



Prevalence and Associated Factors of Depressive Symptoms Among Mizan-Tepi University Students During the COVID-19 Pandemic

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Abstract

Background Depression is an extremely common and widespread problem among university students. A better understanding of the magnitude and determinants of depressive symptoms is required to create appropriate interventions for those groups. This study aimed to assess the prevalence and predictors of depressive symptoms among Mizan-Tepi University students during the pandemic lockdown.

Methods From September 11th to September 25th, 2020, 779 Mizan-Tepi University students participated in this web-based cross-sectional study. The link was created with a Google Form, and the questionnaire was distributed to participants via e-mail, WhatsApp, Telegram, and other social media accounts. To determine the prevalence and determinants of depressive symptoms, both descriptive and inferential analyses were used. The chi-squared test of association and logistic regression were used to identify predictors of depressive symptoms among university students. We used (IBM) SPSS version 20 for all statistical analyses.

Results The prevalence of depressive symptoms among university students was 39.5%. According to results of multi-variable binary logistic regression, being female (AOR = 0.339, 95%CI: 0.220–0.522), being an alcoholic (AOR = 2.101, 95%CI: 1.452–3.041), smoking (AOR = 2.088, 95%CI: 1.460–2.986), being quarantined for 14 days (AOR = 1.775, 95%CI: 1.231–2.560), frequently using social media (AOR = 1.510, 95%CI: 1.063–2.145), fearing COVID-19 (AOR = 5.058, 95%CI: 3.508–7.292), having sleeping problems (AOR = 1.703, 95%CI: 1.051–2.760), having a family member infected with COVID-19 (AOR = 1.829, 95%CI: 1.211–2.763), being exposed to COVID-19 (AOR = 1.748, 95%CI: 1.114–2.743), monthly disposable income \geq 501 ETB (AOR = 0.531, 95%CI: 0.359–0.784), having a higher level of hope (AOR = 0.158, 95%CI: 0.056–0.447), and having high social support (AOR = 0.546, 95%CI: 0.374–0.797) were significantly associated with depressive symptoms among students.

Conclusion In this study, the prevalence of depressive symptoms was found to be high among university students. Being an alcoholic, smoking, quarantined for 14 days, frequently using social media, fearing COVID-19, having sleep problems, having a family member infected with COVID-19, and being exposed to COVID-19 were all associated with an increased risk of developing depressive symptoms, while being a female, having a high level of disposable monthly income, hope, and social support decreased the risk of depressive symptoms among university students. Interventions should be put in place to promote mental health among university students.

Keywords Depressive symptom · Mental health · COVID-19 · Lockdown · University students

Introduction

Depression is a common mental condition marked by continuous melancholy and a loss of interest in ordinarily enjoyable activities, as well as an inability to carry out daily tasks [1]. Depression affects about 264 million individuals of all ages throughout the world. It is a primary cause of disability and a significant contributor to the overall global disease burden worldwide [2].

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Coronavirus disease 2019 (COVID-19) initially began in December 2019 in Wuhan, China, and swiftly expanded to become a global pandemic and global health concern within a few months [3]. COVID-19 was declared a pandemic by the World Health Organization in March 2020, and by the end of the month, more than 0.5 million people had been infected, with 30,000 deaths [4]. Psychologists and mental health professionals predicted that the pandemic will have an impact on the worldwide population's mental health, with an increase in cases of depression, suicide, and self-harm, among other symptoms, documented globally [5]. At the time of the outbreak, individuals are commonly stressed and worried due to a variety of factors such as loss of employment, loss of income, fear of infection, and mortality [6].

According to studies conducted in Italy, China, and the USA, the prevalence of depression has risen dramatically during the COVID-19 epidemic [7, 8]. Findings from China reported that the prevalence of depression was 37% during quarantine [9, 10]. Furthermore, another report in Spain during the early phase of the COVID-19 pandemic identified that 36% of the study participants had moderate to severe psychological problems, of which 41% had depressive symptoms [11]. Studies from various countries have reported a prevalence of depression above 35% [12–15]. Globally, the prevalence of depression among university students ranges from 14 to 39% [16]. Prior to the pandemic, the prevalence of depression in Ethiopia was 6.5% [17].

Poor mental health among university students has been a cause of concern globally. Because of various academic-related and environmental factors, mental disorders, including depression, are common among higher education students [13, 18–20]. According to a previous systematic review, university students have higher rates of depression than the general population [21]. A variety of factors contribute to the occurrence of depression among university students. According to Tareke et al., being female, consuming alcohol, chewing Khat, smoking, being quarantined for 14 days, frequently using social media, and having sleeping problems were all found to be substantially linked with depression symptoms [22]. Previous studies found that gender, fear of COVID-19 [23], sleep problems, alcohol intake, smoking habits [24, 25], usage of social media regularly [26], and level of social support [27, 28] were significantly associated with mental health issues. Staying at home has been linked to the development of depression symptoms, particularly in college students [8]. Brooks et al. discovered that decreased social contact, changes in routine activities, and norm shifts all contributed to depressive symptoms [29]. Since the outbreak began, the COVID-19 pandemic has had an impact on all aspects of life, including education, which has resulted in schools being closed or meeting online [30]. With the emergence of COVID-19, students experienced changes not only in their daily lives, but also in the way they

were educated, which may have made it difficult for them to reorganize and manage their work, set goals, and prioritize activities [30]. Some students report that studying at home is more difficult than learning at school and that they experience higher levels of self-negation and depression [31].

Because depression causes passivity, disappointment, confusion, a lack of energy, poor academic performance, and interpersonal relationship problems in students, it is critical to study its prevalence and implement interventions to reduce its symptoms in these groups [32]. However, studies on the mental health status of students in developing countries like Ethiopia are very limited. As a result, comprehending and analyzing psychological issues during this volatile period is crucial. The main goal of this study was to determine the prevalence of depressive symptoms and associated factors among Mizan-Tepi University students. Policymakers, health care planners, medical practitioners, and others might use the information from this study to develop a diagnosis, treatment, and preventive strategies of COVID-19-induced depressive symptoms.

Material and Methods

Study Design and Setting

Due to the countrywide lockdown situation during COVID-19, a web-based cross-sectional study was done utilizing a self-administered questionnaire. For this study, we collected data from Mizan-Tepi University students using a quantitative methodology.

Data Collection Method

Mizan-Tepi University students were invited to participate in this web-based survey. For the reason of reducing direct face-to-face interaction, we employed a web-based technique to create, disseminate, and collect data for the survey. The link to the online version of the survey, which was created using a Google form, was distributed to participants via e-mail, WhatsApp, Telegram, and other social accounts in contact with the investigators. Data have been collected from 11th September 2020 through 25th September 2020.

Sampling Method

The source population for this study was all regular undergraduate students at Mizan-Tepi University. Students' information was gathered using the snowball sampling technique. An informed consent form was attached to the e-questionnaire, and after reading the consent form, each participant agreed to participate in the survey. Participants were asked to share the e-questionnaire with their friends

via any social media platform. All students who responded to the e-questionnaire between September 11th and September 25th, 2020, were our samples. We received responses from 809 students, but 30 surveys were discarded owing to incomplete information.

Study Variables

The response variable was depressive symptoms, which is dichotomized as {Yes (presence) and No (Absence)}.

Explanatory Variables

Demographic variables: gender, residence, and monthly disposable income in ETB. COVID-19-related perception: fear of COVID-19, frequent use of social media, and influence on social interaction. COVID-19-related behavior: taking traditional preventive medicine, sleep problems, being exposed to covid-19 infection, and family member infected by COVID-19. Perception of online education: perceived more stress, and satisfaction with online education. Perceived social support and Herth Hope index: PSS and hope.

Data collection Tools

A questionnaire that comprised depressive symptoms was assessed by the Center for Epidemiologic Studies Depression scale (CES-D) [33]. This scale contains 20 items to describe the frequency of the participants' feelings in the past week. Each item has four possibilities ranging from 0 (rarely, less than 1 day) to 3 (usually or all of the time, 5–7 days). The overall score ranges from 0 to 60, with a higher number indicating more severe depression symptoms. Individuals having a total score of 16 were judged to have depression symptoms.

To evaluate PSS, we adopted the Oslo-3 item social support scale. It is a three-item questionnaire, commonly used to assess social support, and has been used in several studies [34, 35]. The sum score scale ranges from 3 to 14, which has three categories: poor support 3–8, moderate support 9–11, and strong support 12–14.

The Herth Hope Index (HHI) was chosen to evaluate the level of hope [36]. HHI contains 12 items with each item scoring from 1 (strongly disagree) to 4 (strongly agree). Then the total score is 12–48. A total score from 12 to 23 indicates a low level of hope, 24 to 35 as a moderate level, and 36 to 48 as a high level [37].

In this study, we have checked internal consistency and reliability, and hence, Cronbach's alpha for CES-D, Oslo 3 PSS, and HHI was 0.933, 0.901, and 0.946 respectively.

Statistical Data Analysis

We performed all statistical analyses using (IBM) SPSS version 20. To highlight descriptive results, we used frequency distribution and percentages. To test the association between response and explanatory variables, we used the chi-squared test of association. To identify predictors associated with depressive symptoms among Mizan-Tepi University students, we used the logistic regression model. Multivariable logistic regressions were conducted by taking all significant covariates in the univariable analysis at a significance level of 25% [38].

Binary Logistic Regression

Binary logistic regression is the form of regression that is used when the dependent variable is dichotomous such as the presence or absence of a particular event and the independent variables are of any type. The Bernoulli distribution for Bernoulli trial specifies probabilities $P(Y=1) = \pi$ and $P(Y=0) = 1 - \pi$, for which $E(Y) = \pi$.

The general model for binary logistic regression is as follows:

$$\log \text{it}(\pi(x_i)) = \log \left(\frac{\pi(x_i)}{1 - \pi(x_i)} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K \quad (1)$$

where x_i is an independent variable in the model, π : the probability of success, $1 - \pi$: the probability of failure, β_0 is constant terms, β_i is the coefficients/slope of the independent variable in the model.

Parameter Estimation

The maximum likelihood estimation (MLE) is a method of estimating the parameters of a probability distribution by maximizing a likelihood function [39].

The maximum likelihood estimates of the parameters could be obtained by maximizing the log-likelihood function form is given by

$$\pi(x_i) = \frac{\exp(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K)}{1 + \exp(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K)} \quad (2)$$

where x_i is an independent variable in the model, π : the probability of success, β_0 is constant terms, β_i is the coefficients/slope of the independent variable in the model.

Since observing values of Y say, $Y'_i (i = 1, 2 \dots n)$ are independently distributed as Bernoulli, the maximum likelihood function of Y is given by:

$$L(\beta/y) = \prod_{i=1}^n P(y_i/x_i) = \prod_{i=1}^n \left[\frac{e^{x_i \beta_i}}{1 + e^{x_i \beta_i}} \right]^{y_i} = \left[\frac{1}{1 + e^{x_i \beta_i}} \right]^{(1-y_i)} \quad (3)$$

where Y_i is the dependent variable in the model, x_i is an independent variable in the model, β_i is the coefficients/slope of the independent variable in the model.

The Wald Test Statistic

The Wald test is a way of testing the significance of particular explanatory variables in a statistical model [40]. Wald χ^2 statistics are used to test the significance of individual coefficients in the model and are calculated as follows:

$$W = \left(\frac{\beta}{se(\beta)} \right)^2 \sim \chi^2_{(1)} \quad (4)$$

where $se(\beta)$ is the standard error of regression coefficient β . We assume a chi-square distribution with one degree of freedom.

The maximum likelihood estimate of the parameter is found by the derivation of the log-likelihood function to each β 's and set each equation to zero which is given as $j = 1, 2, \dots, k$

$$\frac{d \log L(\beta/y)}{d\beta_j} = 0, j = 1, 2, \dots, k \quad (5)$$

where y is the dependent variable in the model, β_j is the coefficients/slope of the independent variable in the model.

Model Adequacy Checking

Hosmer and Lemeshow Test

The Hosmer and Lemeshow test is commonly used to test for assessing the goodness of fit of the model and allows for any number of explanatory variables [40].

$$C^2 = \sum_{i=1}^p \left[\frac{(O_i - E_i)^2}{m_i p_i (1 - p_i)} \right] \quad (6)$$

The Hosmer Lemeshow test statistics is defined where O_i, E_i, m_i, p_i are denotes the observed events, expected, observations and, the average predicted risk for the i th risk desire group respectively.

The statistical hypothesis of the Hosmer Lemeshow test.

H_f : The model is good to fit the data.

H_o : The model is not good to fit the data

The decision rule is we do not reject the null hypothesis if the p -value $> \alpha$ value = 0.05.

Results

This study was carried out to assess the prevalence and determinants of depressive symptoms among Mizan-Tepi University students during the COVID-19 pandemic lockdown. In this study, both descriptive and inferential analyses have been used to assess the prevalence and determinants of depressive symptoms. Of all 779 Mizan-Tepi University students who took part in this study, 308 (39.5%) suffered depressive symptoms (Table 1).

Socio-economic and Demographic Characteristics of the Participants

Out of 779 Mizan-Tepi University students who took part in this study, the majority of the participants 475(61.0%) were females. Students from Urban areas account for 55.2% of the study participants.

Nearly three-fourths (73.4%) of the participants had a monthly disposable income of ≤ 500 ETB. About 35.2%, 36.8%, and 39.4% of participants had alcoholic, Khat chewing, and smoking habits respectively (Table 1).

COVID-19-Related Perception, Behavior, and Psychological Features of Participants

According to a survey of students, 21.8% of them believe that online education is more stressful than traditional teaching methods. During home quarantine, nearly half 48.5% of the participants had poor social support. Regarding influence on social interaction, the majority of the participants 532 (68.3%) faced a problem with it. More than half (56.0%) of the participants had frequently used social media and (56.4%) of the participants expressed fear about the COVID-19 pandemic. More than one-third (34.5%) of the participants had a history of staying in quarantine for 14 days. The majority of the participant's family members, 457 (58.7%), were exposed to COVID-19, and as a result, 22.7% of the participant's family members were infected. Furthermore, 500 (64.2%) of the individuals had sleeping issues. Please see Table 1 for more information.

Factors Associated with Depressive Symptoms

In chi-square test of association, sex, monthly disposable income, alcohol drinking habit, Khat chewing habit, smoking habit, stayed in quarantine for 14 days, frequent use of social media, fear COVID-19, taking preventive medicine, sleeping problems, family member infected by COVID-19, being exposed to COVID-19 infection, perceived more stress

Table 1 Descriptive statistics of Mizan-Tepi University students

Variable	Categories	N (%)	Depressive symptoms		P-value ¹
			No	Yes	
			N (%)	N (%)	
Sex	Male	304 (39.0)	166 (54.6)	138 (45.4)	0.007
	Female	475 (61.0)	305 (64.2)	170 (35.8)	
Residence	Rural	349 (44.8)	216 (61.9)	133 (38.1)	0.462
	Urban	430 (55.2)	255 (59.3)	175 (40.7)	
Monthly disposable income	≤ 500	572 (73.4)	369 (64.5)	203 (35.5)	0.000
	≥ 501	207 (26.6)	102 (49.3)	105 (50.7)	
Alcohol habit	No	505 (64.8)	328 (65.0)	177 (35.0)	0.001
	Yes	274 (35.2)	143 (52.2)	131 (47.8)	
Khat chewing habit	No	492 (63.2)	320 (65.0)	172 (35.0)	0.001
	Yes	287 (36.8)	151 (52.6)	136 (47.4)	
Smoking habit	No	472 (60.6)	312 (66.1)	160 (33.9)	0.000
	Yes	307 (39.4)	159 (51.8)	148 (48.2)	
Stayed in quarantine for 14 days	No	510 (65.5)	333 (65.3)	177 (34.7)	0.000
	Yes	269 (34.5)	138 (51.3)	131 (48.7)	
Frequent use of social media	No	343 (44.0)	233 (67.9)	110 (32.1)	0.000
	Yes	436 (56.0)	238 (54.6)	198 (45.4)	
Fear of COVID-19	No	340 (43.6)	273 (80.3)	67 (19.7)	0.000
	Yes	439 (56.4)	198 (45.1)	241 (54.9)	
Influence on social interaction	No	247 (31.7)	145 (58.7)	102 (41.3)	0.494
	Yes	532 (68.3)	326 (61.3)	206 (38.7)	
Taking preventive medicine	No	312 (40.1)	211 (67.6)	101 (32.4)	0.001
	Yes	467 (59.9)	260 (55.7)	207 (44.3)	
Sleep problems	No	279 (35.8)	195 (69.9)	84 (30.1)	0.000
	Yes	500 (64.2)	276 (55.2)	224 (44.8)	
Family member infected by COVID-19	No	602 (77.3)	382 (63.5)	220 (36.5)	0.002
	Yes	177 (22.7)	89 (50.3)	88 (49.7)	
exposed to COVID-19 Infection	No	322 (41.3)	211 (65.5)	111 (34.5)	0.015
	Yes	457 (58.7)	260 (56.9)	197 (43.1)	
Perceived more stress with a perception of online education	Disagree	223 (28.6)	135 (60.5)	88 (39.5)	0.009
	No change	386 (49.6)	238 (61.7)	148 (38.3)	
	Agree	170 (21.8)	98 (57.6)	72 (42.4)	
Satisfaction on the perception of online education	Dissatisfied	259 (33.2)	156 (60.2)	103 (39.8)	0.926
	Satisfied	520 (66.8)	315 (60.6)	205 (39.4)	
PSS	Poor	378 (48.5)	250 (66.1)	128 (33.9)	0.007
	Moderate	297 (38.1)	162 (54.5)	135 (45.5)	
	Strong	104 (13.4)	59 (56.7)	45 (43.3)	
HHI	Low level	49 (6.3)	44 (89.8)	5 (10.2)	0.000
	Moderate level	650 (83.4)	370 (56.9)	280 (43.1)	
	High level	80 (10.3)	57 (71.2)	23 (28.8)	
Total		779	471 (60.5)	308 (39.5)	

¹Pearson chi-square *p*-value

with the perception of online education, PSS, and HHI were found to be significantly associated with depressive symptoms among university students. Detailed information is presented under Table 1.

Univariable Analysis

In the univariable analysis, covariates with a *p*-value less than 25% were considered for multivariable analysis. From the univariable analysis, we observed that the covariate sex, monthly disposable income, alcohol drinking habit, Khat chewing habit, smoking habit, stayed in quarantine for 14 days, frequent use of social media, fear COVID-19, taking preventive medicine, sleeping problems, family member infected by COVID-19, being exposed to COVID-19 infection, perceived more stress with the perception of online education, PSS, and HHI were significant. However, residence, influence on social interaction, and satisfaction on the perception of online education were not a significant at 25% level of significance. Therefore, based on this result, it is better to ignore these covariates and shall do our multivariable analysis using the significant factors. Hence, the effects of these significant covariates shall better be interpreted using the multivariable analysis.

Multivariable Binary Logistic Regression Results

Female students were 0.339 (AOR = 0.339, 95%CI: 0.220–0.522) times less likely to have a prevalence of depressive symptoms as compared with male students. Regarding alcohol consumption, drinkers were 2.101 (AOR = 2.101, 95%CI: 1.452–3.041) times more likely to develop depressive symptoms as compared to non-drinkers. Moreover, the history of cigarette smoking had 2.088 (AOR = 2.088, 95%CI: 1.460–2.986) times higher odds of developing depression than non-smokers (Table 2).

Results suggested that students who had a quarantine history were 1.775 (AOR = 1.775, 95%CI: 1.231–2.560) times more likely to have depressive symptoms as compared to students who did not have a quarantine history. The prevalence of depressive symptoms among students who used social media frequently was 1.510 (AOR = 1.510, 95%CI: 1.063–2.145) times more likely than students who did not use social media frequently. Our findings suggested respondents who fear COVID-19 had 5.058 times (AOR = 5.058, 95%CI: 3.508–7.292) higher odds of depressive symptoms than those respondents who did not fear COVID-19. The odds of depressive symptoms among participants who had a sleeping problem were 1.703 (AOR = 1.703, 95%CI: 1.051–2.760) times more likely as compared with participants who did not have such like problems.

Prevalence of depressive symptoms of students whose family members were infected by COVID-19 were 1.829

(AOR = 1.829, 95%CI: 1.211–2.763) times more likely as compared with students whose family members were not infected by COVID-19. Regarding social support, those who had high social support were 0.546 (AOR = 0.546, 95%CI: 0.374–0.797) times less likely to develop depressive symptoms than those who have poor social support. The study also found that the odds of developing depressive symptoms among those who had a high level of hope were 0.158 (AOR = 0.158, 95%CI: 0.056–0.447) times lower as compared to those who have low levels of hope (Table 2).

Discussion

The purpose of this study was to examine depressive symptoms and their related factors among Mizan-Tepi University students during the COVID-19 pandemic lockdown. The overall prevalence of depressive symptoms in this study was 39.5%. This is consistent with a previous study from China [9, 10, 41], Pakistan [42], Spain [11], Ethiopia [22], Myanmar, and South East Asia [43].

However, the current studies report were higher than previous reports, 26.8% of Haramaya university students [21], 26.0% among China university students systematic review of 84 studies [44], 27.2% among Swiss students [45], and 31.7% among Ukraine students [46]. This difference might be due to different study designs, population, and cultural differences. The current prevalence was also higher than previous studies in Ethiopia among university students prior to the pandemic, which found 32.2% [47], 26.8% [21], and 34.73% [48]. This disparity may be due to the fact that these studies were conducted prior to the pandemic, and the increase in depression may have been caused by COVID-19, which resulted in a slew of socioeconomic and cultural issues. This indicates a higher risk of depressive symptoms during the COVID-19 outbreak than previously.

While other studies reported an even higher prevalence of depressive symptoms in French 43.0% [49], Bangladesh university students 53.7–59.16%, [46, 50], and Greek university students 51.2% [51], this discrepancy between studies may be due to differences in the sample, culture, education systems, or the different impacts of the pandemic on different countries and region [52]. Furthermore, the current study's report was lower than previous reports of university students at northwest Ethiopia (71.4%). This distinction may be emphasized because they only work with pre-engineering students and have been concerned about academic, environmental, and social issues since they were freshmen [53]. Moreover, previous study during an early stage of COVID-19 pandemic in Ethiopia reported higher prevalence of depression symptoms 46.3% [54]. This disparity could be attributed to an overload of misinformation since the inception of COVID-19.

Table 2 Multivariable binary logistic regression result for Mizan-Tepi University students

Variables	Categories	<i>B</i>	S.E	Sig	Exp(B)	95% C.I. for EXP(B)	
						Lower	Upper
Gender	Male				1		
	Female	-1.082	0.221	<0.001	0.339	0.220	0.522
Monthly disposable income	≤500				1		
	≥501	-0.633	0.199	0.001	0.531	0.359	0.784
Alcohol consumption	No				1		
	Yes	0.742	0.189	<0.001	2.101	1.452	3.041
Chewing Khat	No				1		
	Yes	0.264	0.195	0.082	1.302	0.889	1.908
Smoking habit	No				1		
	Yes	0.736	0.183	<0.001	2.088	1.460	2.986
Quarantined for 14 days	No				1		
	Yes	0.574	0.187	0.002	1.775	1.231	2.560
Frequently use social media	No				1		
	Yes	0.412	0.179	0.021	1.510	1.063	2.145
Fear COVID-19	No				1		
	Yes	1.621	0.187	<0.001	5.058	3.508	7.292
Taking preventive medicine	No				1		
	Yes	0.297	0.207	0.071	1.346	0.896	2.019
Sleep problems	No				1		
	Yes	0.532	0.246	0.031	1.703	1.051	2.760
Family member infected by COVID-19	No				1		
	Yes	0.604	0.210	0.004	1.829	1.211	2.763
Exposed to COVID-19	No				1		
	Yes	0.559	0.230	0.015	1.748	1.114	2.743
PSS	Low				1		
	Moderate	-0.46	0.270	0.063	0.631	0.372	1.072
	High	-0.605	0.193	0.024	0.546	0.374	0.797
HHI	Low				1		
	Moderate	1.173	0.599	0.050	3.231	0.998	10.451
	High	-1.846	0.531	0.001	0.158	0.056	0.447
Nagelkerke <i>R</i> square		0.478					
Hosmer and Lemeshow test		0.095					

B Coefficient, *S.E.* standard error, *Sig.* *p*-value, *Exp (B)* odds ratio, *C.I.* 95% confidence interval for odds ratio

Our results showed that gender was significantly associated with a risk of depressive symptoms among university students. Females were less likely than males to have the risk of depressive symptoms, according to the findings of the current study. This is in line with a Chinese study that found female students to have a reduced prevalence of depressive symptoms [55]. This result is also supported by [56, 57]. However, this is in contrast to a study by [58] which found that being a woman increased the risk of depression when compared to male counterparts [58]. This difference could be owing to the high number of females who took part in this study and the fact that the current study only looked at students.

This study's findings revealed a link between sleep problems and depressive symptoms. This is consistent with a previous study [59]. High-quality sleep, as a vital sign of health and happiness, is beneficial for reducing stress and improving the body's immune [60]. Students with sleep problems are more likely to feel exhausted, lack energy, irritation, restlessness, and other negative emotions, which may be linked to more significant depressive symptoms [59].

According to our findings, alcohol intake and smoking were highly connected with depression symptoms among students. Students who consume alcohol regularly are more likely to acquire depressive symptoms. This is consistent with previous studies [61, 62]. Alcohol usage generally

precedes the symptoms of fatigue and social difficulties linked with depression [63]. Furthermore, smokers were found to be more likely than non-smokers to acquire depressive symptoms. This finding is supported by a previous study from Ethiopia [58] and Australia [64]. This is also consistent with another study [61, 65]. This is because smokers are more likely to acquire respiratory issues, which exacerbate the effect of COVID-19. As a result, they may acquire depressed symptoms. In addition, smoking lowers the dopamine hormone released in the brain, which is responsible for happiness and pleasure [63, 66]. As a result, they are easily depressed, and this provides a clue to provide sufficient support for these susceptible people to reduce their burden.

According to the findings of the current study, being quarantined for 14 days was substantially linked to depressive symptoms among university students. This finding is supported by previous research [67]. Even though harsh measures are taken for the greater good, quarantine can cause a variety of psychological issues and reduce human well-being owing to isolation from family, friends, and loved ones, as well as extended periods of restricted to no social interaction [68, 69].

When compared to students with lower monthly disposable income, those with higher monthly income had a lower likelihood of depressive symptoms. This suggested that having more disposable income could be protective against depressive symptoms. Higher wealth, according to a similar study conducted during epidemic [70], offers students more confidence that food and water will be available.

The study by [71] found a significant relationship between COVID-19 fear and depression, as well as significant moderation effects of having friends or family who were infected or died due to COVID-19. In line with this finding, the current study showed that depressive symptoms among university students were associated with fear of COVID-19 and having family members infected with COVID-19, as well as exposure to COVID-19 infection (those who had contact with confirmed or suspected persons). This is also consistent with a previous study that reported that depressive feelings increased with fear of COVID-19 [72]. The growing number of confirmed illnesses and deaths has exacerbated university students' negative feelings. If there are still family members with proven COVID-19 cases and anyone who has been exposed to COVID-19 infection, they may be more concerned about their family members and their health, leading to further depressive symptoms [10].

Moreover, our study revealed usage of social media regularly was found to be substantially related to depressive symptoms. The usage of social media regularly was found to be substantially related to depressive symptoms. A previous study reported that the use of the internet was found to be a predictor of depression [67]. This could be because information about the pandemic drives them to use social media

more frequently, and having more information about cases, fatalities, and linked increases depression among students.

Not surprisingly, the current study results suggested that a higher level of social support was associated with a lower prevalence of depressive symptoms. This is in line with the previous findings [73]. As a positive psychological resource, social support is closely related to an individual's health and well-being [74]. This is also supported by a study from China [75]. The family is an important source of social support, especially during the home quarantine [55]. From the perspective of family support, providing students with enough care and encouragement will help them to overcome negative psychology and reduce the occurrence of psychological problems [73].

Furthermore, university students with a high level of hope had a decreased prevalence of depressive symptoms. This is consistent with the study by [76] found that higher levels of hope could moderate the effect of negative life events on depressive symptoms groups. As COVID-19 continues to spread globally, psychological problems have become widespread [77]. Another study also reported that depressive symptoms were related to low scores of hope [78]. As a result, persons who feel more hopeless are at a larger risk of developing depressive symptoms and require more care to give protective measures.

Limitations and Strengths of the Study

This study tried to assess the depressive symptoms among Mizan-Tepi University students. While conducting this research, there are some limitations. (i) We cannot prove a causal relationship in this cross-sectional study. (ii) The self-reported questionnaire was conducted online, which will contribute to a certain amount of answer bias. (iii) Due to limited resources and the urgency of the COVID-19 outbreak, snowball sampling was chosen over random sampling. As a final note, in addition to the variables that we took into account, there may be other factors that were related to the prevalence of depressive symptoms among university students, which require further study. Despite this limitation, this research is among a very few studies in developing countries in which standardized tools are used, and rigorous analyses are performed.

Conclusions

The current study found that university students had experienced a higher prevalence of depressive symptoms during the COVID-19 pandemic. Being an alcoholic, smoking, quarantined for 14 days, frequently using social media, fearing COVID-19, having sleep problems, having a family

member infected with COVID-19, and being exposed to COVID-19 were all associated with an increased risk of developing depressive symptoms, while being a female, having a high level of disposable monthly income, hope and social support decreased the risk of depressive symptoms among university students. Measures to enhance the mental health of students who are depressed should be done based on substantial risk factors, and responsible bodies should endeavor to safeguard them.

Abbreviations CES-D: Center for Epidemiologic Studies Disease; COVID-19: Corona Virus Disease 2019; ETB: Ethiopian Birr; HHI: Hearth Hope Index; Oslo-3 PSS: Oslo-3 Perceived Social Support

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Author Contribution MEL and SAT: designed the study, participated in the data extraction, performed analysis interpreted results, and drafted. Finally, both authors read and approved the manuscript.

Data Availability The datasets used in this study available from the corresponding author on reasonable request.

Declarations

Ethical Approval and Consent for Participation Ethical clearance was obtained from the Mizan-Tepi University, College of Natural and computational Science. The investigators informed the study participants about the overall objective of the study, and informed that their responses would be kept anonymous to guarantee the confidentiality of the information they gave. Therefore, every respondent's consent for participation was informed before proceeding to fill the questionnaire. Furthermore, the questionnaire was developed anonymously, and the study results were given as aggregated numbers rather than identifying the respondents' personalities.

Consent for Publication Not applicable.

Competing Interests The authors declare no competing interests.

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