COMPARATIVE STUDY OF PREVALENCE OF DEPRESSION, ANXIETY, AND STRESS AMONG UNDERGRADUATE MEDICAL STUDENTS IN LONGITUDINAL CURRICULUM OF MEDICAL COLLEGE

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ABSTRACT

Objective: Medical education is long and stressful due to academic demands, frequent examinations, excessive workload, chronic exposure to human suffering and death and vast extensive syllabus, and increased psychological pressure due to multiple reasons, all of which can cause burnout, leading to mental disorders such as depression and anxiety. The aim of the study is to estimate the prevalence of depression, anxiety, and stress among undergraduate medical students of Rama Medical College, Kanpur, and its correlation with year of medical education.

Methods: A cross-sectional study was conducted by providing self-administered questionnaire containing sociodemographic datasheet and depression, anxiety, and stress scale (DASS 42). Descriptive statistics were used to analyze participants' sociodemographic characteristics and the prevalence of academic burnout using SPSS. The association of academic burnout with academic year was determined using the Pearson correlation coefficient. The data were also analyzed using analysis of variance.

Results: Using DASS 42, it was found that 11.8%, 16.8%, and 19% experienced mild, moderate, and severe depression, respectively. 32.5% had mild and 16.6% had moderate anxiety. 17.9%, 22.1%, 9.0%, and 2.0% of students experienced mild, moderate, severe, and extremely severe stress, respectively. The percentages of students experiencing depression, anxiety, and stress increased as the academic year progressed.

Conclusion: High prevalence of depression, anxiety, and stress was found among undergraduate medical students. One out of every three students is found to be depressed and about half of the students were reported experiencing anxiety and stress. A clear progression of depression, anxiety, stress, and burnout was observed as the academic year progressed.

Keywords: Depression, Anxiety, Stress, Depression anxiety and stress scale 42.

INTRODUCTION

Medical education is long, physically, intellectually and emotionally demanding, especially in the era of multiple distractions such as social media. Before entering into the medical school, the mental health of medical students is similar to that of the general population or even better [1]. Inside the medical school, they are exposed to various academic and psychosocial stressors thought to be characteristic of medical school milieu. They experience excessive workload, work-life balance, relationships, academic pressure, the desire to be a competent clinician, sleep deprivation, peer competition, fear of fail in medical school, demise and misery of patient, student abuse, financial burden, etc. [2]. Moreover, they face individual life stressors, which are outside the control of medical school authority such as marriage, illness, birth of a child, or death of a family member. Due to the earlier mentioned stressful events, the mental health declines as the medical students progress further in their medical training [3]. The deterioration begins right from the 1st year. These stressors result in academic dishonesty, poor academic performance, burnout, substance abuse, cynicism, and mental illnesses such as depression and anxiety. The mental component contributes to poor health-related quality of life among medical students [4].

Depression is a leading cause of disability worldwide and is a major contributor to the overall global burden of disease. Women are affected more by depression than men. Depression is, by definition, a mood disorder, and disturbances of mood are at the core. A depressed mood and a loss of interest or pleasure are the key symptoms of depression. Person feels blue, hopeless or worthless, exhausted and unmotivated.

It has been labeled as one of agonizing emotional pain. Almost all depressed patients (97%) complain of reduced energy; difficulty finishing tasks; impaired at school and work and have less motivation. About 80% of patients complain of trouble sleeping, especially early morning awakening. Many patients have diminished appetite and experience weight loss. At its worst, depression can lead to suicide [5].

Anxiety is one of the most commonly experienced feelings of all human conducts. It is an unpleasant feeling of awkwardness, edginess, alarm, or distress. It is also described as the emotional state that emerges from a testing situation which a person is incapable of handling. Anxiety is defined as a diffuse, unpleasant, vague sense of apprehension, usually accompanied by autonomic symptoms such as headache, perspiration, palpitations, tightness in the chest, and mild stomach discomfort. It can also produce motor symptoms, such as restlessness. Anxiety is an ordinary response to a demanding condition and it might assist one facing a tough scenario by encouraging him/her to manage it, but undue anxiety may have a severe influence on everyday life and hinder the normal working of an individual [5]. Anxiety is the sixth most significant contributor to non-fatal health loss globally. It is directly responsible for 10% of the disability-adjusted life years, being just second only to major depression [6].

The huge amount of stress in medical education may lead to many adverse effects such as diminished attention and concentration, negligence, absenteeism, increased incidence of errors, cheating during examinations, and self-medication. Throughout the world, medical education has been stated as one of the most stressful curricula as it

causes negative consequences on the physical as well as mental health of medical students. Stress is a psychological and physical reaction to the ever-increasing demands of life. To some extent, it can be a motivator for certain individuals and is considered a normal part of medical education but not all students find stress constructive [7]. For many students, stress arouses feelings of fear, incompetence, uselessness, anger, and guilt and can be associated with both psychological and physical morbidities.

Depression and anxiety have a massive impact on the student's quality of life. On the individual level, it causes impaired ability to work efficiently, substance abuse, college dropout, attrition from the profession, deterioration in relationships, and increased suicidal tendency. Asian students face more pressure from parents and teachers to perform well and this may inadvertently cause more stress to the students [8]. Therefore, it is critical to know the prevalence of depression, anxiety, and stress among medical students. This is especially pertinent as evidence had shown that mental disorders and stress can cause multitude of problems such as burnout, suicide, and serious professional misconducts [9].

A literature review was done surveying research studies from PubMed and ScienceDirect. Research suggests undergraduate medical students showing varying level of depression, anxiety, and stress. Various studies have been done worldwide, and some of them are summarized below.

In 2015, a cross-sectional study was performed to assess the presence of depression, anxiety, and stress among medical students. Depression anxiety and stress scale (DASS) 42 was used for assessment and the associations with their sociodemographic characteristics were identified. More than half of the respondents were affected by depression (51.3%), anxiety (66.9%), and stress (53%). Morbidity was found to be lesser in 2nd semester as compared to students in 5th semester. Males reported lower scores as compared to their female counterparts. Perception of self-assessment in academics was strongly associated with the higher score in DASS 42 [10].

One such comparison study was done in 2016 between students of different semesters of Brazilian medical school to compare the prevalence of anxiety, depression, and stress. 34.6% reported depressive symptomatology, 37.2% showed anxiety symptoms, and 47.1% showed stress symptoms. Significant differences were found as follows. Depression between first and second semesters (p=0.045), anxiety between first and tenth (p=0.048) and first and eleventh (p=0.025) semesters and stress between seventh and twelfth (p=0.044), tenth and twelfth (p=0.011), and eleventh and twelfth (p=0.001) semesters [11].

Another study in Foundation University Medical College, Islamabad, was conducted to determine the frequency of depression and anxiety in all 5-year students. The Beck Anxiety Scales and Beck Depressive Inventory were used to assess the prevalence of depression and anxiety at three different times during the academic year. Out of 150 students, 37.46% had mild depression and 14% had moderate to severe depression. About 19% of students had moderate-to-severe anxiety. In the final year, females had higher association with depression (p=0.037). In 2nd year, time of assessment was significantly related to depression and anxiety (p=0.000) [6].

In 2019, a study was carried out in Malaysia to determine the prevalence of depression and anxiety in 149 senior medical students (final 2 years) and to assess their quality of life. The prevalence rates of depression and anxiety were 11% and 33%, respectively. Malay students were found to have significantly more anxiety as compared to other ethnic groups (p<0.05). Anxiety and depression were associated with significantly poorer Quality of Life [12].

After reviewing the prior studies, certain limitations were found. Either the overall prevalence was observed or sample size was small.

The present study is an attempt to find the prevalence of depression, anxiety, and stress and its correlation with the year of education.

METHODS

This is a cross-sectional study conducted in undergraduate medical students of Rama Medical College, Hospital and Research Centre, Kanpur. All medical undergraduates who gave consent for the study, i.e., 136 out of 150 in 1st year, 133 out of 150 in 2nd year, 96 out of 100 in 3rd year, and 93 out of 100 in 4th year were enrolled. Information about sociodemographic variables was collected after taking informed consent. The detail about depression, anxiety, and stress was extracted using DASS 42 questionnaire. Before the conduction of the study, ethical clearance was taken from Institutional Review Committee Rama Medical College Hospital and Research Centre, Kanpur.

A semi-structured proforma was especially designed to collect the sociodemographic variables such as age, gender, religion, year of study, living condition, financial status, suffered from major life event (death of close one, road traffic accident, breakup, and hospitalization within the past 3 months).

The DASS 42 [13] aims to provide an appropriate and integrated framework for mental health screening containing 42 items. It helps to examine each of the psychological structure of depression, stress, and anxiety by 14 questions each. The scoring is done in the form of four-point Likert ranging from 0 to 3, representing never, sometimes, often, and almost always, respectively. The scores related to the items of each scale are summed for interpretation. The interpretation of scoring is done as follows:

Depression: 0–9 normal, 10–13 mild, 14–20 moderate, 21–27 severe, and 28+ extremely severe.

Anxiety: 0–7 normal, 8–9 mild, 10–14 moderate, 15–19 severe, and 20+ extremely severe.

Stress: 0–14 normal, 15–18 mild, 19–25 moderate, 26–33 severe, and 34+ extremely severe.

Sociodemographic and individual characteristics were presented as numbers and percentages. The data were analyzed using IBM SPSS (the Statistical Package for the Social Science), version 20.0 software. Descriptive statistics were used to analyze participants' sociodemographic characteristics and prevalence of depression, anxiety, and stress. The association of depression, anxiety, and stress with year of education was determined using the Pearson correlation coefficient. p<0.05 was considered statistically significant. The data were also analyzed using one-way analysis of variance followed by Tukey's honestly multiple comparison tests.

RESULTS

The study included 458 medical students, of whom 46.1% (211) were male and 53.9% (247) were female. The majority of the students were Hindu, accounting for 68.6% (314), followed by Muslims at 16.6% (76), Sikhs at 10.0% (46), and other religions at 4.8% (22). Distribution across the years of medical education showed that 1st and 2nd-year students were the largest groups, comprising 29.7% (136) and 29.0% (133), respectively, while 3rd and 4th-year students made up 21.0% (96) and 20.3% (93), respectively. Most students came from nuclear families, 66.8% (306), compared to 33.2% (152) from joint families. The frequency distribution of major life events, chronic illnesses, family history, and history of medical and psychiatric illness is presented in Table 1.

The sociodemographic variables were compared among medical students of different academic years, as shown in Table 2, revealing several significant trends.

The prevalence of depression, anxiety, and stress was calculated using the DASS 42 scale as shown in Table 3. It was found that the majority

Table 1: Distribution of demographic profile of studied medical students

Variables	Category	Number of students	Percentage
Gender	Male	211	46.1
	Female	247	53.9
Religion	Hindu	314	68.6
	Muslim	76	16.6
	Sikh	46	10.0
	Other	22	4.8
Year of medical education	1st year	136	29.7
	2nd year	133	29.0
	3rd year	96	21.0
	4th year	93	20.3
Family type	Nuclear	306	66.8
	Joint	152	33.2
Any major life event	Yes	69	15.1
	No	389	84.9
Any chronic illness	Yes	38	8.3
	No	420	91.7
History of any medical illness	Yes	22	4.8
	No	436	95.2
History of any psychiatric illness	Yes	93	20.3
	No	365	79.7
Family history of psychiatric or medical illness	Yes	67	14.6
	No	391	85.4

Table 2: Comparison of studied medical students based on demographic variables

Variables	Category	1st year (n=136)	2nd year (n=133)	3rd year (n=96)	4th year (n=93)	p-value
Gender	Male	55 (40.4)	53 (39.8)	58 (60.4)	45 (48.4)	0.008*
	Female	81 (59.6)	80 (60.2)	38 (39.6)	48 (51.6)	
Religion	Hindu	90 (66.2)	93 (69.9)	62 (64.6)	69 (74.2)	0.004*
	Muslim	19 (14.0)	27 (20.3)	15 (15.6)	15 (16.1)	
	Sikh	14 (10.3)	13 (9.8)	10 (10.4)	9 (9.7)	
	Other	13 (9.6)	0 (0.0)	9 (9.4)	0 (0.0)	
Family type	Nuclear	95 (69.9)	80 (60.2)	67 (69.8)	64 (68.8)	0.286
	Joint	41 (30.1)	53 (39.8)	29 (30.2)	29 (31.2)	
Any major life event	Yes	14 (10.3)	26 (19.5)	10 (10.4)	19 (20.4)	0.042*
	No	122 (89.7)	107 (80.5)	86 (89.6)	74 (79.6)	
Any chronic illness	Yes	14 (10.3)	14 (10.5)	0 (0.0)	10 (10.8)	0.012*
	No	122 (89.7)	119 (89.5)	96 (100.0)	83 (89.2)	
History of any medical illness	Yes	0 (0.0)	13 (9.8)	9 (9.4)	0 (0.0)	<0.001*
	No	136 (100.0)	120 (90.2)	87 (90.6)	93 (100.0)	
History of any psychiatric illness	Yes	13 (9.6)	25 (18.8)	28 (29.2)	27 (29.0)	<0.001*
	No	123 (90.4)	108 (81.2)	68 (70.8)	66 (71.0)	
Family history of psychiatric or medical illness	Yes	26 (19.1)	14 (10.5)	9 (9.4)	18 (19.4)	0.051
	No	110 (80.9)	119 (89.5)	87 (90.6)	75 (80.6)	

Table 3: Prevalence of depression, anxiety, and stress in undergraduate medical students

DASS 42	Number of students	Percentage
Depression		
Normal	308	67.2
Mild	54	11.8
Moderate	77	16.8
Severe	19	4.1
Extremely severe	0	0.0
Anxiety		
Normal	233	50.9
Mild	149	32.5
Moderate	76	16.6
Severe	0	0.0
Extremely severe	0	0.0
Stress		
Normal	225	49.1
Mild	82	17.9
Moderate	101	22.1
Severe	41	9.0
Extremely severe	9	2.0

DASS 42: Depression, anxiety, and stress scale

of students were not depressed, i.e., 308 (67.2%), while 54 (11.8%) experienced mild depression, 77 (16.8%) moderate, and 19 (4.1%) severe, with no cases of extremely severe depression. In terms of anxiety, 233 (50.9%) of students were normal, 149 (32.5%) had mild anxiety, and 76 (16.6%) had moderate anxiety, with no cases of severe or extremely severe anxiety. Stress levels showed that 225 (49.1%) of students were in the normal range, 82 (17.9%) experienced mild stress, 101 (22.1%) moderate stress, 41 (9.0%) severe stress, and 9 (2.0%) extremely severe stress. This indicated that while a significant portion of students was unaffected, sizable percentages experienced varying levels of depression, anxiety, and stress.

The prevalence of depression, anxiety, and stress was compared across different academic years, revealing significant trends as shown in Table 4. For depression, a higher percentage of 1st-year students were in the normal range of 110 (80.9%), which progressively decreased to 47 (50.5%) by the 4th year, with a significant p<0.001. Mild and moderate depression rates were relatively stable across the years, but severe depression emerged in the 3rd and 4th years, 9 (9.4%) and 10 (10.8%), respectively. In terms of anxiety, there was no statistically significant difference (p>0.05); however, normal anxiety levels decreased from 82 (60.3%) in the 1st year to 37 (39.8%) in the 4th year, with mild and

Table 4: Comparison of prevalence of depression, anxiety, and stress in undergraduate medical students

DASS 42	1st year (n=136)	2nd year (n=133)	3rd year (n=96)	4th year (n=93)	p-value
Depression					<0.001*
Normal	110 (80.9)	93 (69.9)	58 (60.4)	47 (50.5)	
Mild	13 (9.6)	13 (9.8)	9 (9.4)	19 (20.4)	
Moderate	13 (9.6)	27 (20.3)	20 (20.8)	17 (18.3)	
Severe	0 (0.0)	0 (0.0)	9 (9.4)	10 (10.8)	
Extremely severe	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Anxiety					0.065
Normal	82 (60.3)	66 (49.6)	48 (50.0)	37 (39.8)	
Mild	40 (29.4)	41 (30.8)	30 (31.3)	38 (40.9)	
Moderate	14 (10.3)	26 (19.5)	18 (18.8)	18 (19.4)	
Severe	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Extremely severe	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Stress					<0.001*
Normal	81 (59.6)	66 (49.6)	49 (51.0)	29 (31.2)	
Mild	28 (20.6)	28 (21.1)	9 (9.4)	17 (18.3)	
Moderate	27 (19.6)	25 (18.8)	20 (20.8)	29 (31.2)	
Severe	0 (0.0)	14 (10.5)	18 (18.8)	9 (9.7)	
Extremely severe	0 (0.0)	0 (0.0)	0 (0.0)	9 (9.7)	

DASS 42: Depression, anxiety and stress scale, *: Significant

moderate anxiety increasing correspondingly. Stress levels exhibited a significant difference (p<0.001), with normal stress levels decreasing from 81 (59.6%) in the 1st year to 29 (31.2%) in the 4th year. Mild stress showed a non-linear pattern, but moderate stress consistently increased, reaching 29 (31.2%) in the 4th year. Severe stress appeared in the 2nd and 3rd years, while extremely severe stress was only present in the 4th year, 9 (9.7%). Overall, these trends indicated an increase in depression and stress as students progressed through their medical education.

Significant correlation between the year of medical education and depression, anxiety, and stress among undergraduate medical students is shown in Table 5. Depression (r=0.258, p<0.001), anxiety (r=0.133, p=0.004), and stress (r=0.276, p<0.001) levels increased significantly with the advancing year of education. These results highlighted the increasing psychological burden and deteriorating quality of life experienced by medical students as they progressed through their education.

DISCUSSION

The purpose of the research was to know the prevalence of depression, anxiety, and stress and to determine their correlation with the year of education among undergraduate medical students. The study also compared the prevalences as the academic year progresses from 1st year to 4th year. The prevalence of depression, anxiety, and stress increased as the year of education progressed. We found an association between academic year and depression, anxiety, and stress.

The prevalence of depression is found to be 32.8%, i.e., one out of every three students is depressed. Out of which, 11.8% are suffering from mild, 16.8% from moderate, and 4.1% from severe depression. The prevalence of depression reported among medical students is high. Two Indian studies by Ganesh *et al.* [14] and Chakraborty *et al.* [15] reported 48.4% and 45.3% medical students as suffering from depression, respectively. One study conducted in Africa by Dafaalla *et al.* [16] also reported high prevalence of depression more than 50%. Our findings are in accordance with results from Aghajani Liasi *et al.* [17], Pokhrel *et al.* [18], and Fernandes *et al.* [19], i.e., 37.5%, 31%, and 27%, respectively.

The number of students suffering from depression progressively increased from 1st year to 4th year with a significant p<0.001. Similarly, a Cambridge-based study conducted by Quince *et al.* [20] reported the steady increase in levels of depression from the 1st year to the 3rd year of medical education. A few studies Singh *et al.* [21] and Dafaalla *et al.* [16] while reporting higher prevalence of depression did not report any significant difference across academic years.

Table 5: Correlation of the year of medical education with depression, anxiety, and stress

Variables	Year of medical education	
	Pearson correlation (r)	p-value
DASS 42		
Depression	0.258	<0.001*
Anxiety	0.133	0.004*
Stress	0.276	<0.001*

DASS: Depression, anxiety, and stress scale, *: Significant

According to the previous studies, the prevalence of anxiety varied between 41.1% as reported by Aghajani Liasi *et al.* [17] and 72.6% as reported by Alwhaibi *et al* [22]. The prevalence of anxiety in the study is found to be 49.1% with 32.5% experiencing mild anxiety and 16.6% experiencing moderate anxiety. Dafaalla *et al.* [16], Pokhrel *et al.* [18], and Chakraborty *et al.* [15] all support our study's conclusions, reporting anxiety prevalence rates of over 50%, 48.8%, and 52.4%, respectively. The number of students experiencing anxiety progressively increased as the academic year progressed with p<0.001. The progression of anxiety has also been reported by Dafaalla *et al.* [16] across different academic years.

A wider range of prevalence of stress has been reported by various studies such as Mohasseb and Said [23] reporting 84.7% whereas Aghajani Liasi *et al.* [17] and Chakraborty *et al.* [15] reported only 30.3% and 31.9%, respectively. The prevalence of stress in our study is found to be 51.9% which is almost between the previous reported range. Out of which, 17.9% experienced mild, 22.1% moderate, 9% severe, and 2% experienced extremely severe stress. Similar to our findings, Dafaalla *et al.* [16] and Azad *et al.* [6] reported more than 50% and 51.7% medical students as suffering from stress. Like anxiety and depression, stress among students also progressively increased as the academic year progressed with p<0.001.

This tendency may be due to supplementary pressure placed on students due to high hopes from parents who have contributed a substantial financial investment in their child's medical education from a private medical college. The variable prevalence of depression, anxiety, and stress in students attending private medical schools may also be due to particular characteristics of students who choose to study at a private institution, were possibly forced to study medicine by their parents, relatively lower effort/diligence given to their studies, lower bars in medical entrance as well as lower peer pressures and standards, strong strength of financial backgrounds, etc.

The present study is based on the interpretation of self-administered questionnaires which may have affected the accuracy of data. There is the possibility of intentionally inaccurate responses from the responders also known as social desirability bias. Another limitation could be the lack of information regarding place of stay, food, and financial aspects that could have contributed toward stress/psychological well-being. Being unable to keep track of class tests during the assessment period is a limitation. Furthermore, the sample consists of students from a single private medical college, so the results cannot be considered representative of all undergraduate students. The correlations between levels of depression, anxiety, and stress in students attending government medical colleges were not done. Confounding effects may also be due to particular characteristics of students who choose to study at a private institution were forced to study by their parents, relatively lower effort/diligence given to their studies, lower bars as to medical entrance as well as lower peer pressures and standards, strong strength of financial backgrounds were not taken into account.

CONCLUSION

The results showed a significant increase in depression and stress levels as students progressed through their medical education, with a substantial proportion experiencing mild to severe symptoms. Anxiety levels also showed a notable increase, although not statistically significant. The correlation analysis revealed a positive relationship between the year of medical education and depression, anxiety, and stress levels. These findings suggest that the psychological burden and quality of life of medical students deteriorate as they advance in their education. The study highlights the need for medical institutions to implement support systems and stress management programs to address the mental health concerns of their students. Early intervention and prevention strategies are crucial to mitigate the negative impacts of depression, anxiety, and stress on medical students' well-being and academic performance.

AUTHORS CONTRIBUTIONS

NM, DP- Conceptualized and designed the study. P, DP- Screened the included articles. NM- Put forward outline of the article with DP- Made data analyses and drafted the manuscript with P. All authors read and approved the final manuscript.

CONFLICTS OF INTERESTS

The authors declare no conflict of interest.

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