ANXIETY, DEPRESSION AND STRESS IN FIRST-YEAR MEDICAL STUDENTS AT TIRADENTES UNIVERSITY: A FIELD REVIEW

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ABSTRACT

The transition to university life in challenging courses, such as Medicine, is a period that brings high levels of stress and an increasing prevalence of mental disorders, including anxiety and depression. These factors directly affect the well-being of students and, consequently, their ability to care for patients. A study of first-year medical students found that a significant portion faces moderate to high stress, with 53.6 percent showing signs of anxiety and 22.7 percent indicating depression. The research highlights the relationship between stress, anxiety, and depression, showing that a lower quality of life is associated with elevated levels of stress. These data highlight the importance of implementing mental health support strategies in educational institutions. Integrating programs and interventions that help students manage their emotional demands is essential, as this not only improves students' well-being, but also enhances the quality of care they will be able to provide in the future. Therefore, it is critical that universities prioritize mental health as an integral part of medical education.

Keywords: Anxiety. Depression. Psychological Stress. Quality of Life. Medical students.

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INTRODUCTION

The transition to university life, especially in demanding courses such as Medicine, can be marked by a combination of euphoria and stress. New responsibilities and intense workload often result in chronic stress, negatively affecting cognitive functions and students' overall health (March-Amengual JM *et al*, 2022).

These students face intense academic pressure, with high demands and workload that contribute to high levels of stress. These factors not only affect the well-being of students, but also have serious implications for their ability to provide quality care to patients. First-year medical students must acquire effective stress management techniques to avoid the potential negative consequences of these stressors, as well as develop the ability to identify and manage stressors (Panja S *et al*, 2023).

Generalized anxiety disorder has as essential characteristics anxiety and excessive worry about various events or activities. The intensity of these feelings is disproportionate to the actual probability or impact of the anticipated event. Major depression disorder, on the other hand, is characterized by a depressed mood, decreased interests or old pleasures, weight loss or gain, among others, and these characteristics are usually present every day, most of the day for at least 2 weeks (5th edition of the DSM-V, 2013).

Depression is widely recognized as one of the most prevalent mental health issues among college students. Among these, medical students have particularly high rates of this condition compared to the general population and students from other areas. Studies conducted in Brazil indicate that between 20% and 50% of medical students face mental disorders, with the prevalence of anxiety symptoms also being remarkably high (Shao R *et al*, 2020).

This situation is partly explained by the various personal and organizational stressors faced during medical training. Academic environments are often characterized by high levels of demand and stress, often to the detriment of students' mental health, with a predominant focus on theoretical outcomes. Academic literature, including studies conducted during and after the COVID-19 pandemic, has revealed that medical students are particularly vulnerable to mental health problems, experiencing elevated rates of depression, anxiety, and burnout (Lee CM *et al*, 2021).

The challenges faced by medical students are multifaceted and contribute to the high prevalence of psychological disorders. Among these challenges are intense academic rigor, financial debt, sleep deprivation, lack of control over their circumstances, constant exposure to illness and death, and inadequate treatment during training. These factors become most evident at key moments in academic training, such as the first year in medical school, the

transition from the preclinical curriculum to the internship, and the final periods before the start of residency. These transformations and the obstacles faced elucidate the increase in mental difficulties in this population. (March-Amengual JM *et al*, 2022).

The reluctance to seek help for mental health problems is an additional concern, exacerbated by factors such as the desire to maintain an image of invincibility and the fear of jeopardizing one's career. However, evidence indicates that psychological support can significantly reduce distress and improve the quality of patient care (Nair M *et al*, 2023). Taking into account the damage that anxiety, depression and stress disorders can cause in the academic and professional lives of these students, it is imperative that educational institutions review their curricula to integrate mental health support, better preparing future physicians for the emotional and academic challenges of their profession (Lee CM *et al*, 2021).

In this context, the present study is necessary to evidence the influence of quality of life and stress on medical students in relation to mental disorders of anxiety and depression. The final objective is to clarify the prevalence of these disorders among first-year medical students at Tiradentes University, in addition to correlating these data with the impact of stress and quality of life on each student's routine. This research may contribute theoretically to the literature on mental health in medical education and, in practice, to the implementation of interventions that promote the well-being of students.

METHODOLOGY

This is a cross-sectional study, carried out at the Tiradentes University through an online questionnaire directed to first-year medical students. Of the 140 students enrolled at the Tiradentes University in the first year of the medical course, 97 students were part of this study, whose inclusion criteria were: being enrolled in the first year of medicine at the Tiradentes University. Students who were not properly enrolled or who were not part of the first year of medicine were excluded.

Exploratory data analysis was performed by calculating simple and percentage frequencies for sociodemographic variables and PSS10 and HAD classifications, and median, interquartile range, minimum and maximum for Whoqol scores. The inferential analysis used the Chi-square or Fisher's exact tests (Siegel & Castellan Jr, 2006) when crossing the HAD-A, HAD-D and PSS10 with other qualitative variables, where the results were presented in terms of a cross-reference table, and percentages calculated as a function of the lines. The Mann-Whitney (Mann & Whitney, 1947) and Kruskal-Wallis (Kruskal & Wallis, 1952) tests were used when the Whoqol scales were crossed with other

qualitative variables, where the results were presented in terms of median and interquartile range. The Shapiro-Wilks test (Shapiro & Wilk, 1965) was used to verify adherence to the Normal distribution.

The data were organized in Microsoft Excel, and all statistical analyses were performed in the R software, version 4.4.1 (The R Core Team, 2024). The level of significance adopted was 5%.

RESULTS AND DISCUSSION

The study analyzed 97 first-year medical students at UNIT, 73.2% of whom were women and 26.8% were men. Most students (45.4%) were between 17 and 19 years old, and 61.8% lived with their parents. In relation to income, 62.9% had an income of 10 minimum wages or more, and 68.1% had no financing or scholarship. Regarding the use of medications, 43.3% of the students used medications, with 29.9% for anxiety, 17.5% for depression, and 9.3% for stress. On the stress perception scale, 58.7% had a moderate level of stress. In addition, 53.6% of the students had some level of anxiety, and 22.7% showed signs of depression (Table 1). Quality of life was assessed in the four aspects of the WHOQOL-BREF, with medians of 67.9 in the physical aspect, 62.5 in the psychological aspect, 75.0 in the social relationships and 75.0 in the environment, indicating a good support network, but a possible need to focus on mental health (Table 2).

Table 1: Socioeconomic characteristics of the students

Variable/Category	Frequency	Percentage
Age group		
17 to 19 years old	44	45,4
20 to 24 years old	40	41,2
25 years or older	13	13,4
What is your sex (gender)?		
Female	71	73,2
Male	26	26,8
You currently reside		
Relatives' house	7	7,2
Parents' house	60	61,8
I share a house / apt with one or more colleagues	6	6,2
Alone	24	24,7
What is the family income?		
Between 1 and 2 minimum wages	2	2,1
Between 2 and 4 minimum wages	6	6,2
Between 4 and 6 minimum wages	7	7,2
Between 6 and 10 minimum wages	21	21,6
Between 10 and 20 minimum wages	32	32,9

More than 20 minimum wage	29	29,9
Funding/scholarship		
No	66	68,1
Yes	31	31,9
Health medicine		
No	55	56,7
Yes	42	43,3
Medication for depression		
No	80	82,5
Yes	17	17,5
Medication for anxiety		
No	68	70,1
Yes	29	29,9
Stress medication		
No	88	90,7
Yes	9	9,3
PSS-10 Rating		
Baixo	11	11,3
Moderate	57	58,7
High	29	29,9
HAD-A Classification		
Absence	45	46,4
Lightweight	16	16,5
Moderate	31	31,9
Grave	5	5,2
HAD-D Classification		
Absence	75	77,3
Lightweight	8	8,3
Moderate	14	14,4

Source: prepared by the authors. Table 2: whoqol-bref domains

Variable	Median	IIQ	Minimal	Maximum
Dom 1 - physical health	67,9	21,4	32,1	92,9
Dom 2 - psychological	62,5	20,8	25,0	91,7
Dom 3 - social relationships	75,0	25,0	16,7	100,0
Dom 4 - environment	75,0	18,8	31,3	93,8

Source: prepared by the authors.

In 2022, Dr. Jing mai, a first-year resident physician, took her own life after battling feelings of anxiety, insomnia, inadequacy, and stress. His tragic death sparked a clamor for reforms in medical curricula to address barriers to mental health and promote well-being, starting with the level of education of students (NairM *et al*, 2023). According to the results obtained in the present study, we have that the worst quality of life is in stressed people, impacting physical and psychological health (Table 3).

Table 3: Relationship between the variables and domains of the quality of life scale

Variables/category	Physical health	P	Psycho-cological i	P	Social re-lationshi-Pis	P-va-lor	Environment	P
Age group								
17 to 19 years old	71,4 ± 14,3	0,105	70,8 ± 17,7	0,045	75,0 ± 25,0	0,021	79,7 ± 15,6	0,001
20 to 24 years old	64,3 ± 22,3		56,2 ± 25,0		66,7 ± 25,0		68,8 ± 20,3	
25 years or older	64,3 ± 14,3		62,5 ± 20,8		66,7 ± 16,7		71,9 ± 15,6	
Current residence								
Family Colleagues	60,7 ± 14,3	0,128	70,8 ± 25,0	0,484	66,7 ± 25,0	0,253	65,6 ± 21,9	0,005
Parents' house	71,4 ± 17,9		66,7 ± 20,8		75,0 ± 18,7		78,1 ± 16,4	
Alone	64,3 ± 21,4		56,2 ± 25,0		66,7 ± 25,0		71,9 ± 13,3	
What is the family income?								
Entre 1-10 S.M.	67,9 ± 19,7	0,64	58,3 ± 18,7	0,387	75,0 ± 16,7	0,342	71,9 ± 25,8	<0,001
Entre 10-20 S.M.	67,9 ± 21,5		68,8 ± 27,0		66,7 ± 18,8		71,9 ± 19,5	
But from 20 S.M.	67,9 ± 21,4		66,7 ± 20,8		75,0 ± 25,0		84,4 ± 9,4	
Medication for anxiety								
No	75,0 ± 18,8	0,001	68,8 ± 25,0	0,026	75,0 ± 20,8	0,396	78,1 ± 14,1	0,07
Yes	64,3 ± 17,9		58,3 ± 20,9		75,0 ± 16,7		68,8 ± 15,6	
Medication for depression								
No	71,4 ± 17,9	<0,001	66,7 ± 20,8	0,014	75,0 ± 16,6	0,418	75,0 ± 19,6	0,675
Yes	57,1 ± 17,9		58,3 ± 29,2		75,0 ± 41,6		78,1 ± 15,6	
Class PSS10								
Down	82,1 ± 23,2	<0,001	79,2 ± 14,6	<0,001	75,0 ± 25,0	0,139	84,4 ± 14,1	0,004
Moderate	71,4 ± 14,3		66,7 ± 20,8		75,0 ± 25,0		78,1 ± 12,5	
High	57,1 ± 17,9		45,8 ± 20,8		66,7 ± 25,0		68,8 ± 18,7	
Class HAD-A								
Absence	75,0 ± 14,2	<0,001	70,8 ± 12,5	<0,001	75,0 ± 25,0	0,013	78,1 ± 15,6	0,004
Lightweight	69,6 ± 15,2		58,3 ± 16,6		75,0 ± 25,0		78,1 ± 12,5	
Moderate/severe	57,1 ± 17,9		47,9 ± 20,8		66,7 ± 25,0		68,8 ± 25,8	
Class HAD-D								
Absence	71,4 ± 17,9	<0,001	66,7 ± 20,8	<0,001	75,0 ± 16,6	0,002	78,1 ± 14,1	0,021

Lightweight	64,3 ± 12,5		56,2 ± 18,8		66,7 ± 18,7		70,3 ± 17,2	
Moderate/severe	48,2 ± 11,6		39,6 ± 11,4		50,0 ± 22,9		62,5 ± 25,0	

The transition to university, often accompanied by changes in routine and even city, can generate a sense of euphoria, but it is also marked by fears and anxieties related to a new and challenging context. Stress, a physiological response to the pressure of unexpected events that outweigh personal coping strategies, is prevalent in this period. Chronic stress is known not only to impair cognitive functions such as memory and perception, but also affects features of the immune, cardiovascular, gastrointestinal, and endocrine systems (leombruni *et al*, 2022). During our study, we had as results the prevalence of stress in medical students of all ages, in addition to a prevalence of high stress in female students (36.6%), while moderate stress is more present in male students (26.9%) (Table 4). As a result, it can be seen that these students are being increasingly harmed psychologically and cognitively due to the presence of stress in their daily lives.

Table 4: Relationship between the variables and the domains of the pss scale10

Variable/Category	Baixo (%)	PSS10 Moderate (%)	High (%)	P-value
Sex/gender				
Female	8 (11,3)	37 (52,1)	26 (36,6)	0,042
Male	3 (11,5)	20 (76,9)	3 (11,5)	
You currently reside				
Family/colleagues	4 (30,8)	3 (23,1)	6 (46,2)	0,034
Parents' house	5 (8,3)	40 (66,7)	15 (25,0)	
Alone	2 (8,3)	14 (58,3)	8 (33,3)	
Class HAD-A				
Absence	10 (22,2)	30 (66,7)	5 (11,1)	<0,001
Lightweight	0 (0,0)	12 (75,0)	4 (25,0)	
Moderate/severe	1 (2,8)	15 (41,7)	20 (55,6)	
Class HAD-D				
Absence	11 (14,7)	47 (62,7)	17 (22,7)	0,051
Lightweight	0 (0,0)	4 (50,0)	4 (50,0)	
Moderate	0 (0,0)	6 (42,9)	8 (57,1)	

As already noted, this period is a challenging experience both personally and academically. Often, students already face an intense workload and significant stress since the entrance exam. The daily and life changes associated with entering college can intensify stress, impacting physical and emotional well-being and, consequently, academic success. High stress can lead to symptoms associated with behavioral changes, constant worries, self-destructive thoughts, and social withdrawal (Bernardelli, LV *et al*, 2022). Taking into account this phase of change, the data indicate that there is a significant difference between

stress levels depending on the living environment: students who live with family members or classmates have high stress (46.2%), while those who live with their parents or alone have moderate stress (66.7%) (Table 4).

Stress can be divided into distress (negative stress) and eustress (positive stress), both of which are physiologically experienced in a similar way. However, current understanding suggests that stress does not reside only in the event itself, but in the physiological response to it. The perception of threat and the insufficiency of coping resources determine the effects of stress (oura *et al*, 2020).

This is the result of an extensive workload, rigorous evaluative tests and the need to meet high performance standards. In addition, the pressure to excel academically, absorb large volumes of complex information, and deal with the future responsibility of treating lives can increase this level of stress (Panja *et al*, 2023).

This feeling impacts the lives of countless people around the world, and is associated with the psychopathology of various health conditions and the difficulty of adapting to demanding social environments. Stressful experiences, combined with psychological factors, influence the clinical manifestations and evolution of various diseases. In 1948, the researcher Selye acutely reported that stress generated a response, known as the alarm occurrence stage. This response can be adaptive, leading to the stage of resistance, which allows the problem to be solved, or it can culminate in a stage of exhaustion, resulting in physiological, psychological, and psychosocial consequences that can be chronic and irreversible (Avila-Carrasco, L *et al*).

Within our research, a clear correlation was observed between stress and anxiety. The results indicate, satisfactorily, that the higher the stress levels, the greater the anxiety reported by the patients. In addition, the comparative analysis between depression and stress showed results very close to what is considered significant (0.051), reinforcing a probable relationship between these two variables (Table 4).

Research on the emotional distress associated with prolonged exposure to stressors reveals that medical students have significantly higher levels of depression compared with the general population. Depression is marked by a combination of genetic and environmental factors that culminate in deep feelings of discouragement and excessive sadness. While there is an established relationship between depression and perceived stress, the exact mechanisms of this connection are not yet completely understood (liu z *et al*, 2021).

Several studies confirm that medical students have higher levels of depression and mental problems than the average population, and this condition can persist after

graduation, impacting the professional lives of doctors. These psychological problems often arise during training, since these students have better psychological status when entering college than when completing the course. This suggests the need for ongoing mental health support from the beginning of medical education to better prepare future professionals for an emotionally demanding career (ranasinghe pd *et al*, 2022).

The results showed that, when comparing the age group with the physical health of the students, there was no significant difference. However, when looking at the psychological domain, younger students (17-19 years) had better quality of life, while young adults (20-24 years) had the worst quality of life. This reveals a decline in psychological well-being as students advance in age during their academic training. In addition, younger people also reported a significantly higher quality of life with regard to social relationships and the environment, when compared to young adults. These findings suggest that the transition to adulthood may be a period of greater vulnerability in terms of emotional and social well-being, reinforcing the need for interventions aimed at the psychological and environmental support of these groups (Table 5).

Table 5: Relationship between the variables and domains of the HAD-D scale

Variable/Category	HAD-D			
	Baixo (%)	Moderate (%)	High (%)	P-value
Medication for depression				
No	68 (85,0)	7 (8,8)	5 (6,2)	<0,001
Yes	7 (41,2)	1 (5,9)	9 (52,9)	
Class PSS10				
Absence	11 (100,0)	0 (0,0)	0 (0,0)	0,051
Lightweight	47 (82,5)	4 (7,0)	6 (10,5)	
Moderate/severe	17 (58,6)	4 (13,8)	8 (27,6)	
Class HAD-A				
Absence	42 (93,3)	2 (4,4)	1 (2,2)	<0,001
Lightweight	13 (81,2)	2 (12,5)	1 (6,2)	
Moderate/severe	20 (55,6)	4 (11,1)	12 (33,3)	

Source: prepared by the authors.

Medical academic training is undoubtedly stressful and contributes to the emergence of depression and anxiety. These diseases, which are usually generated by various external and internal factors, play a significant role in academic performance, since they generate symptoms that can lead to school dropout, substance abuse, and suicidal ideation. In the long term, these problems can affect the safety and effectiveness of the care provided (mhata nt *et al*, 2020).

This research corroborates that the higher the level of depression, the greater the anxiety, creating a harmful cycle for the mental health of students. In addition, it was observed that, as depression increases, stress levels also tend to increase almost

proportionally, as demonstrated in the PSS results10, revealing a significant correlation between these conditions (Table 5).

A qualitative-quantitative research conducted at a medical school between August 2016 and March 2017 revealed that academic pressure was the main concern of students. The large amount of information and the high standards required have been identified as the main causes of mental distress, and in addition, the lack of time to sleep and engage in extracurricular activities has contributed to these feelings. Another study showed that approximately 42% of Jefferson Medical College students reported significant financial difficulties in the last year, considering them stressful events, which can also exacerbate symptoms and changes in hu- mor (Shao R *et al*, 2020).

Among the students who use antidepressant medications, it was found that 52.9% had high levels of depression, suggesting that medication alone may not be sufficient to guarantee a satisfactory quality of life in these cases (Table 5).

Factors associated with depression in medical students include financial stressors, changes in family relationships, and academic concerns about graduate life. A previous study highlighted some more specific risk factors for each year in which students were in the 1st year the "volume of work" and "absence of feedback", while the 3rd year students reported "fears about future ability" and "pedagogical inadequacy" as the main stressor (Mirza AA *et al*, 2021).

Despite having higher rates of this disorder, these students often do not seek appropriate treatment due to time constraints, fear of confidentiality, stigma, cost of attendance, and academic implications (mhata nt *et al*, 2023). Finally, the results show that the worst quality of life is found among those with moderate or severe depression, affecting both psychological health and social relationships and the environment in which they live, highlighting the importance of appropriate treatment (Table 5).

These correlations reinforce the urgent need for interventions that promote the integral well-being of medical students, ensuring that they can effectively deal with the challenges of their training and career.

Anxiety is a widely recognized problem in the state population, gaining particular relevance in the context of medical students. The presence of this condition not only compromises academic performance and increases dropout rates, but also profoundly affects the professional development of these future physicians. The existing literature points out that anxiety can have significant negative repercussions, not only for the students themselves, but also for the patients they treat. Like depression, generalized anxiety disorder is often not detected and treated early (Quek TT *et al*, 2019).

Our studies indicate that the higher the level of depression, the greater the anxiety, creating a feedback relationship that intensifies emotional suffering (Table 6).

Table 6: Relationship between the variables and domains of the HAD-A scale in %

Variable/Category	HAD-A			
	Absence	Lightweight	Mode-rado/engraved	P-value
Medication for anxiety				
No	39 (57,4)	11 (16,2)	18 (26,5)	0,002
Yes	6 (20,7)	5 (17,2)	18 (62,1)	
Class PSS10				
Baixo	10 (90,9)	0 (0,0)	1 (9,1)	<0,001
Moderate	30 (52,6)	12 (21,1)	15 (26,3)	
High	5 (17,2)	4 (13,8)	20 (69,0)	
Class HAD-D				
Absence	42 (56,0)	13 (17,3)	20 (26,7)	<0,001
Lightweight	2 (25,0)	2 (25,0)	4 (50,0)	
Moderate	1 (7,1)	1 (7,1)	12 (85,7)	

Source: prepared by the authors.

This disorder can be defined as apprehension, tension or restlessness due to the anticipation of danger, the source of which is largely unknown or unrecognized. Studies show that anxiety in medical students can deteriorate academic performance, resulting in difficulties in assimilating complex content and managing the demands of the course. In addition, the presence of this disorder is associated with a reduction in students' empathy and enthusiasm when interacting with chronic patients. Decreased empathy is of particular concern as it can affect the quality of care provided, negatively influencing patients' experience and potentially compromising clinical outcomes (Bernardelli, LV *et al*, 2022). The worst quality of life was observed among those with moderate or severe anxiety, affecting not only psychological health, but also social relationships and the environment in which they live (Table 6).

A 2019 systematic review revealed a global prevalence of 33.8% of anxiety among medical students. In addition to intense feelings of fear and panic, anxiety can manifest itself with physiological symptoms such as palpitations, fatigue, dizziness, headache, nausea, and shortness of breath. Like depression, anxiety can impair attention, working memory, and perceptual-motor function, all of which are essential for the safe and effective practice of medicine (Quek TT *et al*, 2019).

It was also observed that the use of medications to treat anxiety does not completely eliminate symptoms, since 62% of individuals who use these medications continue to have high levels of anxiety. In addition, the increase in anxiety proportionally accompanies the increase in stress levels, corroborating the findings that these conditions are interconnected and mutually intensifying (Table 6).

This information reinforces the importance of appropriate and effective interventions to address anxiety among medical students, aiming not only to improve their well-being, but also to ensure the quality of care they will provide in the future.

CONCLUSION

The survey revealed worrying levels of stress, anxiety, and depression among medical students at UNIT, highlighting the fragility of mental health in this group. With a sample composed predominantly of women and a significant portion of students living with their parents, the data indicate that 58.7% of students have moderate stress, while 53.6% show signs of anxiety. The direct relationship between these factors suggests that the transition to university life, marked by new academic demands and pressures, intensifies emotional distress, impacting levels of performance and quality of life. In addition, the emphasis between stress and depression underscores the need for targeted interventions.

However, it is important to recognize some limitations of the research, such as external factors that also influence the stress and quality of life of students, in addition to the demands of the medical school itself.

Therefore, the growing concern with mental health in medical training is a call for the implementation of curricular changes that prioritize the well-being of students. Dr. Jing Mai's tragedy serves as a wake-up call about the urgency of promoting an educational environment that values mental health, integrating self-care practices and emotional support from the early years of training. It is recommended that future studies suggest viable interventions to lessen the negative impact that medical school has on students' mental health. Only in this way will it be possible to prepare medical futures that are not only competent, but also resilient and healthy.

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