

# Prioritizing Mental Health: A Cross-Sectional Investigation of Depression Prevalence and Risk Factors among Medical Students in Peshawar, Pakistan

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## Abstract

**Background:** Depression is a significant problem among medical students worldwide, affecting their well-being and potentially compromising patient care. This study aimed to determine the prevalence of depression among medical students in Peshawar, Pakistan, and to identify the associated risk factors. **Methods:** A cross-sectional study was conducted from April to June 2023, involving medical students from seven colleges in Peshawar. We employed stratified sampling to distribute surveys to students. We collected data on socio-demographic characteristics, prevalence of depression using the Hospital Anxiety and Depression Scale (HADS), and depression risk factors. We used multivariate logistic regression, clustered by university, to assess factors associated with depression. **Results:** Out of 400 distributed questionnaires, 324 were returned (response rate: 81%). The participants' mean age was  $21.70 \pm 1.65$  years, with 53.1% being females. The prevalence of depression was 19.4% and 26.2% were borderline cases. No variables were found to be significantly linked to depression in our multivariate regression model. However, male gender, year of study, experiencing discrimination or harassment in medical school, and having negative perceptions of medical school's impact on mental health had odds ratios above 1, with confidence intervals including the null value. **Conclusion:** This study reveals a high prevalence of depression among medical students in Peshawar, Pakistan. It emphasizes the need to address risk factors and establish support systems to minimize the impact of depression on students' well-being and academic performance. Further studies are necessary to identify modifiable factors associated with depression in medical students.

## Introduction

Depressive disorder, commonly referred to as depression, is a significant mental disorder. It is characterized by a long-term sad mood, loss of enjoyment, or interest in activities, with symptoms persisting for about two weeks. Symptoms include anhedonia, diminished energy, guilt or low self-worth, disturbed sleep or hunger, impaired attention, and a loss of interest and pleasure.<sup>1</sup>

Students in higher education, particularly those in their first year, deal with difficulties in both their personal and academic lives. These unfavorable circumstances increase individuals' susceptibility to mental health disorders such as depression.<sup>2</sup>

Medical educators around the world are becoming increasingly concerned about medical students' depression. According to a recent systematic review, depression was present in up to 27.2% of medical students worldwide.<sup>3</sup> Depression is the greatest cause of years spent with a disability and the single largest contributor

to worldwide disability.<sup>4</sup> Inability to operate in the classroom and during clinical rotations, other problems caused by stress, and declining performance are only a few of the potential drawbacks of emotional strain on medical students.<sup>5</sup>

The rate of depression among medical students is quite high and when their training is complete, their levels of overall psychological discomfort are consistently higher than those of peers their own age and the general public.<sup>6</sup> According to a study conducted in India, medical students in their 2<sup>nd</sup> and 3<sup>rd</sup> years are more stressed out and consequently more prone to develop depression than those in their 1<sup>st</sup> year.<sup>7</sup> The struggle of medical students with depression may result in decreased quality of life and increased dropout rates.<sup>8</sup>

Depression rates among medical students vary geographically: from 6.0% to 66.5% in the UK, 13.10% to 76.21% in China, 40% in India, 66.6% of the men and 87.6% of the women in Saudi Arabia,

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10.3% in South Korea, and 70% in Karachi and 48.30% in Punjab, Pakistan.<sup>9-15</sup> Because depression can ultimately result in suicidal ideation, identifying the risk factors of depression in medical students should be a priority. Financial strain, exam-related stress, a lengthy study period in medical schools, and other factors have all been highlighted by Quynh Anh et al. as potential risk factors of depression.<sup>16,17</sup> The female gender, mental illness, lack of support during stressful times, stressful life events experienced within the previous six months, dissatisfaction with one's socioeconomic status, lack of motivation to perform well, and dissatisfaction with student's performance are independent predictors for severe and moderate depression.<sup>18</sup> Regular nutritional consumption, leisure and exercise time, spending time with a partner, friends, and family, and confiding in peers have all been connected to a reduction in depressive symptoms.<sup>19</sup>

To reduce depressive symptoms in medical students, increase self-esteem, reduce self-perceived medical errors, and eventually improve the quality of patient care, factors connected to depression in medical training should be acknowledged and effectively managed.<sup>20</sup> In this study, we aimed to identify prevalence of depression and its associated risk factors in medical students from several colleges in Peshawar, Pakistan.

## Methods

### Study Design

We carried out a cross-sectional survey-based study with medical students from all medical schools in Peshawar, Pakistan. The study was carried out from April 2023 to June 2023.

### Setting

Peshawar is home to seven medical schools. We included all these medical schools in our study. Five of these schools are private, while two are public. The private schools are North West School of Medicine, Pak International Medical College, Peshawar Medical College, Jinnah Medical College, and Rehman Medical Institute. The public medical schools are Khyber Medical College (KMC) and Khyber Girls' Medical College.

### Participants

We obtained informed oral consent from medical students from the 1st to the final year of the MBBS program, and questionnaires were filled out by those willing to participate.

### Sample Size Calculation

To determine the sample size, we utilized the formula:  $SS = Z^2 * P(1-P) / D^2$ , where SS is the Sample Size, Z is 1.96 (reflecting the 95% confidence level), P is the Expected Prevalence or Proportion (approximately 70% from previous studies), and D is the margin of error (0.05).<sup>14,15</sup> By inputting these values into the formula, we calculated an approximate sample size of 323 participants.

### Sampling and Data Collection

We used a stratified sampling technique, accommodating 100 students from each college, except for KMC, which had nearly 200

participants. After a thorough selection process, we chose 50 students from each of the other institutions and 100 students from KMC.

### Survey

The survey contained socio-demographic characteristics, the Hospital anxiety and depression scale (HADS), the 9-item patient health questionnaire (PHQ-9), and questions related to risk factors of depression. The questionnaire was meticulously built by a special committee that included a consultant psychiatrist, a junior member, a healthcare representative, and research committee students who reviewed and discussed the survey. Following their approval, a pilot study was conducted.

### Outcome Variables

The tentative diagnosis of depression was our main outcome of interest, which was evaluated using the HADS, a 14-item questionnaire, out of which 7 questions were used to diagnose depression and 7 were used to diagnose anxiety. So, we used the 7 questions for the diagnosis of depression had the following categories: 0-7 score: Normal case, 8-10 score: Borderline case, 11-21 score: Abnormal case; and severity of depression was found out using PHQ-9, a nine-item questionnaire. The severity of depression was classified as minimal depression (1-4 score), mild (5-9 score), moderate (10-14 score), moderately severe (15-19 score), and severe depression (20-27 score).

### Independent Variables

The potential associations between the following factors and depression were examined: big life event (participants who had experienced the death of a close relative or friend, traffic, rape, breakups, admission to the hospital for a serious illness over the past three months, family mental illness history, academic stress among different years of medical college, and the impact of medical college on their mental health. We also identified if the students were 'day scholars' (live off-campus and commute) or 'hostelites' (live on-campus or in housing provided by the institution). In this study, we also went through to investigate the relationship between depression and discrimination (gender) and harassment in medical college using a predefined question in the survey: "Have you ever experienced any discrimination or harassment during your medical school education."

### Data Analysis

Data was analyzed using SPSS Version 20. Quantitative data was expressed in terms of standard deviation and mean while qualitative was expressed in terms of frequency and percentages. Bivariate analysis included chi square test to find out the relationship between depression, survey-based risk factors of depression, and socio-demographic data.

We utilized logistic regression to identify factors associated with depression using Stata18® (StataCorp, TX). Initially, an exploratory analysis was conducted, employing simple logistic regressions clustered by medical school to identify study

variables associated with depression (HADS score > 10), using a p-value < 0.20. Independent variables deemed significant in the exploratory analysis were subsequently included in a multivariate clustered logistic regression model to identify adjusted risk factors for depression. A p-value <0.05 was considered statistically significant.

## Results

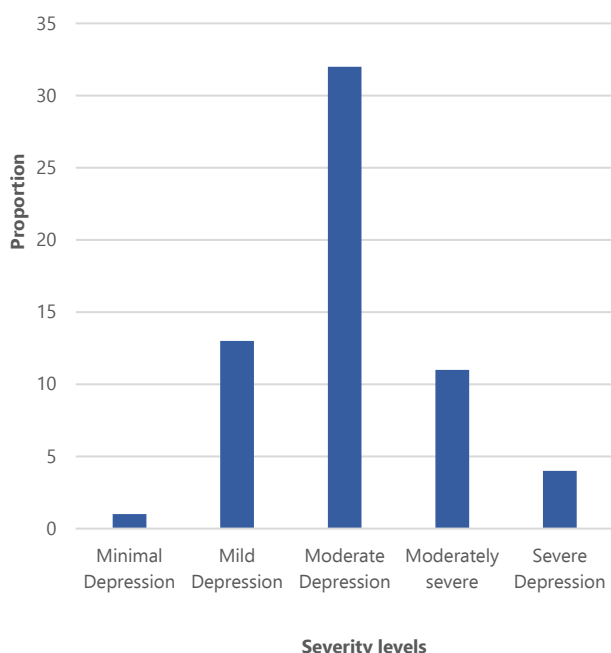
### Socio Demographic Characteristics of Participants

Four hundred questionnaires were distributed among medical students in Peshawar, out of which 324 were returned (response rate: 81%). The participants' ages ranged from 21 to 27, with a mean age of 21.70 ± 1.65 years. Among 324 participants, 151 (46.6%) were male, 172 (53.1%) were female, and 1 participant did not specify their gender. One hundred ninety (58.6%) participants were hostelite, 134 (41.3%) were day scholars. Numbers of participants from different colleges were KMC- 82 (25.3%), RMI- 42 (13%), PIMS- 51 (15.7%), PMC- 39 (12%), JMC- 50 (15.4%), NWMC- 24 (7.4) and KGMC- 36 (11.1%), as shown in [Table 1](#).

### Prevalence of Depression

According to the HADS scale, 63 (19.4%) students were depressed, and 85 (26.2%) were borderline cases. Borderline cases mean that they are at the edge of developing depression. According to PHQ9 scale 3 (0.9) participants had minimal depression, 12 (3.7%) had mild depression, 34 (10.5%) had moderate depression, 10 (3.1%) had moderately severe depression and 4 (1.2%) had severe depression as shown in [Figure 1](#). Depression was high among JMC (36%) students and lowest among KGMC (13.8%) students as shown in [Figure 2](#).

**Figure 1. Distribution of Depression Severity Levels Among Surveyed Medical Students in Different Colleges in Peshawar.**

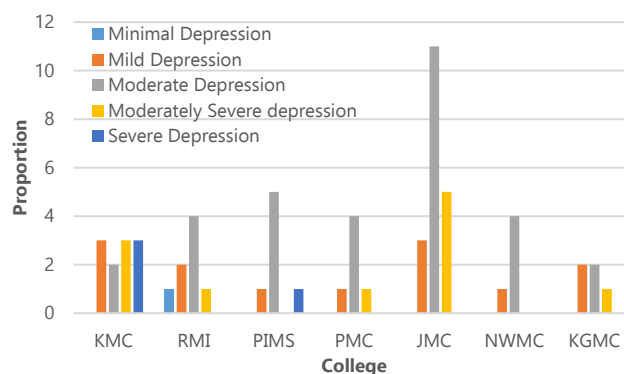


**Table 1. Participant's Socio-demographic Characteristics.**

Variables	n (324)	Males (n=151)	Females (n=172)	p-value
Age in years, mean ± SD	21.70±1.65			
Level of studies, n (%)	0.105			
1 <sup>st</sup> year MBBS	58 (17.9)	25 (43.1)	33 (56.9)	
2 <sup>nd</sup> year MBBS	68 (21)	29 (42.7)	39 (57.3)	
3 <sup>rd</sup> year MBBS	68 (21)	35 (51.4)	33 (48.6)	
4 <sup>th</sup> year MBBS	82 (25.3)	38 (46.3)	44 (53.7)	
5 <sup>th</sup> year MBBS	47 (14.5)	24 (51)	23 (49)	
Medical Colleges, n (%)	0.001			
KMC	82 (25.3)	34 (41.4)	48 (58.6)	
KGMC	36 (11.1)		36 (100)	
RMI	42 (13.0)	24 (57.1)	18 (42.9)	
PIMS	51 (15.7)	31 (60.7)	20 (39.3)	
JMC	50 (15.4)	28 (56)	22 (44)	
PMC	39 (12)	24 (61.5)	15 (38.5)	
NWMC	24 (7.4)	10 (41.6)	14 (58.4)	
Residency, n (%)	0.491			
Hostellite	190 (58.6)	85 (44.7)	105 (55.3)	
Day scholar	134 (41.3)	65 (48.5)	69 (51.5)	
Major life events, n (%)				
Have you experienced any traumatic event in life	169 (52)	71 (42)	97 (58)	0.738
Have experienced any discrimination during medical school education	81 (25)	41 (50.6)	39 (49.4)	0.011
Medical school has negatively affected your mental health	144 (44.4)	68 (47.2)	78 (52.8)	0.040
Regards family, n (%)				
Family history of mental illness	80 (24.7)	35 (43.8)	44 (56.2)	0.105
Feel stressed due to family issues, n (%)	0.521			
Rarely	75 (23.1)	39 (52)	36 (48)	
Sometime	90 (27.8)	38 (42.2)	52 (47.8)	
Often	63 (19.4)	23 (36.5)	40 (63.5)	
Always	59 (18.25)	32 (54.2)	26 (45.8)	
Feel supported by family and friends, n (%)	0.002			
Rarely	34 (10.5)	17 (50)	17 (50)	
Sometime	67 (20.7)	29 (43.2)	38 (56.8)	
Often	71 (21.9)	30 (42.2)	41 (57.8)	
Always	138 (42.6)	69 (50.8)	68 (49.2)	

**Legend:** n=total number of participants, KMC=Khyber Medical College, KGMC=Khyber Girls' Medical College, RMI=Rehman Medical Institute, PMC=Peshawar Medical College, PIMS=Pak international Medical School, JMC=Jinnah Medical College, NWMC=North West Medical College.

**Figure 2. Severity of Depression Among Medical Students Across Different Colleges in Peshawar.**



### Depression-related Factors Among Medical Students

Bivariate analysis revealed significant associations between depression and the following factors: female gender ( $p=0.03$ ), positive family history ( $p < 0.01$ ), gender discrimination in medical school ( $p=0.01$ ), negative impact of studies on mental health ( $p=0.04$ ), and lack of family and friends' support ( $p<0.01$ ). Conversely, year of MBBS ( $p=0.10$ ), experience of any traumatic event in life ( $p=0.73$ ), residency that is whether days scholars or hostelites ( $p=0.225$ ) and stress due to family reasons ( $p=0.57$ ) were not significantly associated with depression, as shown in [Table 2](#).

**Table 2. Analysis of Depression Prevalence and Associated Factors Among Medical Student.**

Characteristics	Without Depression	Borderline	With Depression	p-value
Sex, n (%)				0.03
Male	72 (22.2)	50 (15.5)	29 (8.9)	
Female	104 (32.2)	34 (10.5)	34 (10.5)	
Current year of MBBS, n (%)				0.1
1 <sup>st</sup> year MBBS	25 (7.7)	18 (5.6)	15 (4.6)	
2 <sup>nd</sup> year MBBS	37 (11.4)	14 (4.3)	17 (5.2)	
3 <sup>rd</sup> year MBBS	38 (11.7)	23 (7.1)	7 (2.2)	
4 <sup>th</sup> year MBBS	50 (15.4)	20 (6.2)	12 (3.7)	
5 <sup>th</sup> year MBBS	26 (8.0)	9 (2.8)	12 (3.7)	
Medical Colleges, n (%)				0.02
KMC	51 (15.7)	20 (6.2)	11 (3.4)	
KGMC	26 (8.0)	5 (1.5)	5 (1.5)	
RMI	20 (6.2)	14 (4.2)	8 (2.5)	
PIMS	29 (8.9)	12 (3.7)	10 (3.1)	
JMC	23 (7.1)	9 (2.8)	18 (5.6)	
PMC	18 (5.6)	15 (4.6)	6 (1.9)	
NWMC	9 (2.8)	10 (3.1)	5 (1.5)	
Residency, n (%)				0.22
Hostellite	97 (29.9)	57 (17.6)	36 (11.1)	
Day scholar	76 (23.5)	28 (8.6)	27 (8.3)	
Major life events				0.74
Have you ever experienced any traumatic events in your life? n (%)				0.74
Yes	90 (27.8)	44 (13.6)	35 (10.8)	
No	84 (25.9)	41 (12.7)	28 (8.6)	
Do you have a history of mental illness in your family? n (%)				<0.001
Yes	29 (8.9)	24 (7.4)	27 (8.3)	
No	147 (45.8)	61 (18.8)	36 (11.1)	
Have you ever experienced any discrimination in medical school education?				0.01
Yes	37 (11.4)	19 (5.9)	25 (7.8)	
No	139 (42.9)	66 (20.6)	38 (11.7)	
Do you feel that medical School has negatively affected your mental health? n (%)				0.04
Yes	65 (20.2)	43 (13.3)	36 (11.1)	
No	110 (33.9)	42 (12.9)	27 (8.3)	
How often do you feel stressed due to family issues? n (%)				0.570
Never	25 (7.7)	6 (1.9)	6 (1.9)	
Rarely	41 (12.8)	19 (5.9)	15 (4.7)	
Sometime	51 (15.9)	24 (7.5)	15 (4.6)	
Often	27 (8.3)	21 (6.5)	15 (4.6)	
Always	32 (9.9)	15 (4.6)	12 (3.7)	
How often do you feel supported by your family and friends? n (%)				0.002
Never	5(1.6)	3(0.9)	6(1.9)	
Rarely	8(2.5)	13(4.0)	13(4.0)	
Sometime	37(11.4)	21(6.5)	9(2.8)	
often	42(12.9)	18(5.6)	11(3.4)	
Always	84(25.9)	30(9.3)	24(7.4)	

[Table 3](#) presents the multivariate analysis results for depression. While age exhibited a slight inverse association with depression, this association was not statistically significant, suggesting that older students may have a marginally lower risk. However, our analysis did not reveal significant impacts of gender, residence status, or additional study years on depression risk. Despite this, it is important to note that factors such as discrimination or harassment and negative perceptions regarding the impact of medical school on mental health were found to be associated with higher odds of depression, albeit not reaching statistical significance. The goodness of fit for the model was also found to be nonsignificant ( $p=0.21$ ), indicating that while the model effectively summarizes the data, further exploration may be required to capture additional influential factors.

### Discussion

To our knowledge, there has been no study employing a similar methodology conducted in Peshawar. Our study examined the relationships between depression and various factors, including traumatic experiences, harassment and discrimination in medical school, and the impact of medical school on mental health. We also tried to correlate depression with family problems, absence of family support, and family mental illness history. We observed a higher prevalence of depression among females, individuals affected by gender discrimination, those reporting a negative impact of medical college on mental health, and participants lacking family support. Conversely, experiences of traumatic events and stress due to family issues were not significantly associated with depression. Additionally, while our multivariate model did not identify specific associated factors, it indicated areas where potential interventions and further research could be beneficial.

Our study found a 19.4% prevalence of depression among medical students, like the 21.5% reported at Makerere University in Uganda.<sup>21</sup> They conducted their study in a single university and did not identify adequate risk factors associated with depression among medical students as well as the association of family related issues with depression. A meta-analysis revealed that the pooled prevalence utilizing IPD among medical students was 18.1%, which is nearly identical to the frequency in our study.<sup>22</sup> Our study prevalence was greater than the 10.3% prevalence of depression found among medical students in South Korea.<sup>23</sup> The prevalence of depression in our study was lower at 19.4% compared to the global incidence of 33.0% among university students as reported in a systemic review study.

Different methodologies, appraisal standards, measurement instruments, and cultural factors have all been cited as causes of differences of prevalence. University is a significant but fleeting era of life with unique demands in terms of academics, finances, and relationships. Going through these changes could make depression more likely. Nonetheless, the current study's high incidence rate of depression symptoms is higher than what is often observed in the general population.<sup>24</sup>

**Table 3. Risk Factors for Depression Among Medical Students: Analysis of Unadjusted and Adjusted Odds Ratios.**

Characteristic	Unadjusted Odds Ratio	95%CI	Adjusted Odds Ratio	95%CI	p-value
Age (continuous)	0.84	0.74-0.95	0.72	0.51-1.02	0.068
Sex: Female	(ref)				
Male	0.96	0.51-1.81	1.09	0.56-2.13	0.806
Residence: Hostellite	(ref)				
Day scholar	1.11	0.97-1.27	0.93	0.68-1.28	0.668
Year (continuous)	0.9	0.76-1.07	1.26	0.79-2.01	0.34
Family history of mental illness	2.94	1.14-7.62	0.42	0.14-1.26	0.123
Medical school effects					
Experienced discrimination/harassment	2.41	0.94-6.20	2.03	0.70-5.91	0.193
Negative effect of medical school	1.88	0.06-3.31	1.39	0.80-2.38	0.239

**Legend:** 95%CI: 95% confidence interval.

We conducted our study among 7 medical colleges of Peshawar, and we found that depression prevalence was highest in students at Jinnah Medical College and lowest among students at Khyber Girls Medical College. In our research, we found that gender discrimination is one of the risk factors of depression. Since Khyber Girls' Medical College is has only female students, there is no gender discrimination and therefore, the rate of depression is the lowest there. Our study also found a significant association of depression and the female gender. A similar significant association was found among females' medical students of Karolinska Institute Medical University, Sweden.<sup>25</sup>

Our study revealed a significant association between absence of family support and depression among medical students. These data implies that a lack of family support may be a factor in this population's higher prevalence of depression. It emphasizes how important it is to understand and deal with the effects of family dynamics on medical students' mental health. Our results are consistent with earlier studies that have repeatedly shown the importance of family support for a healthy mind. Smith et al., conducted a similar cross-sectional study and reported a strong associated between medical students' enhanced depressive symptoms and a lack of family support.<sup>26</sup> Another study was conducted to investigate the association between depressive symptoms and social support, which found out that greater social support was associated with decreased depressive symptoms.<sup>27</sup> These converging findings further emphasize the importance of family support in the context of medical education.

Surprisingly, our study did not identify a significant association between traumatic events and stress due to family issues among medical students. These results suggest that, within our study population, these specific factors may not be primary contributors to the mental health challenges faced by students at medical college. Nevertheless, a further investigation on the factors affecting medical students, using qualitative research methods or a larger sample size may be required. It highlights the need to explore other potential variables that influence mental health outcomes in this context.

Our study also did not find any association between residencies of students and depression. This finding was contrary to a study which found out that hostelites are more emotionally disturbed and are more depressed as compared to days scholars.<sup>28</sup>

A multifaceted approach is needed to combat medical student depression, including problems like discrimination, harassment, and the perceived detrimental impact of medical school on mental health. Accessible counseling, mental health programs, and peer support groups are essential. A safe, confidential reporting mechanism and rigorous anti-discrimination and harassment policies are essential for a secure workplace. Mental health education in the medical curriculum can raise awareness, reduces stigma, and encourages free debate. Wellness programs that teach stress management, resilience, and healthy living choices and peer mentoring can help pupils. Faculty and staff must get sensitivity training to identify and address mental discomfort and unconscious biases. Flexible academic rules can reduce academic stress, while anonymous student comments can help improve stress. Adapting tactics to change requirements needs ongoing intervention, and efficient research and evaluation. Community-building activities reduce isolation and establish support networks. These evidence-based therapies can dramatically reduce depression in medical students.

This study's limitations include the cross-sectional design, as it cannot prove causality between identified factors and depression. Due to potential bias, self-reported questionnaires may not fully reflect feelings or experiences. Since the sample was limited to Peshawar medical schools, findings may not apply to other demographics. The study could not account for all potential confounding variables, such as personal coping techniques or challenges that may affect depression risk. To better understand medical student depression, longitudinal designs, greater geographic sampling, and more complete assessments of contributory factors should be used in future studies.

In this study we provide valuable insights into the prevalence and risk factors associated with depression among medical students.



The findings shed light on the significant mental health challenges faced by this population and the associated factors.

## Summary – Accelerating Translation

This study conducted in Peshawar, Pakistan aimed to determine the prevalence of depression among medical students and identify potential risk factors associated with it. The cross-sectional study involved students from seven medical colleges, and data was collected using surveys. Out of the 400 questionnaires distributed, 324 were returned, resulting in an 81% response rate. The mean age of the participants was  $21.70 \pm 1.65$  years, with 46.6% males and 53.1% females.

Using the Hospital Anxiety and Depression Scale (HADS) for the prevalence of depression, we found that 19.4% of students were

depressed. Additionally, 26.2% of the students were identified as borderline cases. Several factors were significantly associated with depression, including the female gender, having a positive family history of mental illness, experiencing gender discrimination within medical school, perceiving a negative effect of studies on mental health, and lacking support from family and friends.

The study concludes that there is a high prevalence of depression among medical students in Peshawar, Pakistan. It highlights the importance of addressing these risk factors and establishing support systems to mitigate the impact of depression on students' well-being and academic performance. The findings emphasize the need for interventions to enhance mental health support and improve the overall quality of medical education in the region.

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Conceptualization, Writing – Original Draft: NG; Project Administration, Resources: AA; Supervision, Validation: R; Methodology: K; Formal Analysis: MSK; Writing – Review & Editing: FG, NG; Data Curation: AG; Software: S; Investigation: KA; Funding Acquisition: SOH.

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