

Research Article

Stress, Anxiety, and Depression among Medical Undergraduate Students and Their Coping Strategies

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Background. Students' mental health deteriorates after they enter medical school and continues to deteriorate throughout their training. Every individual has a certain number of coping resources, and once these coping resources are challenged, mental illness usually results. **Objective.** We aimed to determine the prevalence and severity of depression, anxiety, and stress as well as coping strategies used by medical undergraduate students enrolled in Arsi University. **Methods.** Institution-based, cross-sectional design was conducted on 265 sampled medical students. Participants were selected by a systematic, random-sampling technique. Data were collected by pretested, structured, and self-administrated questionnaires. Afterwards, logistic regression analysis was employed, and statistical significance was accepted at $p < 0.05$. **Results.** In the present study, 5 questionnaires were rejected for incompleteness, resulting in a response rate of 98.1%. The mean age of the respondents was 22.03 (SD = 2.074) years. The current prevalence rates of depression, anxiety, and stress were 52.3%, 60.8%, and 40.4%, respectively. The proportion of respondents who had extremely severe symptoms of depression, anxiety, and stress was 6.2%, 16.2%, and 2.3%, respectively. Depression was specifically associated with monthly income and residency. Anxiety was significantly associated with residency and educational level. Stress was associated with monthly income, educational level, and residency. The main coping strategy adopted by the respondents was religion with a mean (\pm SD) of 5.94 (1.85). The coping mechanisms of denial, substance use, behavioral disengagement, venting, and self-blame were significantly associated with depression, anxiety, and stress. **Conclusion.** Overall prevalence rate of depression, anxiety, and stress is alarmingly high. Therefore, implementing stress reduction interventions and establishing a student counseling center are highly recommended.

1. Introduction

Stress is a biopsychosocial model that refers to the consequence of the failure of an organism to respond adequately to mental, emotional, or physical demands [1]. Clinically, anxiety is characterized by intense feelings of dread, accompanied by somatic symptoms that indicate a hyperactive autonomic nervous system [2], whereas depression manifests as loss of interest or pleasure, sadness, feelings of guilt or low self-worth, disturbed sleep or appetite, extreme tiredness, and poor concentration [3]. Studies suggest that mental health worsens after students begin medical school and remain poor throughout training. Consequently, it is commonly observed that medical students and resident

doctors experience high rates of psychological morbidity when compared with students in other disciplines [4–7]. Previous studies have shown that stress is adversely affecting medical student physical and cognitive capacities [8–11]. When associated with anxiety and depression, occupational stress, as experienced by the student, can influence his or her quality of life and decrease his or her academic performance due to anxiety-induced difficult cognitive functioning, such as memory disorders, blockage, incapacity to make decisions, and increased sensitivity to appraisals of others [12]. Similarly, high rates of depression, anxiety, and stress can result in poor quality of life, drug abuse, and suicide [13–15]. Globally, the incidence of depression, anxiety, and stress among medical students is increasingly reported [16–20].

For instance, the prevalence of stress within undergraduate medical students of the United States (26%) [21], Britain (31.2%) [22], Malaysia (41.9%) [23], Nigeria (94.2%) [24], and Ethiopia (52.4%) [25]. Sources of increased stress levels experienced by students include overcrowded lecture halls, semester grading system, inadequate resources and facilities, adaptation to the new environment, being away from home for the first time, and changes in living arrangements, the vastness of the syllabus, long hours, and expectations of rote learning [26–28].

Coping strategies are specific efforts that individuals employ to manage stress, both behavioral and psychological, so they can tolerate, reduce, or minimize stressful events. Although people differ in the way they think about and react to stressful situations, coping plays a central role in adaptation to stressful life events [29]. Every individual has a certain number of coping resources, and once these coping resources are challenged or exceeded, stress usually results [24]. The equipping of undergraduates with the skills necessary to recognize personal distress and to develop strategies to promote their own well-being is fundamental to promoting professionalism [8]. Conversely, failure in coping with stress may lead students to stop or discontinue further education, suicidal intentions or make students participate in activities like smoking, drinking, aggressive behavior with others, damaging the institution's property, or involving in violent activities by disrespecting laws and rights of others [2, 20].

The main goals and objectives of the medical curriculum are to provide competent and safe doctors to the community. A mentally healthy student is one who thinks clearly and logically, is able to initiate proper social relationships, and is eager to learn with a substantial ambition to implement his/her plans in the future [2]. The equipping of undergraduates with the skills necessary to recognize personal distress (to determine when they need to seek assistance) and to develop strategies to promote their own well-being is fundamental to promoting professionalism [8]. Therefore, the main aim of this study was to determine the prevalence and severity of depression, anxiety, and stress as well as coping strategies used by medical undergraduate students enrolled in Arsi University.

2. Methods and Materials

Arsi University College of Health Sciences focuses on educating and/or training competent and ethical health professionals for the contribution of paramount in national GDP, particularly the health of the whole community in the growing manufacturing industry, at all levels [30]. The medical curriculum of the School of Medicine at Arsi University takes six years [30]. Medical students stay three years in the preclinical and three in the clinical practice. Furthermore, specific to Arsi University's medical curriculum, the type of assessment between preclinical and clinical students is different. In a preclinical year, medical students are assessed with 70% written and 30% practical examinations, while the reverse is true in clinical years.

Institution-based, cross-sectional study design was conducted at Arsi University from January 03 to 31, 2019, among 265 sampled undergraduate medical students. The sample size was first estimated by a single population proportion with 95% CI, 5% margin of error, and prevalence of depression (51.3%), anxiety (66.9%), and stress (53%), which are taken from Iqbal et al.'s study [31]. Thereafter, by taking maximum result, the minimum required sample size for the present study was calculated through the correction formula because the overall numbers of medical students in the study area were <10,000. In the present study, after proportional allocation of the calculated sample size to each academic year level, stratified random sampling was employed. From each stratum, after randomly selecting the first respondent based on their id number required, respondents were chosen every 4 intervals through systematic random sampling. All medical students in Arsi University at the time of the study were eligible to participate with the exception of severely ill students and that was out of town during the time of data collection. An ethical support letter was obtained from Arsi University's ethical board. Informed consent was secured, and participation was totally voluntary. The confidentiality was kept anonymous.

Of the 265 sampled students learning at Arsi University, 260 (98.1%) agreed to take part. Data were collected by a self-administered questionnaire that comprises the following parts.

- (i) Sociodemographic profile: it includes age, gender, enrollment year, marital status, residence, income, religion, and ethnicity.
- (ii) Depression Anxiety Stress Scale 21 (DASS-21): it is self-report tool designed to measure the emotional states of depression, anxiety, and stress over the last week [32]. Each of the three DASS scales contains 7 items. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest or involvement, anhedonia, and inertia; the anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect, while the stress scale is sensitive to levels of chronic non-specific arousal. It also measures difficulty relaxing, nervous arousal, and being easily agitated, irritable, and impatient. When completing the DASS-21, the respondent is required for the presence of a symptom over the previous week. Each item was scored from 0 (did not apply to me) to 3 (applied to me very much or most of the time). Sum scores are computed by adding up the scores on the items per (sub) scale and multiplying them by a factor of 2. Sum scores for the total DASS-total scale thus range between 0 and 120, and those for each of the subscales may range between 0 and 42. For the depression domain, normal scores range from 0–9 and while higher scores range from 10 to 28. For the anxiety domain, the normal scores range between 0 and 7, while pathological scores range from 8 to 20, while for the stress domain, the normal scores range

from 0–14 while the pathological scores range from 15 to 34. Cut-off scores of 60 and 21 are used for the total DASS score and for the depression subscale, respectively. Scores ≥ 60 (for DASS-total) and ≥ 21 (for the depression subscale) are labeled as “high” or “severe.” These cut-off scores are derived from a set of severity ratings proposed by S. Lovibond and P. Lovibond [33]. However, to determine the prevalence of DAS, DASS-21 scores with normal levels of depression, anxiety, and stress were coded as “0” (No), whereas those with mild, moderate, severe, or extremely severe levels were coded as “1” (Yes). These cut-off scores are derived from a set of severity ratings proposed by Yeshaw and Mossie [34]. Various studies demonstrated that the DASS-21 was found to have strong internal consistency. Anxiety Cronbach’s α was 0.80; depression was 0.80; stress was 0.77; and overall was 0.88 [35]. Cronbach’s α for the combination of anxiety and depression was 0.57, 0.70 for anxiety and stress, and 0.60 for depression and stress [36].

- (iii) Brief COPE scale: it is designed to assess a number of different coping behaviors and thoughts after a person’s response to a specific situation among adults with or without clinical conditions [37, 38]. It consists of 28 items, and each item is rated on a 4-point Likert scale ranging from “I have not been doing this at all (score 1)” to “I have been doing this a lot (score 4).” The items were scored to produce 14 dimensions (minimum mean score was 2, and the maximum score was 8), and each dimension reflects the use of a coping strategy, such as active coping, planning, acceptance, denial, self-distraction, use of substance, use of emotional support, use of instrumental support, behavioral disengagement, venting, positive reframing, humor, religion, and self-blame [37]. Mean score interpretations were as follows: 2.00 = have not been doing this at all, 2.01 to 4.00 = have been doing this a little, 4.01 to 6.00 = have been doing this medium amount, and 6.01 to 8.00 = have been doing this a lot. The higher score indicates greater coping by the respondents [39]. It is a validated instrument in which Cronbach’s alpha values range between 0.50 and 0.90, with only 3 coping strategies falling below 0.60 [37, 39].

2.1. Data Processing, Analysis, and Interpretation. The questionnaire was pretested on 13 randomly selected undergraduate medical students of Hawassa University. Data were checked for completeness on a daily basis. To be edited and cleaned, the collected data were double entered into EpiData version 3.1 and exported into SPSS version 21 for analysis. Incomplete and inconsistent data were excluded from the analysis. The data were processed by using descriptive analysis and analytical methods, including frequency distribution, cross-tabulation, and summary

measures. Bivariate logistic regression was used to measure the association between independent variables with dependent variables. All variables with a p -value of <0.05 on bivariate logistic regression were entered into the multiple logistic regression model for predicting the influence of criterion variables. Multiple logistic regression analysis was carried out to find the role of each significant variable in determining the relevant subscale scores. Odds ratios were calculated, and statistical significance was accepted at $p < 0.05$.

3. Results

3.1. Sociodemographic Characteristics. From a total of 265 medical students who received the questionnaire, 260 completed the survey, yielding an overall response rate of 98.1%. Age of the study sample ranged between 18 and 27 years with the mean (SD) of 22.03 (± 2.62) years. In the present study, most respondents were male (63.1%), single in marital status (75.4%), living in campus (91.5%), and had a monthly income of ≤ 700 ETB (52.7%) (Table 1). Regarding their academic year, religion, and ethnicity, 54 (20.8%) were from the sixth year, 130 (50%) were Orthodox believers, and 139 (53.9%) were Oromo, respectively.

3.2. Prevalence of Depression, Anxiety, and Stress. The present study demonstrated a strong internal consistency between depression and anxiety ($r = 0.494$, $p < 0.001$), depression and stress ($r = 0.456$, $p < 0.001$), and stress and anxiety ($r = 0.420$, $p < 0.001$). From the 260 valid analyzed questionnaires, the proportion of respondents detected to have depression, anxiety, and stress symptoms was 52.3%, 60.8%, and 40.4%, respectively, whereas the percentage of respondents who had extremely severe symptoms of depression, anxiety, and stress was 6.2%, 16.2%, and 2.3%, respectively (Table 2).

3.3. Association of Sociodemographic Characteristics with Depression, Anxiety, and Stress. A binary logistic regression analysis was applied to evaluate the possible impact of sociodemographic characteristics of respondents’ depression level (Table 3). In the present study, depression had no statistical association with age, educational year, religion, and ethnicity. Conversely, it had a statistically significant association with respondents’ gender, in which males were 0.59 times less likely to be depressed than females (95% CI: 0.36–0.99). It was also associated with a monthly income, in which respondents who had a monthly income of ≤ 700 ETB were 1.68 times more depressed than those above 700 ETB (95% CI: 1.03–2.74). Depression was also associated with marital status, in which respondents who were not in a relationship (single) were 0.53 times less likely depressed than those in a relationship (married) (95% CI: 0.30–0.95). Finally, it was also statistically associated with residency, in which nondormitory living respondents were 10.52 more likely depressed than those living in a dormitory (95% CI: 2.41–46.00) (Table 3).

TABLE 1: Sociodemographic characteristics in relation to gender, $N=260$, AU, January 2019.

Sociodemographic variables		Male	Female	Total ($N=260$)
Age	<20 years	36 (54.5%)	30 (45.5%)	66 (100.0%)
	20-24 years	91 (67.4%)	44 (32.6%)	135 (100.0%)
	>24 years	37 (62.7%)	22 (37.3%)	59 (100.0%)
Marital status	Single	128 (65.3%)	68 (34.7%)	196 (100.0%)
	Married	36 (56.3%)	28 (43.8%)	64 (100.0%)
Monthly income	≤ 700 ETB	87 (63.5%)	50 (36.5%)	137 (100.0%)
	>700 ETB	77 (62.6%)	46 (37.4%)	123 (100.0%)
Educational year	1st year	27 (61.4%)	17 (38.6%)	44 (100.0%)
	2nd year	22 (48.9%)	23 (51.1%)	45 (100.0%)
	3rd year	23 (59.0%)	16 (41.0%)	39 (100.0%)
	4th year	36 (76.6%)	11 (23.4%)	47 (100.0%)
	5th year	23 (74.2%)	8 (25.8%)	31 (100.0%)
	6th year	33 (61.1%)	21 (38.9%)	54 (100.0%)
Residency	Nondormitory	11 (50.0%)	11 (50.0%)	22 (100.0%)
	Dormitory	153 (64.3%)	85 (35.7%)	238 (100.0%)
Religion	Orthodox	80 (61.5%)	50 (38.5%)	130 (100.0%)
	Muslim	40 (62.5%)	24 (37.5%)	64 (100.0%)
	Protestant	42 (67.7%)	20 (32.3%)	62 (100.0%)
	Others [‡]	2 (50.0%)	2 (50.0%)	4 (100.0%)
Ethnicity	Oromo	97 (69.8%)	42 (30.2%)	139 (100.0%)
	Amhara	38 (53.5%)	33 (46.5%)	71 (100.0%)
	Sidama	2 (33.3%)	4 (66.7%)	6 (100.0%)
	Tigre	7 (50.0%)	7 (50.0%)	14 (100.0%)
	Wolayita	5 (62.5%)	3 (37.5%)	8 (100.0%)
	Others ^{††}	12 (66.7%)	6 (33.3%)	18 (100.0%)
		3 (75.0%)	1 (25.0%)	4 (100.0%)

Key . [‡]Catholic, Waaqeffanna, Faith, and Pagan. ^{††}Silte, Harari, and Kambata. ETB=Ethiopian Birr. Current exchange rate: \$1USD = 45.50 ETB.

TABLE 2: Severity distribution of depression, anxiety, and stress in relation to gender, $N=260$, AU, January 2019.

Subscale	Sex		Total N (%)	
	Male N (%)	Female N (%)		
Depression	Normal	86 (69.4)	38 (30.6)	124 (100.0)
	Mild	34 (63.0)	20 (37.0)	54 (100.0)
	Moderate	25 (55.6)	20 (44.4)	45 (100.0)
	Severe	15 (71.4)	6 (28.6)	21 (100.0)
	Extremely severe	4 (25.0)	12 (75.0)	16 (100.0)
Anxiety	Normal	72 (70.6)	30 (29.4)	102 (100.0)
	Mild	13 (59.1)	9 (40.9)	22 (100.0)
	Moderate	41 (65.1)	22 (34.9)	63 (100.0)
	Severe	20 (64.5)	11 (35.5)	31 (100.0)
	Extremely severe	18 (42.9)	24 (57.1)	42 (100.0)
Stress	Normal	106 (68.4)	49 (31.6)	155 (100.0)
	Mild	20 (54.1)	17 (45.9)	37 (100.0)
	Moderate	29 (70.7)	12 (29.3)	41 (100.0)
	Severe	8 (38.1)	13 (61.9)	21 (100.0)
	Extremely severe	1 (16.7)	5 (83.3)	6 (100.0)

In a binary logistic regression analysis of the present study, anxiety had no significant statistical association with sociodemographic variables like monthly income, religion, and ethnicity (Table 3). Contrariwise, it was statistically associated with the age of respondents, with individuals in the age range between 20 and 24 being 1.94 times less likely to be anxious than respondents >24 years (95% CI: 1.04–3.61). It was also associated with the gender of respondents; males were 0.58 less likely to be anxious compared to females (95% CI: 0.34–0.99). Anxiety was also

associated with marital status; respondents who were not in a relationship (single) were 0.52 times less likely to be anxious than those in a relationship (married) (95%: 0.28–0.96). Concerning its association with the educational level of respondents, third-year respondents were 4.85 more likely to be anxious than sixth-year students (95% CI: 1.93–12.19). Finally, anxiety was also associated with residency; nondormitory living respondents were 15.48 more likely to be anxious than those living in a dormitory (95% CI: 2.05–116.00) (Table 3).

TABLE 3: Logistic regression of sociodemographic risk factors versus depression, anxiety, and stress, N=260, AU, January 2019.

Sociodemographic variables		Total N (%)	Depression		Anxiety		Stress	
			COR	AOR	COR	AOR	COR	AOR
Age	<20 years	66 (100.0)	1.09 (0.54–2.20)		1.70 (0.83–3.46)	0.41 (0.09–1.88)	2.07 (1.01–4.27)	2.08 (0.47–9.31)
	20–24 years	135 (100.0)	1.07 (0.58–1.98)		1.94 (1.04–3.61)	0.64 (0.24–1.69)	1.18 (0.62–2.25)	0.98 (0.39–2.47)
	>24 years	59 (100.0)	1.00*		1.00*	1.00*	1.00*	1.00*
Sex	Male	164 (100.0)	0.59 (0.36–0.99)	0.63 (0.37–1.08)	0.58 (0.34–0.99)	0.60 (0.33–1.08)	0.57 (0.34–0.95)	0.66 (0.37–1.16)
	Female	96 (100.0)	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*
Monthly income	≤700 ETB	137 (100.0)	1.68 (1.03–2.74)	1.97 (1.17–3.33)	1.45 (0.88–2.39)		1.87 (1.13–3.10)	1.99 (1.00–3.98)
	>700 ETB	123 (100.0)	1.00*	1.00*	1.00*		1.00*	1.00*
Marital status	Single	196 (100.0)	0.53 (0.30–0.95)	0.60 (0.33–1.11)	0.52 (0.28–0.96)	0.52 (0.26–1.03)	0.55 (0.31–0.96)	0.56 (0.30–1.05)
	Married	64 (100.0)	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*
Educational year	First year	44 (100.0)	1.27 (0.57–2.82)		1.91 (0.85–4.28)	8.31 (1.65–41.77)	1.03 (0.45–2.40)	0.51 (0.10–2.63)
	Second year	45 (100.0)	1.59 (0.72–3.52)		4.50 (1.88–10.73)	14.89 (3.40–65.23)	4.92 (2.09–11.61)	1.84 (1.02–11.21)
	Third year	39 (100.0)	0.99 (0.44–2.27)		4.85 (1.93–12.19)	12.78 (3.45–47.37)	0.69 (0.28–1.72)	0.54 (0.16–1.86)
	Fourth year	47 (100.0)	1.32 (0.60–2.89)		2.34 (1.05–5.22)	6.54 (2.02–21.16)	1.24 (0.55–2.81)	1.11 (0.34–3.57)
	Fifth year	31 (100.0)	1.84 (0.75–4.51)		2.014 (0.82–4.94)	5.47 (1.78–16.84)	1.26 (0.50–3.16)	1.12 (0.34–3.69)
	Sixth year	54 (100.0)	1.00*		1.00*	1.00*	1.00*	1.00*
Residency	Nondormitory	22 (100.0)	10.52 (2.41–46.00)	12.55 (2.79–56.37)	15.48 (2.05–116.0)	42.11 (4.88–363.36)	3.52 (1.38–8.97)	4.93 (1.73–14.08)
	Dormitory	238 (100.0)	1.00*	1.00*	1.00*	1.00*	1.00*	1.00*
Religion	Orthodox	130 (100.0)	4.39 (0.43–44.51)		0.93 (0.40–2.17)		0.83 (0.11–6.25)	
	Muslim	64 (100.0)	3.29 (0.33–32.47)		0.79 (0.31–2.03)		0.63 (0.09–4.58)	
	Protestant	62 (100.0)	2.64 (0.26–26.76)		0.77 (0.31–1.90)		0.63 (0.08–4.79)	
	Others	4 (100.0)	1.00*		1.00*		1.00*	
Ethnicity	Oromo	139 (100.0)	0.93 (0.13–6.79)		1.44 (0.20–10.51)		0.22 (0.02–2.15)	
	Amhara	71 (100.0)	1.29 (0.17–9.68)		1.45 (0.19–10.88)		0.22 (0.02–2.19)	
	Sidama	6 (100.0)	1.00 (0.08–12.56)		5.00 (0.27–91.52)		0.67 (0.04–11.29)	
	Tigre	14 (100.0)	1.00 (0.11–9.23)		2.50 (0.26–24.38)		0.25 (0.02–3.04)	
	Wolayita	8 (100.0)	3.00 (0.24–37.67)		1.67 (0.15–18.87)		0.11 (0.01–1.78)	
	Gurage	18 (100.0)	1.57 (0.18–13.86)		2.00 (0.22–17.89)		0.21 (0.02–2.47)	
	Others	4 (100.0)	1.00*		1.00*		1.00*	

Key. *Reference category.

In the present study, when the impact of sociodemographic characteristics on the stress level was evaluated by binary logistic regression analysis, stress had no association with religion and ethnicity (Table 3). However, it had a significant statistical association with the age of respondents, with respondents younger than 20 years being 2.07 more likely stressed than those older than 24 years (95% CI: 1.01–4.27). It was also associated with the sex of respondents with males being 0.57 times less likely stressed than females (95% CI: 0.34–0.95). Statistically, it was also associated with monthly income; participants who had a monthly income of ≤ 700 ETB were 1.87 times more likely stressed than those respondents who had a monthly income of above 700 ETB (95% CI: 1.13–3.10). Stress was also associated with marital status; respondents who were not in a relationship (single) were 0.55 times less likely stressed than those in a relationship (married) (95%: 0.31–0.96). Concerning its association with the educational level of respondents, the second-year respondents were 4.92 times more likely stressed than those in the sixth year (95% CI: 2.09–11.61). Finally, it is also statistically associated with residency; nondormitory living respondents were 3.52 more likely stressed than those in the dormitory (95% CI: 1.38–8.97) (Table 3).

3.4. Predictor Risk Factors for Depression, Anxiety, and Stress. For variables who were candidates for multivariate logistic regression (p -value < 0.05), the predictors of depression were monthly income and residency (Table 3). In the present study, the odds of being depressed were markedly increased with 1.97 times among respondents who had a monthly income of ≤ 700 ETB than > 700 ETB (95% CI: 1.17–3.33). Similarly, the odds of being depressed were markedly increased with 12.55 times among respondents living in nondormitory than those living in a dormitory (95% CI: 2.79–56.37).

Concerning anxiety, only educational years and residency were found to be predictors of anxiety (Table 3). In the present study, the odds of being anxious were markedly decreased as the educational level increased after the first year. For example, the odds of being anxious were markedly increased with 14.89 times in the second-year students compared to the sixth-year ones (95% CI: 3.40–65.23). The odds values of being anxious were also more likely to increase to 42.11 times among participants living in nondormitory than in a dormitory (95% CI: 4.88–363.36).

In the present study, monthly income, educational year, and residency were found to be predictors of stress in all sociodemographic characteristics (Table 3). For instance, the odds of being stressed were markedly increased to 1.99 times among participants who had a monthly income of ≤ 700 ETB than those who had above 700 ETB (95% CI: 1.00–3.98). Similarly, the odds of being stressed were markedly increased with 1.84 times in the second-year participants higher compared to the sixth-year ones (95% CI: 1.02–11.21). Furthermore, the odds of being stressed were more likely to

increase to 4.93 times among respondents living in non-dormitories than those in a dormitory (95% CI: 1.73–14.08).

3.5. Effectiveness of Coping Strategies. The total coping strategies applied by the respondents were 28 with the minimum score of 2 and a maximum score of 8. Among coping strategies, “religious coping with a mean (\pm SD) coping score of 5.94 (1.85), active coping with 5.52 (1.75), positive reframing with 5.39 (1.67), and planning with 5.38 (1.71)” were found to be the axioms used by most respondents. Inversely, “behavioral disengagement with a mean (\pm SD) coping score of 4.34 (1.75), denial with 4.10 (1.70), and substance use with 3.47 (1.81)” were found to be the least used coping strategies (Table 4). In the present study, active coping strategies were the most commonly used strategies than avoidant strategies. However, there was a variation across genders concerning the specific types of coping strategies used by respondents. Females were more commonly involved in the use of emotional support with a mean (\pm SD) coping score of 4.89 (1.67), use of instrumental support with 5.33 (1.82), positive reframing with 5.65 (1.77), humor with 4.93 (1.89), acceptance with 5.15 (1.78), religion with 6.09 (2.00), and self-blame with 4.78 (1.64) than males did. Contrariwise, males were more commonly used active coping with a mean (\pm SD) coping score of 5.56 (1.71) and substance use with 3.49 (1.75) than females did (Table 4).

3.5.1. Coping Strategies Adopted under Depressed Situation. A binary logistic regression analysis was done to assess the common coping strategies that were utilized by respondents under depressed situations. From the total 14 factors of the BC instrument, 7 factors were not statistically associated with respondents’ depression level ($p < 0.05$) (Table 5). However, the coping mechanisms of denial, substance use, use of emotional support, use of instrumental support, behavioral disengagement, venting, self-blame, and humor were significant variations among DAS-depression distribution.

3.5.2. Coping Strategies Adopted under Anxious Situation. In the present study, a binary logistic regression analysis was done to assess common coping strategies that were utilized by respondents under an anxious situation. Out of the 14 factors of the BC instrument, 8 factors were not statistically associated with the scores of respondents’ anxiety level ($p < 0.05$) (Table 6). Nevertheless, the coping mechanisms of denial, substance use, behavioral disengagement, venting, positive reframing, and self-blame were significant variations among DAS-anxious distribution.

3.5.3. Coping Strategies Adopted under Stressed Situation. A binary logistic regression analysis was also done to assess the common coping strategies that were utilized by respondents under a stressed situation. Other than humor, acceptance, and religion, all other factors of the BC

TABLE 4: Rank of coping strategies according to mean score as rated by study participants in relation to gender, $N = 260$, AU, January 2019.

Scale	Sex		Total ($N = 260$) mean (SD)
	Male mean (SD)	Female mean (SD)	
Self-distraction	5.09 (1.41)	5.06 (1.69)	5.08 (1.52)
Active coping*	5.56 (1.71)	5.46 (1.82)	5.52 (1.75)
Denial	4.12 (1.65)	4.07 (1.80)	4.10 (1.70)
Substance use*	3.49 (1.75)	3.44 (1.92)	3.47 (1.81)
Use of emotional support**	4.58 (1.59)	4.89 (1.67)	4.69 (1.63)
Use of instrumental support**	4.92 (1.66)	5.33 (1.82)	5.07 (1.73)
Behavioral disengagement	4.33 (1.73)	4.37 (1.81)	4.34 (1.75)
Venting	4.76 (1.34)	4.76 (1.67)	4.76 (1.47)
Positive reframing**	5.24 (1.60)	5.65 (1.77)	5.39 (1.67)
Planning	5.35 (1.62)	5.43 (1.87)	5.38 (1.71)
Humor**	4.76 (1.78)	4.93 (1.89)	4.82 (1.82)
Acceptance**	4.90 (1.63)	5.15 (1.78)	4.99 (1.69)
Religion**	5.85 (1.76)	6.09 (2.00)	5.94 (1.85)
Self-blame**	4.57 (1.73)	4.78 (1.64)	4.65 (1.70)

Key.* Male mean scores are significantly higher than female mean scores. ** Female mean scores are significantly higher than male mean scores.

TABLE 5: Bivariate logistic regression of coping strategies adopted by respondents under depressed situation, $N = 260$, AU, January 2019.

Category	Overall mean (SD)	Depression		p -value
		Yes mean (SD)	No mean (SD)	
Self-distraction	5.08 (1.52)	5.24 (1.46)	4.90 (1.57)	0.078
Active coping	5.52 (1.75)	5.68 (1.54)	5.36 (1.94)	0.139
Denial	4.10 (1.70)	4.54 (1.75)	3.62 (1.52)	0.001
Substance use	3.47 (1.81)	2.99 (1.55)	3.91 (1.92)	0.001
Use of emotional support	4.69 (1.62)	4.97 (1.56)	4.39 (1.65)	0.004
Use of instrumental support	5.07 (1.73)	5.32 (1.66)	4.79 (1.76)	0.013
Behavioral disengagement	4.34 (1.75)	4.88 (1.68)	3.75 (1.65)	0.001
Venting	4.76 (1.47)	5.15 (1.34)	4.33 (1.50)	0.001
Positive reframing	5.39 (1.67)	5.52 (1.60)	5.24 (1.75)	1.178
Self-blame	4.65 (1.70)	5.20 (1.62)	4.05 (1.57)	0.001
Planning	5.38 (1.71)	5.48 (1.66)	5.27 (1.77)	0.321
Humor	4.82 (1.82)	5.13 (1.68)	4.49 (1.91)	0.005
Acceptance	4.99 (1.69)	5.09 (1.64)	4.88 (1.74)	0.319
Religion	5.94 (1.85)	5.88 (1.84)	6.00 (1.87)	0.610

TABLE 6: Bivariate logistic regression of coping strategies adopted by respondents under anxious situation, $N = 260$, AU, January 2019.

Category	Overall mean (SD)	Anxiety		p -value
		Yes mean (SD)	No mean (SD)	
Self-distraction	5.08 (1.52)	5.23 (1.51)	4.84 (1.50)	0.050
Active coping	5.52 (1.75)	5.64 (1.57)	5.34 (1.99)	0.183
Denial	4.10 (1.70)	4.49 (1.71)	3.51 (1.51)	0.001
Substance use	3.47 (1.81)	3.76 (1.94)	3.03 (1.48)	0.001
Use of emotional support	4.82 (1.60)	4.49 (1.67)	4.70 (1.63)	0.108
Use of instrumental support	5.07 (1.73)	5.24 (1.67)	4.80 (1.79)	0.050
Behavioral disengagement	4.34 (1.75)	4.71 (1.68)	3.78 (1.72)	0.001
Venting	4.76 (1.47)	5.01 (1.39)	4.36 (1.51)	0.001
Positive reframing	5.39 (1.67)	5.56 (1.65)	5.13 (1.69)	0.043
Self-blame	4.65 (1.70)	4.93 (1.67)	4.22 (1.66)	0.001
Planning	5.38 (1.71)	5.54 (1.67)	5.12 (1.76)	0.050
Humor	4.82 (1.82)	5.00 (1.79)	4.55 (1.84)	0.051
Acceptance	4.99 (1.69)	5.02 (1.67)	4.94 (1.72)	0.717
Religion	5.94 (1.85)	6.03 (1.80)	5.80 (1.94)	0.348

TABLE 7: Bivariate logistic regression of coping strategies adopted by respondents under stressed situation, $N=260$, AU, January 2019.

Category	Overall mean (SD)	Stress		<i>p</i> -value
		Yes mean (SD)	No mean (SD)	
Self-distraction	5.08 (1.52)	5.31 (1.30)	4.92 (1.64)	0.038
Active coping	5.52 (1.75)	5.91 (1.51)	5.26 (1.85)	0.003
Denial	4.10 (1.70)	4.55 (1.81)	3.80 (1.56)	0.001
Substance use	3.47 (1.81)	3.77 (2.06)	3.27 (1.59)	0.028
Use of emotional support	4.69 (1.63)	5.10(1.60)	4.42 (1.59)	0.001
Use of instrumental support	5.01 (1.73)	5.48 (1.66)	4.79 (1.72)	0.002
Behavioral disengagement	4.34 (1.75)	4.86 (1.80)	3.99 (1.64)	0.001
Venting	4.76 (1.47)	5.20 (1.38)	4.46 (1.46)	0.001
Positive reframing	5.39 (1.67)	5.72 (1.56)	5.16 (1.72)	0.008
Self-blame	4.65 (1.70)	5.34 (1.46)	4.18 (1.69)	0.001
Planning	5.38 (1.71)	5.84 (1.58)	5.07 (1.74)	0.001
Humor	4.82 (1.82)	5.06 (1.75)	4.67 (1.85)	0.088
Acceptance	4.99 (1.69)	5.20 (1.61)	4.85 (1.73)	0.096
Religion	5.94 (1.85)	6.16 (1.77)	5.79 (1.90)	0.110

instrument were statistically associated with respondents' stress level ($p < 0.05$) (Table 7).

4. Discussion

The main goal and objective of the medical curriculum is to provide competent and safe doctors to community. However, mental illness among medical students has often been swept under the carpet and underrecognized [40], although the rates of these mental illnesses among this vulnerable population are by no means trivial. Coping strategy is how a person reacts or responds to a stressor [41–44]. And coping is always associated with stress as a feature of adaptation [45]. Although coping does not directly reduce stress levels, it moderates the impact of stress, according to Lazarus [46].

Therefore, the main aim of the present study was to determine the prevalence and severity of depression, anxiety, and stress as well as coping strategies used by medical undergraduate students enrolled in Arsi University.

The overall prevalence of depression, anxiety, and stress symptoms was 52.3%, 60.8%, and 40.4%, respectively. The reason might be medical students are overloaded with a tremendous amount of information with limited time for internalization, a new study environment with obligation to succeed especially during preclinical encounters [8, 27, 47]. This greater degree of workload creates a feeling of distress and disappointment that predisposes students to having difficulties in solving problems, impaired judgment, and absenteeism from class lessons and breaks their mental stability [25, 48–51]. Actually, our present finding is almost similar to the prevalence reported by Basudan et al. [52], Kulsoom and Afsar [53], Inam et al. [54], and Iqbal et al. [31]. Conversely, it is higher than the study reports of Shamsuddin et al. [55], Fuad et al. [56], Moutinho et al. [57], Mehta et al. [58], and Wong et al. [59]. This difference could be due to the difference in the cultural perception of stressful factors, economic burden, very high tuition fees, lack of

family support, and higher or lower “readiness” to report different complaints [60, 61]. In our present setup, academic counseling is not a common practice that may be also a contributor.

The proportion of respondents who had extremely severe symptoms of depression, anxiety, and stress was 6.2%, 16.2%, and 2.3%, respectively. This prevalence was similar to the finding of Patil et al. [62]. However, it is inconsistent with the study results of Gan et al. [63] and Al-Ani Radeef and Ghazi [64]. Discrepancies stemming from the methodology and type of questionnaire used could account for this high prevalence obtained by the aforementioned authors. Other possible reasons for the variability could be due to certain differences in the curriculum, teaching facilities, qualification and experience of the instructors, and level of care given to the students.

In this cross-sectional study, we correlated socio-demographic risk factors of the student (as independent variables) with the prevalence of depression, anxiety, and stress levels amongst the undergraduate medical students of Arsi University. In our study, students living in nondormitories have a considerably higher degree of depression, anxiety, and stress, which infers living in a dormitory came out to be protective. This finding is in line with the study reported by Rab et al. [65] and Ajay and Vijay [66]. However, it is inconsistent with the study reports of Kunwar et al. [67] and Liaqat et al. [68]. This unequivocal distribution tells us that probably depression, anxiety, and stress are associated with a multitude of factors such as poor dormitory conditions, more economic stress, distance from the family, less structured environment, and problems dealing with roommates, which might be different or parallel in the two study groups under consideration.

Medical students who had lower monthly incomes were more likely to be depressed and stressed. Despite the fact that food and dormitory services are provided to the students by the university, students need money for excursions, to print handouts, to buy dressings, and other basic necessities [25]. This indicates that financial constraints could be an

additional source of depression, anxiety, and stress besides academic stressors [69–73]. However, other studies have noted no difference [74, 75]. Again, sample size differences may account for these different results. The same stressors may be perceived differently by different medical students, depending on their cultural background, personal traits, experience, and coping skills [76]. The educational system also plays an enabling role, subsequently leading to increased stress levels experienced by students.

There was a significant association between students' academic year and the level of anxiety and stress. Many studies have shown higher stress levels and a higher prevalence of stress-related illnesses among 2nd-year medical students compared to other academic years [25, 47, 54, 77]. On the other hand, senior students developed skills of how to manage stress and stress-related illness than students in the early years [78]. The possible reason could be the amount and complexity of the material to be learned in the second year with progressive assessments of anatomy, physiology, and biochemistry that they have to pass to join the next higher level. Additional supportive evidence is the high level of stress and stress-related illness, which can be attributed to course workload, lack of leisure time, shortage of learning materials, and frequent examinations [79, 80].

It has been proven that coping mechanisms are essential for individuals perceiving stress. Coping strategies refer to specific efforts, both behavioral and psychological, that people employ to master, reduce, tolerate, or minimize stress due to undesired events [41, 43, 81]. Effective and appropriate coping strategies may minimize the impact of encountered stressful situations on one's well-being [82, 83]. The strategies that the students identified for coping with stress covered almost all categories reported previously [84]. "Active coping" means taking action or exerting efforts to remove or circumvent the stressor, while "acceptance" means accepting the stressful event, "planning" consists of thinking about how to confront the stressor, "positive reframing" means making best of the situation by growing from it, and "denial" is an attempt to reject the reality of the stressful event and "behavioral disengagement" means giving up or withdrawing efforts to attain a goal [27].

In the present study, the widely employed original COPE questionnaire containing 14 domains of coping strategies was utilized to assess the most common strategies adopted by respondents. The coping strategies most commonly reported by respondents comprise religious coping, active coping, positive reframing, and planning strategies. The main coping strategy adopted by the respondents was religion, which was similar to the study by Al-Sowygh [45], Gade et al. [83], Ahmad et al. [85], Bormann et al. [86], and Muhamad [87]. This was also reported by Krauss [88], who stated that religious people posed a higher level of self-control; thus, they are more able to persist in difficult tasks and life situations. However, our result finding was dissimilar to the study findings reported in Malaysia [39] and Jordan [89]. The possible reasons for the variability could be due to certain differences in the curriculum, teaching facilities, and the level of care given to the students.

A significant correlation between DAS scores and coping mechanisms was found. In particular, the coping mechanisms of denial, substance use, behavioral disengagement, venting, and self-blame were significantly associated with DAS, which have been reported in studies as very adaptive and hasten the recovery from distress [37, 43, 45, 90]. However, the present study was dissimilar to studies conducted in the United Kingdom and Jordanian medical students, who are using alcohol, tobacco, and drugs as common coping strategies [21, 22, 77, 89, 91]. The possible reasons for the variability could be due to geographical and racial differences.

5. Conclusion

The overall prevalence of depression, anxiety, and stress is alarmingly high among undergraduate medical students of Arsi University. Monthly income and residency were identified as risk factors of depression. Similarly, residency and educational level were risk factors for anxiety. Lastly, monthly income, educational level, and residency were predictors for stress. There was no significant difference in depression, anxiety, and stress between age groups, sex, marital status, ethnicity, and religion.

6. Limitations and Recommendations

The present study was a cross-sectional study conducted among medical students. Therefore, generalization for the College of Health Sciences is impossible. The findings of the present study were based on the self-reported information that was provided by the students, and some potential for reporting bias may have occurred. All tools are also not validated in the present study area. Cause-effect relationship that cannot be established and lacks a control group were also described as limitations of the present study.

Special attention needs to be given to stress reduction. Besides stress reduction interventions, the implementation of a structured orientation program that addresses issues like expectations for each phase, how students are going to be evaluated, how to cope, and how to get through each phase smoothly were recommended. In addition to awareness creation, establishing a student counseling center on campus with qualified staff is also highly recommended. Family or close friend problems (recent death or accidents), distance from family, frequency of money sent, and being first from home to go far were not assessed. We conducted the present study as a preliminary study; however, in the future by incorporating all possible risk factors, studies should be conducted at large.

Abbreviations

ARS:	Academic related stressors
AOR:	Adjusted odds ratio
COR:	Crude odds ratio
CI:	Confidence interval
DRS:	Desire and drive related stressors
EpiData:	Epidemiological data

ETB: Ethiopia Birr
 GARS: Group activity-related stressors
 IRS: Interpersonal and intrapersonal related stressors
 MSSQ: Medical Student Stressor Questionnaire
 SD: Standard deviation
 SRS: Social related stressors
 SPSS: Statistical Package for the Social Sciences
 TLRs: Teaching and learning related stressors.

Data Availability

The dataset used and/or analyzed during the current study is available from the corresponding author upon reasonable request.

Disclosure

An earlier version of the document has been presented as “preprint” through the following link: <https://www.researchsquare.com/article/rs-152511/v1>.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' Contributions

LM, GB, and DW had participated in the design of the study, data analyses, and manuscript preparation. All the authors contributed equally and have read and approved the final manuscript.

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