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"EXPLORING THE MENTAL HEALTH LANDSCAPE: A CROSS-SECTIONAL ANALYSIS OF DEPRESSION, ANXIETY, AND STRESS IN RAJNANDGAON'S MEDICAL UNDERGRADUATES"

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Abstract: Context:
Background- In the bustling corridors of Rajnandgaon's medical college, a silent battle is being waged. The rigorous demands of medical education often cast a shadow over the mental well-being. The study seeks to shed light on this pressing issue.
Aims: To assess the prevalence of depression, anxiety and stress among undergraduate medical students of Rajnandgaon, Chhattisgarh, India**.**
Methods and Material: A cross-sectional study was conducted in this medical college during mid-semester 2023, involving 420 participants who gave written consent. DASS-21 scale was distributed through Google Forms via self -administered technique.
Statistical analysis: IBM SPSS (version 20), was used to analyze Chi-square tests for association, Spearman's correlation for inter-domain relationships, and Binary logistic regression to assess the factor influence on each other. Inter-domain's comparisons and relationships visualized through Venn diagrams, while Line diagram showed the prevalence over time.
Results: More than one fifth (20.48%) subjects were having all three psychological domains; needs to pay attention for the management. More than one fifth (24.51%) subjects were having stress, more than two fifth (40.93%) were having anxiety and near about two fifth (34.93%) were having depression.
Conclusions: A significant prevalence of stress, anxiety, and depression among medical students, with nearly a quarter experiencing stress, over a third anxiety, and a similar proportion of depression. Notably, one in five students reported all three conditions. The higher prevalence especially among males, underscores the current mental health challenges. Urgently strict mental health screening and effective management during admission are necessary to address these issues.

Key-words: Medical students , DASS-21scale, Screening tool, Future outcome

Introduction-

The journey to becoming a medical professional is fraught with challenges that extend beyond the academic rigor of medical education. In Rajnandgaon, as in many other regions, medical education's rigorous demands can leads a unique set of pressures that significantly impact on students' mental health.[1]

Stress, anxiety, and depression are pivotal in the onset of mental health disorders, diminishing life quality, intensifying learning challenges, and negatively impacting overall health.[2] If unnoticed, these issues can escalate psychological distress, influencing both personal and professional spheres of life.[3,4]

In Indian population[5], one in seven experienced mental disorders of varying severity, with about[6] 15%, confronts mental health challenges, encompassing a spectrum of disorders from stress, anxiety and depression to more complex conditions such as bipolar disorder, schizophrenia, substance use, and neuro-developmental disorders, even death.

In Chhattisgarh[5], anxiety disorders are reported in fewer than 3000 individuals per 100,000, and depressive disorders affect between 2750 to 2999 per 100,000. Alarmingly, showing rising trend of mental disorders among medical students.

This observational cross-sectional study delves into the prevalence of these psychological conditions among medical students, with aim to illuminate the extent of such issues faced by these students and explore the factors contributing to their well-being. Our objective is to provide a clearer picture of the mental health landscape that these future healthcare professionals will face.

Our results will underscore the importance of mental health resources in medical institute and urge stakeholders to focus on the psychological health of upcoming healthcare providers.

Material and Methods:

Study population, setting & design:

The present cross-sectional observational study involving medical students from the first to fourth years at Bharat Ratna Late Shri Atal Bihari Vajpayee Memorial Medical College, Rajnandgaon, Chhattisgarh, India. This government-run institution, nestled in the heart of Rajnandgaon and allied with a tertiary care hospital, offers a structured undergraduate medical curriculum spanning four academic years followed by a mandatory year-long rotatory internship. The study setting was done in the institute, targeting 450 students.

The institute, which expanded its intake from 100 to 125 students annually after 2020, targeted all 450 students enrolled over four years for the study. To ensure the validity of the mental health assessment and to eliminate any confounding effects of examination-related mental strain, the data collection was strategically scheduled during a period devoid of exams, specifically more than three months following the conclusion of the last examination. This careful timing allowed for an accurate evaluation of the students' mental well-being, free from the acute pressures of academic assessments.

Inclusion & exclusion criteria:

Participants who provided written consent were included, while absentees or those declining participation were excluded.

Study definition:

Stress refers to a psychological state resulting from an individual's assessment of their ability to meet societal demands[7]. Anxiety is a state of unease, a physical response to perceived danger, whether real or imagined, and is influenced by thoughts, beliefs, and feelings. Depression, a widespread mental disorder, is characterized by sadness, loss of interest, guilt, disturbed sleep or appetite, low energy, and poor concentration[8].

Sample size:
The present study, targeting 450 students across four years. Of the 100 final-year students, 86 took part, with 14 third-year repeats. The third year had 114 students. The first and second years had 125 each, 23 and 7 absentees from second & first year respectively. The questionnaire was distributed & completed by all 420 present students, achieving a 100% response rate.

Data collection, Tool & Technique:
The DASS-21 questionnaire[9], a short form of the original 42-item survey, screened depression, anxiety, and stress levels. Consent was obtained prior to participation. Before distributing this self-administered structured, pre- designed, pre- validated questionnaire, participants received an explanation about the survey, and their questions were addressed. The survey was distributed via Google Forms and approved by the ethics committee.

Plan of analysis:
Data collection was meticulous, ensuring consistency and completeness before entry into a Microsoft Excel sheet. Analysis was conducted using IBM SPSS (version 20), adhering to descriptive statistical principles. Descriptive statistics, Venn diagrams, and line diagrams were used to present data. The Chi-square test and Spear man's correlation assessed associations and correlations, with correlation strengths ranging as Very weak: 0.00–0.20, Weak: 0.21–0.40, Moderate: 0.41–0.60, Strong: 0.61–0.80, Very strong: >0.81–1.00. Binary Logistic Regression analyzed the influence of variables, considering a p-value < 0.05 as significant.

Confidentiality:
Data confidentiality was maintained, with participants assigned unique Identification number (IDs) known only to the principal researcher.

Results:
The current study aimed to ascertain the prevalence of stress, anxiety, and depression among the undergraduate medical students at this institution. The findings indicated a significant occurrence of these mental health conditions within the student population.

Table 1: Showing socio-demographic details of study subjects (N=420)

Characteristics	Frequency (%)	Characteristics	Frequency (%)
Bach		**Type of Family Problems (n=17)**	
2018	86 (20.5%)	Health Issues	4 (23.5%)
2019	114 (27.1%)	Financial Issues	5 (29.5%)
2020	102 (24.3%)	Family related Issues	8 (47.0%)
2021	118 (28.1%)	**Family History of Mental Illness**	
Age Group (In years)		No history	392 (93.3%)
18-20	85 (20.2%)	History present	28 (6.7%)
21-23	266 (63.3%)	**Type of Mental Illness (n=28)**	
>23	69 (16.4%)	Anxiety	14 (3.3%)
Gender		Depression	11 (2.6%)
Male	215 (51.2%)	Stress	03 (0.7%)
Female	205 (48.8%)	**Relative affected (n=28)**	
Family Type		1st degree blood relatives	27 (6.4%)
Nuclear	308 (73.3%)	2nd degree blood relatives	01 (0.2%)
Joint	103 (24.5%)	**Self -status of Mental Illness**	

3rd Generation	9 (2.1%)	Yes	27 (6.4%)
Residence		No	393 (93.6%)
College Hostel	384 (91.4%)	**Type of Mental Illness Present among Subjects (n=27)**	
Day scholar	24 (5.7%)	Anxiety	13 (3.1%)
At home	12 (2.9%)	Depression	5 (1.2%)
History of Addiction		Stress	4 (1.0%)
Yes	27 (6.4%)	Depression & Anxiety	5 (1.2%)
No	393 (93.6%)	**Subjects On Treatment (n=27)**	
Type of Addiction (n=27)		Yes	16 (59.3%)
Sedative	2 (0.5%)	No	11 (40.7%)
Tea	4 (1.0%)	**Time of Treatment (n=16)**	
Mobile	9 (2.1%)	Up to 1 year	7 (43.7%)
Smoked Tobacco	3 (0.7%)	≥ 1year	9 (56.3%)
Alcohol	3 (0.7%)	**Treatment Continuation Status (n=16)**	
Alcohol & Sedative	1 (0.2%)	Continue	08 (50.0%)
Smoked Tobacco & Alcohol	2 (0.5%)	Discontinue	08 (50.0%)
> 2 Forms	3 (0.7%)	**Subject Perception about Cause for their Mental Illness (n=16)**	
Family Problems		Academic Pressure	9 (56.3%)
Yes	17 (4.0%)	Disease Status	6 (37.5%)
No	403 (96.0%)	Family issue	1 (6.2%)

The table-1 provides a comprehensive overview of the socio-demographic characteristics and mental health-related factors of the study population. The data suggested that the majority of participants are young adults of 21-23 years age group, predominantly from nuclear families and residing in college hostels. The findings indicate a relatively low prevalence of mental health issues, with only 6.7% of the participants reporting a family history of mental illness and 6.4% having a personal history of mental illness. The most common mental health conditions reported were anxiety, depression, and stress, with a small percentage of participants seeking treatment for their conditions. The table also provides insights into the perceived causes of mental illness, with academic pressure and disease status being the most commonly cited factors.

Figure 1A &B:

Figure-1A: Venn diagram is showing relation & difference between Depression, Anxiety & Stress (N=420)

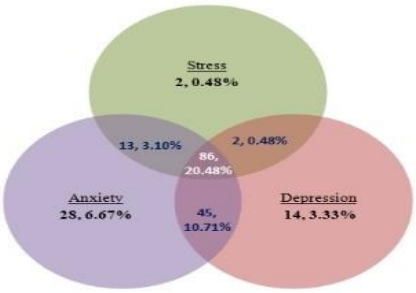
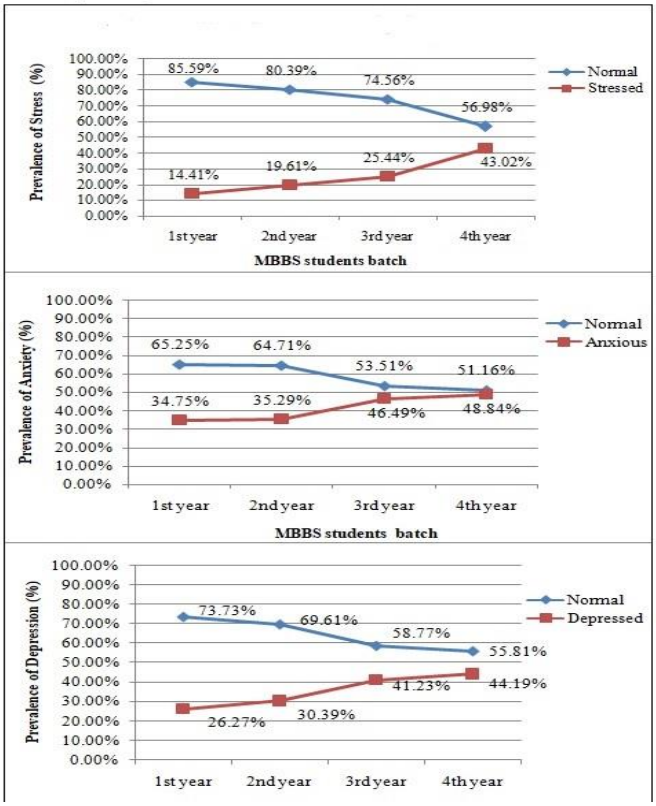


Figure-1B: Showing year wise distribution of Depression, Anxiety & Stress (N=420)



The Venn diagram in figure 1A delineates the overlap and unique instances of stress, anxiety, and depression among medical students. A Venn diagram shows minimal stress (0.48%) but higher anxiety (6.67%) and depression (3.33%) among medical students. Notably, 10.71% suffer both anxiety and depression, 3.10% have stressed and anxiety, and 0.48% face stress and depression. A significant 20.48% endure all three conditions.

A year-wise analysis provided in figure 1B reveals the prevalence of stress, anxiety, and depression across different academic years of the M.B.B.S. program. Yearly data reveals stress, anxiety, and depression prevalence in M.B.B.S. students: 24.52% stress, 40.95% anxiety, and 34% depression. The fourth year is most affected with 43.02% stress, 48.84% anxiety, and 44.19% depression. The third year has 25.44% stress, 46.49% anxiety, and 41.23% depression. The second year shows 19.69% stress, 35.29% anxiety, and 30.39% depression. The first year reports the lowest with 14.41% stress, 35.29% anxiety, and 30.39% depression. The trend indicates the escalating mental health challenges faced by students as they progress through their medical education, with the most significant burden observed in the final year.

Table 2: Comparison of Prevalence of Stress, Anxiety and Depression between Genders (N=420)

Categories of each domain	Male No. (%)		Female No. (%)		Total No (%)	
Stress						
Normal	161 (38.34%)		156 (37.14%)		317 (75.47%)	
Mild	32 (7.61%)		22 (5.23%)		54 (12.85%)	
Moderate	07 (1.66%)	**12.83%**	14 (3.33%)	**11.64%**	21(5.00%)	**24.51%**
Severe	08 (1.90%)		11 (2.61%)		19 (4.52%)	
Extremely severe	07 (1.66%)		02 (0.47%)		09 (2.14%)	
Total	215 (51.20%)		205 (48.80%)		420 (100.00%)	
Anxiety						
Normal	121 (28.80%)		127 (30.23%)		248 (59.04%)	
Mild	13 (3.09%)		15 (3.57%)		28 (6.66%)	
Moderate	35 (8.33%)	**22.38%**	33 (7.85%)	**18.56%**	68 (16.19%)	**40.94%**
Severe	20 (4.76%)		10 (2.38%)		30 (7.14%)	
Extremely severe	26 (6.20%)		20 (4.76%)		46 (10.95%)	
Total	215 (51.20%)		205 (48.80%)		420 (100.00%)	
Depression						
Normal	133(31.66%)		140 (33.33%)		273 (65.00%)	
Mild	28(6.66%)		18 (4.28%)		46 (10.90%)	
Moderate	33 (7.85%)	**19.50%**	29 (6.90%)	**15.46%**	62 (14.76%)	**34.93%**
Severe	12(2.85%)		10 (2.38%)		22 (5.23%)	
Extremely severe	9 (2.14%)		8(1.90%)		17 (4.04%)	
Total	215 (51.20%)		205 (48.80%)		420 (100.00%)	

The provided table 2 reveals the gender wise prevalence of depression, anxiety and stress among the participants. On **stress domain,** a higher percentage of males (38.34%) reported being in the 'Normal' category compared to females (37.14%). More females 6.43% reported 'Moderate' to 'Extremely severe' level of stress compared to 5.22% males. Overall, 75.47% of the sample reported 'Normal' stress level suggesting that, while most students manage stress well, female students may require more support. Overall, stress level appear manageable but warrant attention

On **anxiety domain,** a slightly higher percentage of females (30.23%) reported 'Normal' anxiety level compared to (28.80%) males. 19.23% males reported higher level of 'Moderate' to 'Extremely severe' anxiety than 14.95% females. A total 59.04% of individuals having 'Normal' anxiety indicating, monitoring anxiety and providing support are crucial to address anxiety, particularly among male students.

Continuing with d**epression domain,** more females (33.33%) reported 'Normal' level of depression compared to (31.66%) males. A higher level of 'Moderate' to 'Extremely severe' depression reported by 12.85% males than 11.2% females. A total of 65.00% of the sample reported 'Normal' depression level. This highlights the importance of depression screening and support services, especially for male students.

Table-3:Showing association of mental health domains with socio- demographic characteristics (N=420)

Characteristics	Stress		Anxiety		Depression	
	Present No. (%)	Absent No. (%)	Present No. (%)	Absent No. (%)	Present No. (%)	Absent No. (%)
Age Group (In years)						

18-20	9 (2.1%)	76 (18.1%)	29 (6.9%)	56 (13.3%)	22 (5.2%)	63 (15.0%)
21-23	65 (15.5%)	201 (47.9%)	105 (25.0%)	161 (38.3%)	90 (21.4%)	176 (41.9%)
>23	29 (6.9%)	40 (9.5%)	38 (9.0%)	31 (7.4%)	35 (8.3%)	34 (8.1%)
Total	103 (24.5%)	317 (75.5%)	172 (41.0%)	248 (59.0%)	147 (35.0%)	273 (65.0%)
Asymptomatic Significant (2-sided)	**0.000**		**0.023**		**0.005**	
Family Type						
Nuclear	69 (16.4%)	239 (56.9%)	121 (28.8%)	187 (44.5%)	97 (23.1%)	211 (50.2%)
Joint	31 (7.4%)	72 (17.1%)	46 (11.0%)	57 (13.6%)	47 (11.2%)	56 (13.3%)
Third Generation	3 (0.7%)	6 (1.4%)	5 (1.2%)	4 (1.0%)	3 (0.7%)	6 (1.4%)
Total	103 (24.5%)	317 (75.5%)	172 (41.0%)	248 (59.0%)	147 (35.0%)	273 (65.0%)
Asymptomatic Significant (2-sided)	0.240		0.420		**0.033**	
History of Addiction						
Yes	19 (4.5%)	8 (1.9%)	20 (4.8%)	7 (1.7%)	20 (4.8%)	7 (1.7%)
No	84 (20.0%)	309 (73.6%)	152 (36.2%)	241 (57.4%)	127 (30.2%)	266 (63.3%)
Total	103 (24.5%)	317 (75.5%)	172 (41.0%)	248 (59.0%)	147 (35.0%)	273 (65.0%)
Asymptomatic Significant (2-sided)	**0.000**		**0.000**		**0.000**	
Status of Family Problems						
Yes	9 (2.1%)	8 (1.9%)	13 (3.1%)	4 (1.0%)	13 (3.1%)	4 (1.0%)
No	94 (22.4%)	309 (73.6%)	159 (37.9%)	244 (58.1%)	134 (31.9%)	269 (64.0%)
Total	103 (24.5%)	317 (75.5%)	172 (41.0%)	248 (59.0%)	147 (35.0%)	273 (65.0%)
Asymptomatic Significant (2-sided)	**0.005**		**0.002**		**0.000**	
Family History of Mental Illness						
Yes	28 (6.7%)	0 (0.0%)	28 (6.7%)	0 (0.0%)	28 (6.7%)	0 (0.0%)
No	75 (17.9%)	317 (75.5%)	144 (34.3%)	248 (59.0%)	119 (28.3%)	273 (65.0%)
Total	103 (24.5%)	317 (75.5%)	172 (41.0%)	248 (59.0%)	147 (35.0%)	273 (65.0%)
Asymptomatic Significant (2-sided)	**0.000**		**0.000**		**0.000**	
Self -Status of Mental Illness						
Yes	22 (5.2%)	5 (1.2%)	23 (5.5%)	4 (1.0%)	23 (5.5%)	4 (1.0%)
No	81 (19.3%)	312 (74.3%)	149 (35.5%)	244 (58.1%)	124 (29.5%)	269 (64.0%)

Total	103 (24.5%)	317 (75.5%)	172 (41.0%)	248 (59.0%)	147 (35.0%)	273 (65.0%)
Asymptomatic Significant (2-sided)	**0.000**		**0.000**		**0.000**	

Table 3 is illustrating the prevalence of stress, anxiety, and depression among different demographic segments within the study population. The findings indicate that the age group of 21-23 years exhibits the highest occurrence rates, with 15.5%, 25.0% & 21.4% for stress, anxiety, and depression respectively. In contrast, the younger cohort of 18-20 years demonstrates the lowest prevalence, with 2.1% for stress, 6.9% for anxiety, and 5.2% for depression.

The data further delineates that individuals from nuclear families report higher prevalence rates (S=16.4%, A=28.8%, D=23.1%) compared to those from joint or extended families. This difference is statistically significant for depression (p=0.033), suggesting a potential impact of family structure on mental health. Additionally, participants with a history of addiction show nearly uniform rates across all three mental health domains, with 4.5% for stress, 4.8% each for anxiety, and depression. This uniformity is marked by a highly significant statistical difference (p=0.000), indicating a strong association between addiction history and the prevalence of these conditions.

The analysis also identifies a significant association (p<0.001) between the presence of family problems and the occurrence of mental health issues, with nearly equal rates of 2.1% for stress and 3.1% for both anxiety and depression. Furthermore, a family history of mental illness shows with a 6.7% prevalence rate for each condition, underscoring the influence of genetic and environmental factors.

Lastly, individuals who self-report mental illness show significantly higher (p=0.001) and nearly equal prevalence rates of 5.2% for stress and 5.5% for both anxiety and depression. This self-reporting aspect highlights the importance of subjective experience in the assessment of mental health.

Furthermore, to complement the findings from the above statistics the study move towards correlation analysis this helps to know the nature, strength and direction between the inter-relationships among all the variables.

Table-4: Showing Spear man's correlation between mental health domains with academic year & age (in completed years) (N=420)

First Year (18-25)		**Age (18-25)**	**Stress**	**Anxiety**	**Depression**
Age (18-25)	**Correlation Coefficient**	1.000			
	Sig. (2-tailed)	-			
Stress	**Correlation Coefficient**	0.153	1.000		
	Sig. (2-tailed)	0.097	-		
Anxiety	**Correlation Coefficient**	0.065	0.512**	1.000	
	Sig. (2-tailed)	0.485	0.000	-	
Depression	**Correlation Coefficient**	0.073	0.303**	0.656**	1.000
	Sig. (2-tailed)	0.429	0.001	0.000	-
Second Year		**Age (19-24)**	**Stress**	**Anxiety**	**Depression**
Age (19-24)	**Correlation Coefficient**	1.000			
	Sig. (2-tailed)	-			

Stress	**Correlation Coefficient**	-0.031	1.000		
	Sig. (2-tailed)	0.759	-		
Anxiety	**Correlation Coefficient**	-0.014	0.565**	1.000	
	Sig. (2-tailed)	0.889	0.000	-	
Depression	**Correlation Coefficient**	0.057	0.425**	0.582**	1.000
	Sig. (2-tailed)	0.570	0.000	0.000	-
Third Year		**Age (19-25)**	**Stress**	**Anxiety**	**Depression**
Age (19-25)	**Correlation Coefficient**	1.000			
	Sig. (2-tailed)	-			
Stress	**Correlation Coefficient**	0.192*	1.000		
	Sig. (2-tailed)	0.040	-		
Anxiety	**Correlation Coefficient**	0.042	0.627**	1.000	
	Sig. (2-tailed)	0.657	0.000	-	
Depression	**Correlation Coefficient**	0.653	0.656**	0.756**	1.000
	Sig. (2-tailed)	0.043	0.000	0.000	-
Fourth Year		**Age (22-30)**	**Stress**	**Anxiety**	**Depression**
Age (22-30)	**Correlation Coefficient**	1.000			
	Sig. (2-tailed)	-			
Stress	**Correlation Coefficient**	0.146	1.000		
	Sig. (2-tailed)	0.179	-		
Anxiety	**Correlation Coefficient**	0.241*	0.842**	1.000	
	Sig. (2-tailed)	0.025	0.000	-	
Depression	**Correlation Coefficient**	0.213*	0.929**	0.864**	1.000
	Sig. (2-tailed)	0.049	0.000	0.000	-

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficients for stress, anxiety, and depression among first-year undergraduate medical students aged 18 to 25 showed a very weak positive correlation between age and stress (0.153), anxiety (0.065) and depression (0.073) with insignificant p- values (for stress= 0.097, anxiety=0.485 & depression 0.429) are suggesting that, as age increases stress, anxiety and depression tends to increase slightly and the observed relationships may occur by chance. The correlation coefficient of 0.512 indicates moderately strong positive correlation between stress and anxiety with highly significant p-value 0.000. It means as stress increases, individuals are more likely to experience higher anxiety. Consistent with existing research, the findings indicate that stress and anxiety frequently interact and exacerbate each other in the daily lives of first-year medical students.

The correlation coefficients for stress, anxiety, and depression among second-year undergraduate medical students aged 19 to 24 indicated a weaker negative correlation of age with stress (-0.31) and with anxiety (-0.014) with insignificant p value 0.759 & 0.889 respectively. It indicates as students gets older their reported stress and anxiety level tends to decrease slightly. A very weak positive correlation between age and depression (0.057) with insignificant p value of 0.570 suggested that, with the increasing age, students experience slightly more depression. However on view of statistically insignificant state age has not meaningful impact on all three domains. The correlation coefficient of 0.565 indicates moderately strong positive correlation between stress and anxiety with highly significant p-value 0.000. It means as stress increases, individuals are more likely to experience higher anxiety. This finding aligns with research showing that stress and anxiety often reinforce each other in daily life of second year medical students. The correlation between anxiety and depression is moderately strong positive (0.582) correlation with highly significant p-value (0.000). It indicates as the age increases the anxiety level also increases as well. It is strong evidence suggesting that relationship existing between them but not due to random chance. A moderately strong positive correlation of 0.425 found between stress and depression with highly significant p-value (0.000). It indicates as stress level increase, individuals are more likely to experience higher depression level and the likelihood of obtaining this correlation by chance alone is extremely low.
The correlation coefficients for stress, anxiety, and depression among third-year undergraduate medical students aged 19 to 25 indicated a weaker positive correlation between age and stress (0.192) & anxiety (0.042) with p values (stress=0.040, anxiety=0.657) suggesting that, older students may experience slightly higher stress level while there is no meaningful relationship with anxiety. A strong positive correlation between age and depression (0.653) with significant p value (0.043) suggested about the meaningful relationship among them. It is showing as individual's age, they may be more susceptible to experiencing depression. There is a statistically significant (0.040) positive correlation (0.192) between stress and anxiety suggesting it's unlikely to have occurred by chance. In applicable status, this finding could be relevant for understanding the mental health of third year undergraduate medical students. The correlation coefficient between anxiety and depression is 0.627, indicating strong positive linear relationship between them. The highly significant (0.000) P value is suggesting as anxiety increases depression increases as well. The correlation coefficient is strongly (0.653) correlate between stress and depression with statistically significant p-value (0.043). It means that the observed correlation is unlikely to occur by chance and depression increases as stress increases.

The correlation coefficients revealed for stress, anxiety, and depression among fourth-year undergraduate medical students aged 22 to 30 years indicated a weak positive correlation of age with anxiety (0.146), stress (0.241) and depression (0.213) with significant p value of 0.025 & 0.049 only with anxiety & depression respectively. It indicates as the age increases, anxiety tends to slightly increase and older students may experience slightly higher levels of depression. The correlation between stress and anxiety showed a very weak positive correlation (0.146) between stress and anxiety with statistically insignificant (0.179) correlation, meaning it could occur by chance. The correlation between anxiety and depression was statistically significant (0.025) weak positive correlation (0.241) between anxiety and depression, indicating as anxiety levels increase, depression tends to increase as well. The correlation between stress and depression was statistically significant (0.049) positive weak correlation (0.213) between stress and depression showing as stress level rise, depression tends to increase as well.

The correlation between anxiety and depression is strong positive (0.656) correlation with highly significant p-value (0.000). It indicates as the age increases the anxiety level also increases as well. It is strong evidence suggesting that relationship existing between them but not due to random chance. A weak positive correlation of 0.303 found between stress and depression with highly significant p-value (0.001), indicates as stress level increase, so does the likelihood of experiencing

depression. The spearman's correlation among all three domains shows a strong positive relationship between stress and anxiety (r=0.774), stress and depression (r=0.752), and anxiety and depression (r=0.770), all with a p-value of 0.000. This indicates that higher level of one are associated with higher level of the others, highlighting the interconnected nature of these mental health domains.

Table-5: Showing Binary Logistic Regression between dependent and independent variables (N=420)

Dependent variables	Independent variables	Coefficient (B)	Standard Error (S.E.)	Wald Statistics	Odds Ratio (Exp.B)	95%CI for Exp.(B)		Significance
						Lower	Upper	
Stress	MBBS students batch	0.32	0.13	6.33	1.38	1.074	1.778	**0.01**
	Age group	0.55	0.24	5.40	1.73	1.091	2.774	**0.02**
	Constant	-3.08	0.45	47.52	0.04	-	-	**0.00**
Anxiety	MBBS students batch	0.14	0.11	1.58	1.14	0.927	1.417	0.20
	Age group	0.29	0.199	2.11	1.33	0.904	1.973	0.14
	Constant	-1.27	0.35	12.97	0.28	-	-	**0.00**
Depression	MBBS students batch	0.18	0.11	2.61	1.19	0.962	1.495	0.10
	Age group	0.36	0.21	3.05	1.43	0.957	2.158	0.08
	Constant	-1.79	0.37	23.07	0.16	-	-	**0.00**

Logistic Regression Model Equation-

Log (stress) = -3.08 + 0.32 *(MBBS students Batch) + 0.55 *(Age group)

Log (Anxiety) = -1.27 + 0.14 *(MBBS students Batch) + 0.29 *(Age group)

Log (Depression) = -1.79 + 0.18 *(MBBS students Batch) + 0.36 *(Age group)

Furthermore, to know the impact of independent factors on dependent factors binary logistic regression is used at 95% C.I. in table 5. It revealed a distinct pattern of stress, anxiety and depression. For stress, the batch year (B=0.32, p=0.01) and age group (B=0.55, p=0.02) emerged as significant predictors. Specifically, as the batch year increases, the odds of experiencing stress increase by a factor of 1.38, indicating a 38% rise in stress odds with each advancing batch. This phenomenon may be attributed to escalating academic demands, impending critical examinations, or augmented clinical duties as students' progress through the MBBS curriculum. Furthermore, the analysis suggests that older age groups are 1.73 times more likely to report stress than their younger counterparts, a 73% escalation in stress odds with each older age group, potentially due to heightened life responsibilities, increased expectations, or the accumulative impact of sustained academic stress.

Conversely, coefficients for anxiety, the batch (B=0.14, p=0.20) and age group (B=0.29, p=0.14), though positive, did not reach statistical significance. Nevertheless, they indicate a trend where the odds of experiencing anxiety increase by 14% with each subsequent batch and by 33% with each older age group.

Similarly, for depression, the batch (B=0.18, p=0.10) and age group (B=0.36, p=0.08) also displayed positive but non-significant trends. The data suggests a potential increase in the likelihood of depression by 19% with each advancing batch and by 43% with each older age group. Negative constants imply a reduced likelihood of these conditions at baseline values of the independent variables. This information is crucial for understanding the baseline risk before considering the effects of batch year and age group on mental health outcomes among MBBS students. (Table-5)

Discussion:

In this study, 420 students participated after providing written consent, resulting in a response rate of 100.00%. The distribution across the academic years was 28.09%, 24.28%, 27.14%, and 20.47% were from first to fourth year respectively. In comparison, a similar cross-sectional study by Kamboj G. et al [10] (2021) reported a response rate of 94.5% with 51.32% (97/189) of participants from the first year and 48.67% (92/189) were from the third year, indicating greater participation but lower response rate than in our study.

In the present study socio- demographic characteristic depicts that the maximum 63.30%, 51.20% and 90.70% participants belonged to 21-23 years of age group, male gender and of Hindu religion respectively. 91.40% students were hostelers, 5.70% were day-scholar and only 2.40% were residing at their home. Maximum 73.33% subjects were belonged to nuclear family, 24.52% were from joint family and the rest 2.14% were from third generation family. Only 4.04% students were facing family problems due to any reason. Most 93.33% students were not having family history of any mental illness. Only 3.33%, 2.61% and 0.71% subjects were showing family history of anxiety, depression and stress respectively.

Comparing socio-demographic characteristics, our study closely aligns with Kumar S. et al.'s [11](2020) findings. It depicts 65% were male participants, 80% belonged to Hindu religion, 70% were hostler and 30% were day-scholar. 25%, 27.5%, 25.5% & 22% participants were from first to fourth year respectively. A similar distribution of gender and academic year, with a slightly higher proportion of Hindu participants in our study was observed. However, our study reported a lower incidence of family history of mental illness compared to the 12% noted by above study.

A descriptive cross sectional study of Chakraborty S. et al.[12] reported anxiety, stress, and depression rates at 52.4%, 31.9%, and 45.3%, respectively, with 38.4% experiencing all three. Our study found lower prevalence rates of 24.51% for stress, 40.94% for anxiety, and 34.93% for depression, with 20.5% showing all three conditions, indicating a lower overall prevalence but a higher incidence of multiple domains on comparison with above study findings.

The study by Sruthi MV et al.[13] (2023) found that 11.7% of medical students experienced extremely severe depression, and 22.4% moderate depression. For anxiety, 10.2% faced extreme severity, while 21.5% had moderate levels. Stress levels were extremely severe in 2.4% and moderate in 9.8% of students. In contrast, our study reported 4.04% with extremely severe depression, 14.76% with moderate depression, 10.95% with extreme anxiety, and 16.19% with moderate anxiety. Extreme stress was noted in 2.14%, and moderate stress in 5.00%. Higher rate of moderate depression, anxiety, and stress levels, but similar rates of extreme anxiety and stress level in our study findings compared to this study.

Compared to the study done by Kamboj G. et al.[10] (2021), our study reported lower prevalence rates for most anxiety, stress, and depression levels. While they found depression in 61.6% of subjects, with severe and extreme levels at 17.5% each, our study had lower rates. Anxiety was reported at 69.8% in their study, with 36% experiencing extreme severity; our findings were less. Stress prevalence was 46.6% in their study, compared to lower levels in ours, except for higher rates of mild stress and moderate levels of anxiety and depression.

The studies by Sattar MA et al.[14] and Kumar S. et al.[11] reported higher instances of depression, anxiety, and stress among first-year students (31%, 26%, 37% & 37.03%, 35.0% , 36.05% respectively) than in subsequent years. Our research, however, found the highest prevalence rates of depression, anxiety and stress in fourth-year students (44.19%, 48.84% & 43.02% respectively), with significant levels of anxiety and depression in the third (46.5% & 41.23%) and second years (35.29% & 30.39%), and the lowest incidence of stress (25.44%, 19.61% & 14.41%) across all three (first-third) years. Compared to these studies, our findings indicate a lower overall prevalence of these mental health issues among our college students.

The study by Kataria L. et al.[15] (2023) revealed a strong positive correlation between depressive symptoms and both anxiety (r=0.813) and stress (r=0.854). Additionally, anxiety and stress were strongly correlated (r=0.824). Our research aligns with these findings, demonstrating significant positive correlations between stress and anxiety (r = 0.774), stress and depression (r =0.752), and

anxiety and depression (r=0.770), all with p-values of 0.000. These results underscore the robust interrelationship among these psychological conditions.

Our research is bolstered by the significant yet frequently ignored impact of mental health conditions on the global disease burden, particularly in Low & Middle Income Countries (LMICs).[16] A joint study by the World Bank Group and World Health Organization (WHO)[17,18] projects the costs and health outcomes of treating depression and anxiety until 2030 in nations accounting for 80% of these disorders' worldwide prevalence. Our study's aims are in harmony with the WHO Mental Health Action Plan 2013-20[19], which advocates for mental health improvement through promotion of well-being, prevention of disorders, provision of care, support for recovery, assurance of rights, and reduction of illness impacts. Additionally, our findings are consistent with the Sustainable Development Goals (SDGs) 2030's[20] ;Goal 3 (Target 3.4 & 3.5), which targets a one-third reduction in premature mortality from non-communicable diseases and promotes mental health and well-being, while also aiming to prevent and treat substance abuse. This underscores the urgent need for mental health support to safeguard the welfare of medical undergraduates.

Conclusion-

The research indicates the impact of mental health issues on medical students are significant and cannot be ignored. All three domain's (stress, anxiety & depression) prevalence are notably higher among male undergraduate medical students, although stress levels are similar between both the sex. The study underscores the influence of demographic and environmental factors. Age and academic year emerge as significant predictors for stress and depression as they reinforced each other's, although for anxiety not enough when considered in isolation. Family history of mental health issues, addiction history and self- reporting are crucial factors. Necessitate a comprehensive approach that encompasses family dynamics and personal history in devising preventive measures. The results highlight the urgent need for robust mental health support systems within medical education. Initiatives such as proactive screening, counseling services, and stress management programs could play a crucial role in addressing the mental health challenges that medical students face. This study not only illuminates the widespread nature of mental health conditions among medical students but also acts as an urgent appeal for the establishment of holistic and enduring mental health support structures within the medical education system. It also offers practical recommendations for the institution to consider.

Limitation & strength of the study-

Among its strengths, the cross-sectional nature of this study provides a snapshot of medical students' mental health, establishing a baseline for potential longitudinal studies. This approach is also more feasible and cost-effective than longitudinal research, allowing for the examination of multiple outcomes and exposures simultaneously. However, the study is limited by its inability to establish causality due to its observational nature. Potential selection bias may affect the generalization of the findings, while response bias could impact the accuracy of self-reported data on sensitive issues such as mental health. Despite these limitations, the study contributes important information to the understanding of mental health challenges in medical education settings.

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Conflict of interest- Nil.

Ethical statement

This study was approved by Institutional Ethics Committee with reference number ---Letter No. **23/IECGMCRJN/2023** obtained on **07/07/2023.**

Declaration of Patient Consent

Patient consent statement was taken from each patient as per institutional ethics committee approval along with consent taken for participation in the study and publication of the scientific results / clinical information /image without revealing their identity, name or initials. The patient is aware that though confidentiality would be maintained anonymity cannot be guaranteed.

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