

Anxiety and its coping mechanisms among engineering and medical students: a comparative study

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Abstract

Objective: To assess the frequency of anxiety and its coping mechanism among medical and engineering students.

Method: The comparative cross-sectional study was conducted from April to September 2023 in Faisalabad, Pakistan, and comprised students from two medical and two engineering education institutions. Within the two subsets, one was a public-sector institution and the other was in the private sector. Data was collected using Generalised Anxiety Disorder-7 and Brief Cope Inventory. Data was Analysed using SPSS 27.

Results: Study subjects ranged between 17-26 years of age and 144(36%) of them were females. Of the 400 subjects, 200(50%) were medical students and the rest were engineering students uniformly representing all years of education. Also, 200(50%) responses were from private-sector institutions and the rest were from public-sector institutions. Mild anxiety was present in 220(55%) subjects, more in engineering students. Moderate anxiety was found in 98(24.5%) students, most in public-sector medical institutions. Minimal and severe anxiety were noted in 56(14%) and 26(6.50%) subjects, respectively. Medical and engineering students showed the same patterns of coping mechanisms, with planning (2.55 ± 0.69) being the most adopted, and substance abuse (1.78 ± 0.68) the least.

Conclusion: Except for mild anxiety, all other groups of anxiety levels were found to be higher among medical students. In terms of coping behaviour, there was no difference between medical and engineering students.

Key Words: Anxiety, Coping mechanism, Coping strategy.

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Introduction

Anxiety is prevalent among medical students across the world, but it is especially seen with greater frequency in the Middle East.¹ The causes of this mental health deterioration are academic as well as non-academic, and the family background of individuals also predispose them to such issues when facing difficult situations.¹

The levels of anxiety also vary when it is observed among students of different academic years.¹ Anxiety and depression for sure affect the professional capabilities as well as the personal lives of students at some level. However, the controversy about medical students suffering more in this regard compared to their counterparts in other professional fields remains alive.¹ The stress levels among medical students are significantly

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high, primarily due to academic pressures. A lack of adequate guidance from teachers has been identified as a major contributing factor. Students experiencing high levels of stress are more likely to resort to maladaptive coping strategies.² When it comes to anxiety, everyone copes with it differently, and the coping mechanisms can themselves predispose the students to more anxiety, like substance abuse, denial, venting, etc.³ Moreover, the symptoms of anxiety share a significant correlation with coping strategy, peer support and family background.⁴ It was found that by revising the curriculum of a course of doctor of pharmacy, the students reported to have increased the use of positive coping strategies and lesser use of negative strategies compared to the students who were on the old curriculum.⁵ That fact that engineering students also can be under significant levels of stress was noted by a study which found that the levels of depression were significant in both male and female participants. The female participants particularly showed higher levels of stress, anxiety and depression.⁶

The current study was planned to assess the frequency of anxiety and its coping mechanism among medical and engineering students. The null hypothesis was that there was no difference between the two sets of students.

Subjects and Methods

The comparative cross-sectional study was conducted from April to September 2023 in Faisalabad, Pakistan, and comprised students from two medical and two engineering education institutions. Within the two subsets, one was a public-sector institution and the other was in the private sector. The sample was raised using non-probability quota sampling technique from Aziz Fatima Medical and Dental College (AFMDC), a private medical college; Faisalabad Medical University (FMU), a public-sector medical university; National Textile University (NTU), a private-sector engineering university; and the University of Agriculture Faisalabad (UAF), a public-sector institution. Those included were undergraduate students from all years of education, while those having a history of diagnosed mental illness were excluded.

After approval from the AFMDC ethics review committee, the sample size was calculated based on literature⁷, taking estimated frequency 0.308 for anxiety.⁵ The formula used was: $n = (Z\alpha/2 + Z\beta)^2 \cdot (p_1(1-p_1) + p_2(1-p_2)) / (p_1 - p_2)^2$. Within the formula, $Z\alpha/2$ was the critical value of normal distribution at $\alpha/2$ (e.g., the confidence level of 95% meant α 0.05 and critical value 1.96), $Z\beta$ was

the critical value of normal distribution at β (e.g., power 80% meant β 0.2 and critical value 0.84), while p_1 and p_2 were the expected sample proportion of the two groups⁷

After taking informed consent from the subjects, data was collected Using Generalized Anxiety Disorder-7 (GAD-7) and Brief Cope Inventory (BCI) questionnaires (Figures 1-2). Both the self-administered questionnaires have been used in Pakistan previously with proven reliability and validity.⁸⁻¹⁰

GAD-7 comprises seven questions and uses a 4-point Likert scale, with 0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day. Score 0-4 shows minimal anxiety, 5-9 mild anxiety, 10-14 moderate anxiety, and >15 shows severe anxiety¹⁰

BCI is a 28-item tool with four options for every question: 1 = I have not been doing this at all, 2 = a little bit, 3 = a medium amount, and 4 = I have been doing this a lot. It determines a person's key coping mechanisms using their performance on the three subscales: avoidant coping (AC), problem-focussed coping (PFC), and emotion-focussed coping (EFC). The average scores for the three major coping mechanisms indicate the respondent's usage of each coping mechanism.⁹

GAD-7

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

Total Score — = Add Columns — + — + —

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all
 Somewhat difficult
 Very difficult
 Extremely difficult

Figure-1: Generalised Anxiety Disorder-7 (GAD-7) questionnaire.

		I haven't been doing this at all	A little bit	A medium amount	I've been doing this a lot
1	I've been turning to work or other activities to take my mind off things.	1	2	3	4
2	I've been concentrating my efforts on doing something about the situation I'm in.	1	2	3	4
3	I've been saying to myself "this isn't real".	1	2	3	4
4	I've been using alcohol or other drugs to make myself feel better	1	2	3	4
5	I've been getting emotional support from others.	1	2	3	4
6	I've been giving up trying to deal with it.	1	2	3	4
7	I've been taking action to try to make the situation better.	1	2	3	4
8	I've been refusing to believe that it has happened.	1	2	3	4
9	I've been saying things to let my unpleasant feelings escape.	1	2	3	4
10	I've been getting help and advice from other people.	1	2	3	4
11	I've been using alcohol or other drugs to help me get through it.	1	2	3	4
12	I've been trying to see it in a different light, to make it seem more positive.	1	2	3	4
13	I've been criticizing myself.	1	2	3	4
14	I've been trying to come up with a strategy about what to do.	1	2	3	4
15	I've been getting comfort and understanding from someone.	1	2	3	4
16	I've been giving up the attempt to cope.	1	2	3	4

Figure-2A: The Brief Cope Inventory (BCI).

PFC is covered by items 2, 7, 10, 12, 14, 17, 23 and 25, including proactive coping, the use of informational support, planning, and a positive outlook. Use of PFC indicates the employment of coping skills meant to change the challenging situation. Additionally, it is an indication of success as individuals show mental fortitude, persistence, and a practical approach to problem-solving. EFC is covered by items 5, 9, 13, 15, 18, 20, 21, 22, 24, 26, 27 and 28, including religion, guilt, humour, acceptance and emotional support. Leaning on this coping shows the employment of coping skills meant to manage the emotions triggered by the stressful situation. Even though high or low scores do not always reflect

psychological wellbeing or disease, they can be used to more broadly identify a respondent's coping strategies.

AC is covered by items 1, 3, 4, 6, 8, 11, 16 and 19, including substance abuse, behavioural disengagement, self-distraction, and denial. An effort to physically or psychologically escape the stressor is indicated by a high score. Contrary to other two types, low AC score often indicates successful coping.

Besides the three categories, the BCI scores were categorised into 14 subcategories. PFC comprised four subcategories. PFC-I indicated active coping (items 2 and 7), PFC-II indicated use of informational support (items 10

		I haven't been doing this at all	A little bit	A medium amount	I've been doing this a lot
17	I've been looking for something good in what is happening.	1	2	3	4
18	I've been making jokes about it.	1	2	3	4
19	I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	1	2	3	4
20	I've been accepting the reality of the fact that it has happened.	1	2	3	4
21	I've been expressing my negative feelings.	1	2	3	4
22	I've been trying to find comfort in my religion or spiritual beliefs.	1	2	3	4
23	I've been trying to get advice or help from other people about what to do.	1	2	3	4
24	I've been learning to live with it.	1	2	3	4
25	I've been thinking hard about what steps to take.	1	2	3	4
26	I've been blaming myself for things that happened	1	2	3	4
27	I've been praying or meditating	1	2	3	4
28	I've been making fun of the situation.	1	2	3	4

Figure-2B: The Brief Cope Inventory (BCI).

and 23), PFC-III showed positive reframing (items 12 and 17), and PFC-IV showed planning (items 14 and 25). EFC comprised six subcategories. EFC-I indicated emotional support (items 5 and 15), EFC-II meant venting (items 9 and 21), EFC-III showed humour (items 18 and 28), EFC-IV indicated acceptance (items 20 and 24), EFC-V meant religion (items 22 and 27), and EFC-VI indicated self-blame (items 13 and 26).

AC comprised four subcategories. AC-I showed self-distraction (items 1 and 19), AC-II indicated denial (items 3 and 8), AC-III meant substance abuse (items 4 and 1) and AC-IV related to behavioural disengagement (items 6 and 16).⁹

Data was analysed using SPSS 27. Chi-square test was used to analyse the relation between the discipline of studies and GAD score. Level of significance was kept at 95% with only 5% chance of error. For BCI, descriptive statistics were employed. The mean and standard deviation of the scores regarding its three categories were calculated for medical and engineering students

separately for comparison. The mean values of the 14 BCI subcategories were also calculated separately, and were then compared.

Results

Study subjects belonged to 17-26 years of age composed of 144(36%) females and 256(64%) males. Of the 400 subjects, 200(50%) were medical students and the rest were engineering students uniformly representing all years of education. Also, 200(50%) responses were from private-sector institutions and the rest were from public-sector institutions.

Mild anxiety was present in 220(55%) subjects, more in engineering students. Moderate anxiety was found in 98(24.5%) students, most in public-sector medical institutions. Minimal and severe anxiety were noted in 56(14%) and 26(6.50%) subjects, respectively. There was a significant association between anxiety level and the discipline of study ($p < 0.001$) (Figure 3). Additionally, the frequency of severe anxiety was greater in private-sector

Table-1: Prevalence of anxiety among medical and engineering students.

Institute	Minimal Anxiety	Mild Anxiety	Moderate Anxiety	Severe Anxiety
Engineering (private)	7 (7%)	67 (67%)	23 (23%)	3 (3%)
Engineering (public)	5 (5%)	67 (67%)	25 (25%)	3(3%)
Medical (private)	24 (24%)	41(41%)	23(23%)	12(12%)
Medical (public)	20 (20%)	45 (45%)	27(27%)	8 (8%)
Total Population	56(14%)	220(55%)	98 (24.50%)	26(6.50%)

p<0.001

medical students compared to those in the public sector (Table 1).

Anxiety among Students by GAD-7

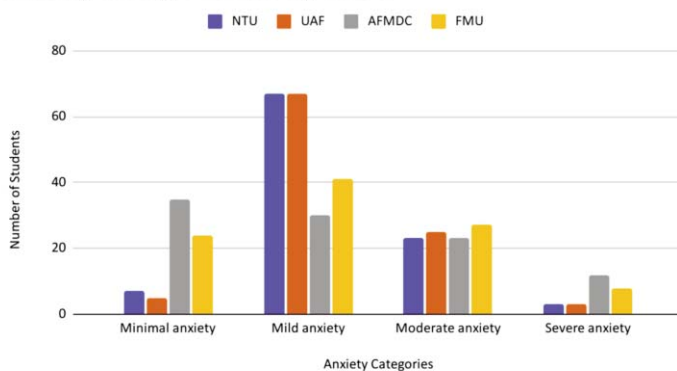


Figure-3: Frequency of different levels of anxiety among medical and engineering students.

GAD-7: Generalised Anxiety Disorder-7, NTU: National Textile University UAF: University of Agriculture Faisalabad, AFMDC: Aziz Fatima Medical and Dental College, FMU: Faisalabad Medical University.

Coping Mechanisms Adopted

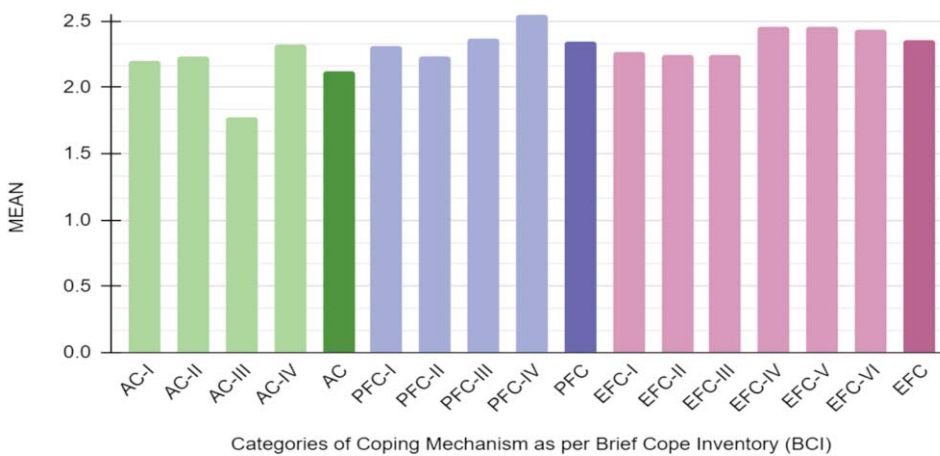


Figure-4: Frequency of different levels of anxiety among medical and engineering students.

GAD-7: Generalised Anxiety Disorder-7, NTU: National Textile University UAF: University of Agriculture Faisalabad, AFMDC: Aziz Fatima Medical and Dental College, FMU: Faisalabad Medical University.

Table-2: Coping strategies adopted by the students.

Brief cope inventory	Engineering Anxiety		Medical Anxiety	
	MEAN	S. D	MEAN	S. D
AC-I	2.2	0.92	2.2	0.92
AC-II	2.24	0.65	2.24	0.65
AC-III	1.78	0.68	1.78	0.68
AC-IV	2.33	0.7	2.33	0.7
AC	2.12	0.43	2.12	0.43
PFC-I	2.32	0.62	2.32	0.62
PFC-II	2.23	0.72	2.23	0.72
PFC-III	2.37	0.71	2.37	0.71
PFC-IV	2.55	0.69	2.55	0.69
PFC	2.35	0.4	2.35	0.4
EFC-I	2.26	0.66	2.26	0.66
EFC-II	2.25	0.68	2.25	0.68
EFC-III	2.24	0.72	2.24	0.72
EFC-IV	2.46	0.7	2.46	0.7
EFC-V	2.46	0.67	2.46	0.67
EFC-VI	2.43	0.73	2.43	0.73
EFC	2.35	0.34	2.35	0.34

Medical and engineering students showed the same patterns of coping mechanisms, with planning (2.55±0.69) being the most adopted, and substance abuse (1.78±0.68) the least (Figure 2). EFC and PFC were adopted more than AC (Table 2). Among the subcategories, the least adopted was AC-III (1.78±0.68), while the most adopted was PFC-IV (2.55±0.69).

Discussion

The current study showed higher levels of anxiety among medical students compared to their engineering counterparts. Moreover, the most commonly adopted coping mechanisms were similar in both categories of students. To our knowledge, the current study is the first to report data from multiple centres with equal representation of private and public sectors. There are five medical and seven engineering institutions in Faisalabad, and the current study involved two from each domain, making the results a true reflection of the prevailing situation in the city.

The current findings were in line with studies in Saudi Arabia¹¹ and Portugal¹²

The current study was conducted after the phase of the coronavirus disease-2019 (COVID-19) was already over. Some studies conducted during COVID-19 had suggested a higher level of anxiety and depression among medical students, especially female students.¹³ A Pakistani study done during COVID-19 found higher levels of anxiety among non-medical students compared to medical students, and reported higher scores in both groups during the pandemic.¹⁴ The current study was also meant to assess if the anxiety levels of medical students compared to non-medical students was following the same trend as it did during COVID-19. In this context, severe levels of anxiety were found higher among medical students (6.50%) compared to engineering (non-medical) students, but the consistent raised levels of anxiety among both the groups was in line with a previous Pakistani study in the context of mild levels of anxiety.¹⁴ For the other levels of anxiety, the current findings matched the findings of Medani et. al.¹⁵ The relative differences in percentages in severe anxiety levels may be due to a different environment, different curriculum, different institutional conditions, different home finance conditions, societal pressures, or other contributing factors present in the settings.

Engineering students have earlier shown to have higher levels of self-reported anxiety compared to students of other degree programmes in engineering universities.¹⁶ In another study, among undergraduate students of a non-medical university engineering students showed higher anxiety scores compared to all the others.¹⁷ In the light of these and current findings, both medical and engineering students tend to show high anxiety levels. It is safe to say that the threat exists for engineering students.

Adoption of good coping strategies can lower anxiety as well as prevent its worsening. A study in 2020 showed the importance of self-coping mechanisms besides social support, relationships and positive family functionality to reduce stress and improve mental wellbeing.⁴ Coping mechanisms like denial, substance abuse and self-blame, were associated with anxiety. Effective measures both behaviourally and psychologically minimise the impact of stress situations on one's wellbeing. The same study found that out of all the coping strategies available, the main coping strategy among the participants was religion.³ In the current study, religious coping and acceptance was the second most prevalent way of coping. Worshipping was also found to be a highly adopted coping strategy in a 2019 study.¹⁸ In the current study, the most used coping mechanism was planning, while the least adopted was substance abuse. This could

be explained by the decreased availability of substances having addiction potential. Another reason could be that the students might not have ticked the substance abuse option despite actually using it because of its taboo status in society. The other findings favoured the adoption of positive reframing and venting as coping strategies. These findings were similar to earlier findings.¹⁸ Coping strategies may be considered expressions of personality factors.¹⁹ Therefore, adopting a better coping strategy can help sensitive people. A study reported that increased anxiety and increased dependence on EFC were associated with decreased academic performance.²⁰ Also, students satisfied with their academic performance are found to be less stressed.²¹ A 2020 study showed that multiple other factors, like lack of good quality sleep, financial issues, employment pressure, and bad relations, could be stressors other than academics to be the cause of more anxiety among specific groups of students.⁴

The current study has limitations, including a sample that was relatively small and was raised from a single city. Besides, anxiety levels vary among students at different points of the year, like the exam season that is considered the most stressful. To assess anxiety levels at different points of the year, longitudinal studies with large samples are required.

Conclusion

Except for mild anxiety, all other anxiety levels were found to be higher in medical students. The same coping strategies were found to be adopted by both categories of students.

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References

1. Mirza AA, Baig M, Beyari GM, Halawani MA, Mirza AA. Depression and Anxiety Among Medical Students: A Brief Overview. *Adv Med Educ Pract.* 2021; 12:393-8. doi: 10.2147/AMEP.S302897.
2. Paudel U, Parajuli A, Shrestha R, Kumari S, Yadav SA, Marahatta K. Perceived stress, sources of stress and coping strategies among undergraduate medical students of Nepal: a cross-sectional study. *F1000Res.* 2024; 11:167. doi: 10.12688/f1000research.75879.3.
3. Melaku L, Bulcha G, Worku D. Stress, anxiety, and depression among medical undergraduate students and their coping strategies. *Educ Res Int.* 2021; 2021:1-13. e9880309. doi.org/10.1155/2021/9880309
4. Shao R, He P, Ling B, Tan L, Xu L, Hou Y, et al. Prevalence of depression and anxiety and correlations between depression, anxiety, family functioning, social support and coping styles among Chinese medical students. *BMC Psychol.* 2020; 8:38. doi:

- 10.1186/s40359-020-00402-8.
5. Maynor L, Gálvez-Peralta M, Barrickman A, Hanif A, Baugh G. Perceived stress, academic self-concept, and coping mechanisms among pharmacy students following a curricular revision. *Curr Pharm Teach Learn.* 2022; 14:159-65. doi: 10.1016/j.cptl.2021.11.013.
 6. Ajit SN, Khanna A, Aggarwal R. Psychological health, stressors and coping mechanism of engineering students. *International Journal of Adolescence and Youth.* 24. 1-10. Doi:10.1080/02673843.2019.1570856.
 7. Chow SC, Shao J, Wang H, Lokhnygina Y. *Sample Size Calculations in Clinical Research.* 3rd ed. Boca Raton: CRC Press. [Online] [Cited April 2025 26]. <https://www.taylorfrancis.com/books/mono/10.1201/9781315183084/sample-size-calculations-clinical-research-shein-chung-chow-jun-shao-hansheng-wang-yuliya-lokhnygina>
 8. Imran N, Haider II, Mustafa AB, Aamer I, Kamal Z, Rasool G, et al. The hidden crisis: COVID-19 and impact on mental health of medical students in Pakistan. [Online] [Cited 2021 September 01]. Available from: URL: <https://doi.org/10.1186/s43045-021-00123-7>
 9. Jamal DY, Yaseen DF, Khalid DM. A Preliminary Validation of the Brief COPE Inventory for Assessing Coping Strategies among Pakistani House Job Doctors. *J Prof Appl Psychol.*2022; 3: 267-75. <https://doi.org/10.52053/jpap.v3i2.108>
 10. Zhong QY, Gelaye B, Zaslavsky AM, Fann JR, Rondon MB, Sánchez SE, et al. Diagnostic Validity of the Generalized Anxiety Disorder - 7 (GAD-7) among Pregnant Women. *PLoS One.* 2015; 10:e0125096. doi: 10.1371/journal.pone.0125096.
 11. Mirza AA, Milaat WA, Ramadan IK, Baig M, Elmorsy SA, Beyari GM, et al. Depression, anxiety and stress among medical and non-medical students in Saudi Arabia: An epidemiological comparative cross-sectional study. *Neurosciences.* 2021; 26:141-51. doi: 10.17712/nsj.2021.2.20200127.
 12. Moreira de Sousa J, Moreira CA, Telles-Correia D. Anxiety, Depression and Academic Performance: A Study Amongst Portuguese Medical Students Versus Non-Medical Students. *Acta Med Port.* 2018; 31:454-62. doi: 10.20344/amp.9996.
 13. Din M ud, Naveed HU, Tauseef M, Javed M, Sarfraz S, Waheed J. Anxiety and Depression among Medical Students during Covid-19 Pandemic in Faisalabad. [Online] [Cited 2024 July 13]. Available from: URL: <https://www.journalrnc.com/index.php/JRMC/article/view/1791>
 14. Nadeem N, Baig I, Ilyas J, Azam F, Ijaz F, Rasid H, et al. Anxiety levels due to covid-19: Comparison between medical and non-medical students. [Online] [Cited 2025 April 26]. Available from: URL: <http://ppmj.org.pk/index.php/ppmj/article/view/301>
 15. Medani KET, Alothaim AMA, Almutairi AJF, Alotaibi MGF, Aljasir NJ, Almutairi AQS. Anxiety among medical and non-medical students in Al n University, Saudi Arabia. *Med Sci.* 2021; 25: 2459-68. doi.org/10.54905/diss/v27i134/e187ms2963
 16. Jensen KJ, Cross KJ. Engineering stress culture: Relationships among mental health, engineering identity, and sense of inclusion. *J Engine Educ.*2021; 110:371-92. <https://doi.org/10.1002/jee.20391>
 17. Naser AY, Alwafi H, Amara NA, Alhamad H, Almadani MA, Alsairafi ZK, et al. Epidemiology of depression and anxiety among undergraduate students. *Int J Clin Pract.* 2021; 75:e14414. doi: 10.1111/ijcp.14414.
 18. Dada JO, Babatunde SO, Adeleye RO. Assessment of academic stress and coping strategies among built environment undergraduate students in Nigerian higher education. *Int J Environ Res Public Health.* 2019; 11:367-78. doi: 10.3390/ijerph17103602.
 19. de la Fuente J, Paoloni P, Kauffman D, Yilmaz Soylu M, Sander P, Zapata L. Big Five, Self-Regulation, and Coping Strategies as Predictors of Achievement Emotions in Undergraduate Students. *Int J Environ Res Public Health.* 2020; 17:3602. doi: 10.3390/ijerph17103602.
 20. Thomas L, Cassady JC, Heller M. The influence of emotional intelligence, cognitive test anxiety, and coping strategies on undergraduate academic performance. [Online] [Cited 2023 January 3]. Available from: URL: <https://espace.bsu.edu/aarc/wp-content/uploads/sites/142/2017/04/Thomas-Cassady-Heller-2017-Learning-and-Individual-Differences.pdf>
 21. Pokhrel NB, Khadayat R, Tulachan P. Depression, anxiety, and burnout among medical students and residents of a medical school in Nepal: a cross-sectional study. *BMC Psychiatry.* 2020; 20:298. doi: 10.1186/s12888-020-02645-6.

AUTHOR'S CONTRIBUTION:

MT: Initiative of research, drafting, literature search, data collection, final revision and editing.

MA: Data collection, design, revision and drafting.

HS: Supervision, critical revision and mentored the study.

QS: Selection of analytical tests and running interpreting statistical analysis.