers (78.1%, n=2746), lived with their family (93.8%, n=3296), and exercised once a week (68.1%, n=2394), as shown in Table 1. Around one-third of families were earning <10,000 Saudi Riyal/month (36.4%, n=1279) or >15,000 Saudi Riyal/month (35.7%, n=1256), while only one-fourth of them had monthly earnings of 10,000–15,000 Saudi Riyal (27.9%, n=980). The mean and degree of participants' stress, anxiety, and depression were then measured as shown in Table 2. The mean stress, anxiety, and depression of students were found to be 19.06 ± 11.386 (min=0, max=42), 11.38 ± 9.870 (min=0, max=42), and 17.47 ± 11.781 (min=0, max=42), respectively. Moreover, nearly half of them had normal stress (40.5%, n=1425) and anxiety (42.4%, n=1492) levels. In terms of depression, nearly one-third of the participants were classified as normal (29.3%, n=1031); however, one-fourth were classified as extremely severe (23.8%, n=838).

The association between varying levels of stress among the

Table 1: Characteristics of the study participants (n=3515).

Demographics	Count	Percentage (%)
Total	3515	100
Gender		
Male	1324	37.7
Female	2191	62.3
Age (years)		
<17	1	0
17-25	3106	88.4
≥ 26	408	11.6
Total household income (SR)		
<10,000	1279	36.4
10,000-15,000	980	27.9
>15,000	1256	35.7
Smoker		
Yes	534	15.2
No	2746	78.1
Housing		
Previously	235	6.7
Alone	120	3.4
With family	3296	93.8
University/outdoor housing	99	2.8
Rate of exercise during the week		
Once a week	2394	68.1
2-3 times	742	21.1
≥ 4 times	379	10.8

students and socio-demographic factors was then evaluated. Results of a Chi-squared test at the 0.05 level revealed significant differences in the stress levels of participants with respect to sex ($p < 0.001$). More specifically, there were significantly higher levels of stress among female students (64.4%, $n = 1,410$) compared to male students (51.36%, $n = 680$), more of whom had a normal degree of stress than other stress levels [Table 3]. Findings also showed significant differences in participants stress levels with respect to housing set up ($p = 0.010$). More specifically, a significantly higher number of students had normal stress levels if they were living with their family (41.0%, $n = 1351$), compared to other stress levels.

Finally, Chi-squared analysis revealed that significant differences were observed in the stress levels of participants relative to their rate of exercise during the week ($p < 0.001$). More specifically, a significantly higher proportion of participants had normal stress levels if they were exercising 2-3 times per week (45.3%, $n = 336$) or 4 or more times per week (49.9%, $n = 189$), compared to students who exercised once a week (37.6%, $n = 900$). Figure 1 shows the distribution of stress levels of students by rate of weekly exercise.

Table 4 shows the association between degree of student's anxiety and socio-demographic characteristics. More specifically, a significantly higher rate of male students (50.4%, $n = 667$) had normal anxiety levels, compared to female students (37.7%, $n = 825$). Similarly, significant differences were found in the anxiety levels of participants with respect to gender at all

Table 2: Mean and degree of participants' stress, anxiety, and depression.

Variables	N	Min	Max	Mean	SD
Stress	3515	0	42	19.06	11.386
Anxiety	3515	0	42	11.38	9.87
Depression	3515	0	42	17.47	11.781
		Count		Percentage (%)	
Total		3515		100	
Stress	Normal	1425		40.5	
	Mild	406		11.6	
	Moderate	567		16.1	
	Severe	599		17	
	Extremely severe	518		14.7	
Anxiety	Normal	1492		42.4	
	Mild	268		7.6	
	Moderate	691		19.7	
	Severe	290		8.3	
	Extremely severe	774		22	
Depression	Normal	1031		29.3	
	Mild	447		12.7	
	Moderate	566		16.1	
	Severe	633		18	
	Extremely severe	838		23.8	

other levels ($p < 0.001$).

Moreover, significant differences were observed in participants' anxiety levels with respect to their smoking history ($p = 0.006$). More specifically, a significantly higher proportion of students who were non-smokers (43.8%, $n = 1202$) had normal anxiety compared with smokers (39.7%, $n = 212$).

In addition, Chi-squared analysis showed significant differences in the anxiety levels of participants relative to their housing arrangements ($p = 0.002$). More specifically, a significantly higher rate of students living with their family (43.0%, $n = 1418$) had a normal level of anxiety in comparison with other anxiety degrees.

Finally, significant differences were found in the anxiety levels of participants with respect to their rate of exercise during the week ($p < 0.001$). More specifically, a significantly higher proportion of participants had a normal anxiety level if they were exercising 2-3 times per week (43.7%, $n = 324$) or ≥ 4 times per week (49.9%, $n = 189$), in comparison with students who exercised once a week (40.9%, $n = 979$). [Figure 2] shows the distribution of anxiety levels of students against the rate of weekly exercise.

Finally, the association between different depression levels with respect to socio-demographic factors was also assessed [Table 5]. A Chi-squared test revealed significant differences in the depression levels of students relative to gender ($p = 0.010$). More specifically, a significantly higher proportion of female students had symptoms of depression (72.66%, $n = 1592$) compared with the degrees of depression among male students (67.37%, $n = 892$).

Results revealed significant differences in the depression levels of participants with respect to the smoking history ($p = 0.026$). More specifically, a significantly higher rate of non-smoking students had normal depression (30.1%, $n = 826$) compared to other degrees of depression. Significant differences were also observed in depression levels relative to the rate of exercise during the week ($p < 0.001$). More specifically, a significantly higher proportion of students who exercised once a week (72.76%, $n = 1742$) had higher depressive symptoms compared to those who exercised 2-3 times per week (67.65%, $n = 502$) and those who exercised ≥ 4 times per week (63.32%, $n = 240$).

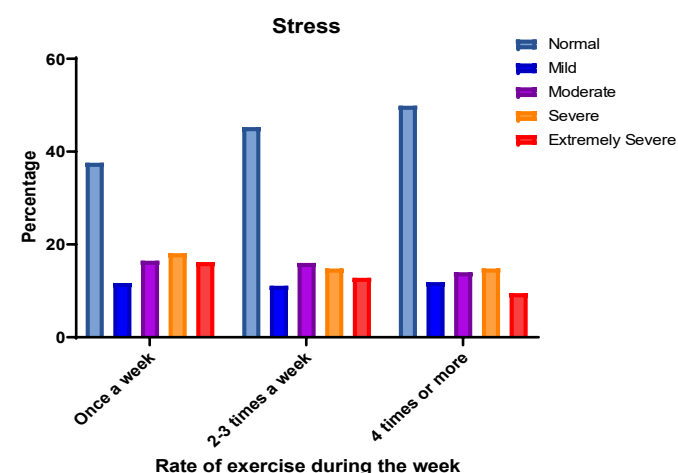


Figure 1: Students' stress levels by rate of weekly exercise.

Table 3: The association between the level of stress and socio-demographic factors among students.

Demographics		Total	Stress			
			Normal	Mild	Moderate	Severe
Total		3515	1425 (40.5%)	406 (11.6%)	567 (16.1%)	599 (17.0%)
Gender	Male	1324	644 (48.6%)	142 (10.7%)	207 (15.6%)	195 (14.7%)
	Female	2191	781 (35.6%)	264 (12.0%)	360 (16.4%)	404 (18.4%)
	<17	1	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Age (years)	17-25	3106	1195 (38.5%)	364 (11.7%)	521 (16.8%)	546 (17.6%)
	≤ 26	408	230 (56.4%)	42 (10.3%)	46 (11.3%)	53 (13.0%)
	<10,000	1279	510 (39.9%)	149 (11.6%)	194 (15.2%)	235 (18.4%)
Total household income (SR)	10,000-15,000	980	407 (41.5%)	110 (11.2%)	165 (16.8%)	153 (15.6%)
	>15,000	1256	508 (40.4%)	147 (11.7%)	208 (16.6%)	211 (16.8%)
	Yes	534	213 (39.9%)	57 (10.7%)	88 (16.5%)	100 (18.7%)
Smoker	No	2746	1126 (41.0%)	326 (11.9%)	436 (15.9%)	463 (16.9%)
	Previously	235	86 (36.6%)	23 (9.8%)	43 (18.3%)	36 (15.3%)
	Alone	120	40 (33.3%)	16 (13.3%)	15 (12.5%)	24 (20.0%)
Housing	With family	3296	1351 (41.0%)	376 (11.4%)	541 (16.4%)	561 (17.0%)
	University/off-campus housing	99	34 (34.3%)	14 (14.1%)	11 (11.1%)	14 (14.1%)
	Once a week	2394	900 (37.6%)	279 (11.7%)	395 (16.5%)	433 (18.1%)
Rate of exercise during the week	2-3 times	742	336 (45.3%)	82 (11.1%)	119 (16.0%)	110 (14.8%)
	≥ 4 times	379	189 (49.9%)	45 (11.9%)	53 (14.0%)	56 (14.8%)

^a-significant using a Chi-square test at a <0.05 level.

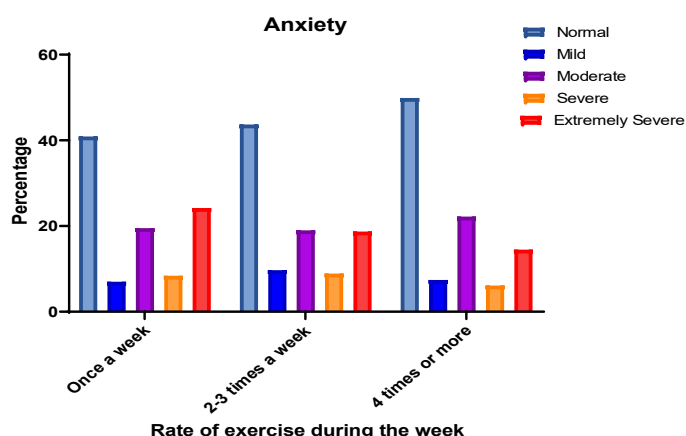


Figure 2: Students' anxiety level by rate of exercise during the week.

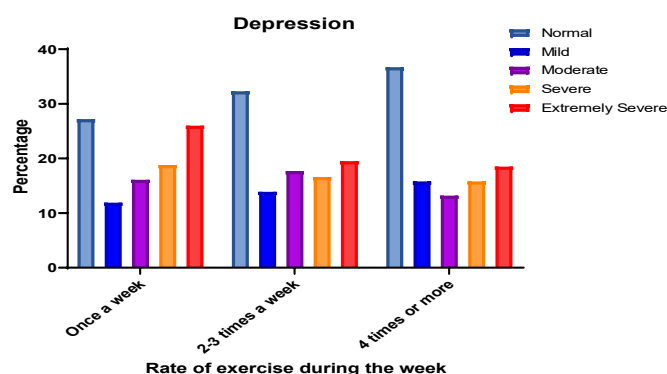


Figure 3: Students' level of depression by rate of exercise per week.

Table 4: The association between students' degree of anxiety and socio-demographic characteristics.

Demographics		Total	Anxiety		
			Normal	Mild	Moderate
Total		3515	1492 (42.4%)	268 (7.6%)	691 (19.7%)
Gender	Male	1324	667 (50.4%)	105 (7.9%)	250 (18.9%)
	Female	2191	825 (37.7%)	163 (7.4%)	441 (20.1%)
	<17	1	0 (0.0%)	0 (0.0%)	0 (0.0%)
Age (years)	17-25	3106	1263 (40.7%)	242 (7.8%)	617 (19.9%)
	≥ 26	408	229 (56.1%)	26 (6.4%)	74 (18.1%)
	<10,000	1279	517 (40.4%)	100 (7.8%)	265 (20.7%)
Total household income (SR)	10,000-15,000	980	441 (45.0%)	74 (7.6%)	179 (18.3%)
	>15,000	1256	534 (42.5%)	94 (7.5%)	247 (19.7%)
	Yes	534	212 (39.7%)	49 (9.2%)	106 (19.9%)
Smoker	No	2746	1202 (43.8%)	206 (7.5%)	535 (19.5%)
	Previously	235	78 (33.2%)	13 (5.5%)	50 (21.3%)
	Alone	120	38 (31.7%)	2 (1.7%)	31 (25.8%)
Housing	With family	3296	1418 (43.0%)	258 (7.8%)	639 (19.4%)
	University/Off-campus housing	99	36 (36.4%)	8 (8.1%)	21 (21.2%)

Rate of exercise during the week	Once a week	2394	979 (40.9%)	168 (7.0%)	466 (19.5%)
	2-3 times	742	324 (43.7%)	72 (9.7%)	141 (19.0%)
	≥ 4 times	379	189 (49.9%)	28 (7.4%)	84 (22.2%)

^a-significant using a Chi-squared test at a <0.05 level.

Table 5: The association between depression levels and socio-demographic characteristics.

Demographics	Total	Depression					p-value	
		Normal	Mild	Moderate	Severe	Extremely severe		
Total	3515	1031 (29.3%)	447 (12.7%)	566 (16.1%)	633 (18.0%)	838 (23.8%)	-	
Gender	Male	1324	432 (32.6%)	166 (12.5%)	202 (15.3%)	238 (18.0%)	286 (21.6%)	0.010 ^a
	Female	2191	599 (27.3%)	281 (12.8%)	364 (16.6%)	395 (18.0%)	552 (25.2%)	
Age (years)	<17	1	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	<0.001 ^a
	≥ 26	3106	836 (26.9%)	395 (12.7%)	514 (16.5%)	576 (18.5%)	785 (25.3%)	
household income (SR)	<10,000	408	195 (47.8%)	52 (12.7%)	52 (12.7%)	57 (14.0%)	52 (12.7%)	0.637
	10,000-15,000	1279	353 (27.6%)	166 (13.0%)	217 (17.0%)	234 (18.3%)	309 (24.2%)	
	>15,000	980	302 (30.8%)	111 (11.3%)	160 (16.3%)	175 (17.9%)	232 (23.7%)	
Smoker	Yes	1256	376 (29.9%)	170 (13.5%)	189 (15.0%)	224 (17.8%)	297 (23.6%)	0.026 ^a
	No	534	151 (28.3%)	60 (11.2%)	96 (18.0%)	92 (17.2%)	135 (25.3%)	
Housing	Previously Alone	2746	826 (30.1%)	365 (13.3%)	435 (15.8%)	486 (17.7%)	634 (23.1%)	0.006 ^a
	With family	235	54 (23.0%)	22 (9.4%)	35 (14.9%)	55 (23.4%)	69 (29.4%)	
	University/off-campus housing	120	28 (23.3%)	10 (8.3%)	17 (14.2%)	30 (25.0%)	35 (29.2%)	
Rate of exercise during the week	Once a week	3296	980 (29.7%)	427 (13.0%)	533 (16.2%)	591 (17.9%)	765 (23.2%)	<0.001 ^a
	2-3 times	99	23 (23.2%)	10 (10.1%)	16 (16.2%)	12 (12.1%)	38 (38.4%)	
	≥ 4 times	2394	652 (27.2%)	284 (11.9%)	385 (16.1%)	450 (18.8%)	623 (26.0%)	
Rate of exercise during the week	2-3 times	742	240 (32.3%)	103 (13.9%)	131 (17.7%)	123 (16.6%)	145 (19.5%)	<0.001 ^a
	≥ 4 times	379	139 (36.7%)	60 (15.8%)	50 (13.2%)	60 (15.8%)	70 (18.5%)	

^a-significant using a Chi-squared test at a <0.05 level.

Figure 3 shows the distribution of depression levels of students against rate of weekly exercise. Chi-squared analysis also showed significant differences in the depression levels of students with respect to their housing arrangements ($p=0.006$). More specifically, a significantly higher proportion of students living with their families had normal depression (29.7%, $n=980$), and significantly higher rates of participants living alone (29.2%, $n=35$) or staying in university or outdoor housing (38.4%, $n=38$) had extremely severe depression, in comparison with other depression levels.

Discussion

Our research aimed to examine the levels of psychological stress, anxiety, and depression symptoms in a large sample of university students following the first weeks of quarantine restrictions. Studies have reported that university students had fewer psychological symptoms overall compared to the period prior to the COVID-19 pandemic. According to a recent study conducted by the Saudi National Mental Health Survey, about 34% of Saudis will meet the criteria for a mental disorder sometime in their lifetime, and 2 in 5 Saudi adolescents will meet the criteria for a mental health condition. [2] Studies have suggested that university students experience more mental health problems compared to the general population. [1] Auerbach et al. reported that one-fifth (20.3%) of university students had a mental disorder, based on information from the WHO World Mental Health Surveys in 21 countries. [9] Our study found that the prevalence of anxiety symptoms was 57.6%, that of stress symptoms 59.4%, and that of depression symptoms 70.6%. Therefore, depression symptoms had the highest prevalence in

the study sample.

Furthermore, our study showed that university students tended to have more psychological problems during the COVID-19 pandemic compared to the rates of psychological problems in other groups studied during the same period, including the rates of stress, anxiety, and depression reported using population samples. [6-13] Additionally, our findings suggest that the COVID-19 pandemic has produced higher rates of psychological problems in university students compared to the prevalence before the pandemic. [3,14]

These findings most likely occurred because this study was conducted when quarantine measures were implemented. Additionally, this was also during the use of virtual learning platforms. COVID-19 was spreading very quickly, and first-aid psychological support to university students had not been initiated. Little information was available about the COVID-19 pandemic, which raised concerns about the possibility of infection. Additionally, the lack of social contact and daily structure contributed to the increased prevalence rates of stress, anxiety, and depression. [15]

Interestingly, our study confirmed the benefits of exercise in reducing and preventing stress, anxiety, and depression, which were all lower in students who exercised more frequently. Chekroud et al. reported in a sample of 1.2 million individuals in the United State of America that those who exercised experienced fewer days of mental health problems in contrast to individuals who did not exercise, and all exercise types were linked to fewer psychological symptoms.

The limitations of this study include that it had a cross-sectional design, so it is difficult to infer a causal relationship between COVID-19 and mental health problems. Additionally, our research was carried out during the COVID-19 pandemic, and we had to use a web-based survey method via the blackboard platform used for online learning activities.

The current study initially aimed at estimating the rate and severity of stress, anxiety, and depression symptoms in Saudi university students. In a later phase of the research, we plan to follow up with students who agreed to be contacted in the future to investigate the continuation of those symptoms, and finally to estimate the negative effects of the COVID-19 pandemic on student mental health and its effects on their academic performance.

Conclusion

We observed that stress, anxiety, and depression increased during the COVID-19 pandemic, and university students were at more risk of developing mental health issues. Previously, the knowledge regarding students' mental health related to the epidemic was limited, and no targeted psychological guidelines, which are needed during the pandemic period, were available to the university counselors. Therefore, ongoing follow-up and monitoring of psychological consequences and their potential negative impact on academic performance and mental wellbeing are required. Physical exercise should be encouraged to alleviate symptoms of stress, anxiety, and depression. Several universities in Saudi Arabia have conducted and provided many support webinars, psychological services, and peer support groups based on speculations that the current spread of COVID-19 and the new experience of distance learning will likely cause many students to suffer from various mental health issues.

Recommendations

Universities are encouraged to continue, establish, and provide mental health resources such as university counseling centers for students, with interventions to help students succeed psychologically and academically.

Ethical approval

The Institutional Review Board (IRB) at King Abdulaziz University approved this study (reference No 260-20).

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