

Prevalence of Anxiety and Depression among Medical Students

Prevalência de Ansiedade e Depressão entre Estudantes de Medicina

Fábio de Oliveira Tabalipa¹

Mariana Fuganti de Souza¹

Gláucia Pfüitzenreuter¹

Vinícius Carriero Lima¹

Eliane Traebert¹

Jefferson Traebert¹

PALAVRAS-CHAVE

- Ansiedade;
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- Medicina;
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KEYWORDS

- Epidemiology;
- Anxiety;
- Depression;
- Prevalence;
- Students;
- Medical Education.

ABSTRACT

Background: Medical students are a vulnerable population to develop depression and anxiety disorders. Objective: To estimate the prevalence and associated factors of anxiety and depression among medical students. Methods: A cross-sectional study with a random sample (n = 346) of medical students at a Brazilian university was performed. The Beck Depression Anxiety Inventory was used to measure anxiety and depression levels. Crude and adjusted analyses were performed using Poisson regression. Results: The prevalence of anxiety was 35.5% and depression was 32.8%. The prevalence of anxiety and depression was 14% higher and 16% higher among women (p = 0.025 and p = 0.006, respectively). Students whose parents were not physicians reported 23% higher prevalence of anxiety (p = 0.006), and those who had physician parents reported 29% higher prevalence of depression (p = 0.034). Those who always or often felt pushed by their parents showed 22% higher prevalence of anxiety (p = 0.006) and 19% higher depression (p = 0.016). Students who had concerns over the future had 15% higher prevalence of depression (p = 0.017). Conclusion: The prevalence of anxiety and depressive symptoms was higher than the average found in the general population.

RESUMO

Introdução: Estudantes de Medicina são uma população propícia ao desenvolvimento de transtornos de depressão e ansiedade. Objetivo: Estimar a prevalência de ansiedade e depressão entre acadêmicos de Medicina. Métodos: Estudo transversal envolvendo uma amostra aleatória e representativa (n = 346) de estudantes de Medicina de uma universidade no Brasil. Os níveis de ansiedade e depressão foram aferidos pelos Inventários de Depressão e Ansiedade de Beck. Análises brutas e ajustadas foram realizadas utilizando-se regressão de Poisson. Resultados: A prevalência de ansiedade foi de 35,5%, e a de depressão, 32,8%. Mulheres apresentaram prevalência 14% maior de ansiedade e 16% maior de depressão (p = 0,025 e p = 0,006, respectivamente). Estudantes com pais não médicos apresentaram prevalência de ansiedade 23% maior (p = 0,006), e aqueles com pais médicos, prevalência de depressão 29% maior (p = 0,034). Aqueles que se sentiam sempre ou frequentemente cobrados pelos pais apresentaram ansiedade 22% maior (p = 0,006) e depressão 19% maior (p = 0,016). Estudantes que tinham preocupações com o futuro mostraram prevalência de depressão 15% maior (p = 0,017). Conclusões: A prevalência de sintomas depressivos e ansiosos foi superior à média encontrada na população em geral.

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INTRODUCTION

Difficulties encountered by medical students may affect their mental health. Constant exposure to stressful situations, such as pressure from parents, fear of failure and the labor market challenges are factors associated with increasing susceptibility to different kinds of emotional outbreaks¹. It is estimated that 15% to 25% of medical students show some kind of psychiatric distress during their education, especially during medical training².

Medical school is traditionally recognized as one of the most laborious, often by becoming a hostile environment of requirements which have ultimately a negative impact on the student's academic performance, physical health and psychosocial well-being^{3,4}. There is great difficulty in adapting to the environment of medical schools, due to the distance from family and friends, student workload and amount of content to be studied, intimidation from the faculty, exposure to death and human suffering, and even to financial difficulties⁵. These variables contribute to the relatively high numbers of psychiatric disorder cases, especially depression and anxiety, among medical students².

Depression and anxiety affect students both professionally and personally. Personal consequences include termination of relationships, substance abuse, health deterioration and decline in physical vigor. Professional consequences include academic performance decay, decline in empathy and ethics, academic dishonesty, negative influence on their choice of specialty and high incidence of medical errors⁶.

Medical students are at high risk of developing depression and anxiety disorders, which can reach levels of severity sufficient enough to bring important consequences to emotional, mental and physical well-being. Few management strategies are focused on these issues, primarily due to lack of knowledge of the main factors associated with these morbidities, and how to resolve them. The aim of this study was to estimate the prevalence, severity and associated factors of anxiety and depression disorders among medical students.

METHODS

Study design and population

This is a cross-sectional study involving medical students at a university in the Brazilian Southern State of Santa Catarina.

A representative sample of students enrolled in all semesters of medical school at both north and south campuses of the university was obtained. The parameters for calculating the sample were: confidence level of 95% ($\alpha = 5\%$), relative error of 5% and unknown prevalence of the studied phenomena ($P = 50\%$) which generates the largest variance. The result was 248 participants. Considering possible losses or refusals and

potential confounding factors of 20%, the final sample included 346 subjects. The simple random sampling method was used to select the sample for the study. Individuals who refused to participate were considered to be losses.

Data

The data collection instrument included questions on socio-demographic features such as gender, age and parental education. Also, level of parental pressure and if parents were physicians; aspects related to the medical school, such as the semester in which they studied at the time of the survey and in which campus were included. Levels of anxiety and depression, using the Beck Depression Inventory (BDI)⁷ and the Beck Anxiety Inventory (BAI)⁸ were assessed under the supervision of a trained psychologist.

The following cut-off points for depression were used, as recommended by the Center for Cognitive Therapy⁷: less than 10 = minor or no depression; 10-18 = mild to moderate depression; 19-29 = moderate to severe depression; and 30-63 = severe depression. As for anxiety, the recommendations of the manual were followed⁸: less than or equal to 10 = no anxiety symptoms; 11-19 = mild to moderate anxiety; 20-30 = moderate anxiety; and 31-63 points = clinically significant anxiety.

Statistical analysis

Poisson regression was used to estimate prevalence ratios (PR) and confidence intervals (95%) in bivariate and multiple analyses, and to examine the association between anxiety, depression and the included variables. Variables with $p < .20$ in bivariate analysis were included in multivariate analysis, remaining in the final model if $p < .05$.

Ethical approval

The study was submitted to and approved by the Ethics Committee on Human Research at the University of Southern Santa Catarina under protocol number 09.482.4.01.III. Only the medical students who signed the consent form participated in the study.

RESULTS

In total, 262 students participated in the study, 131 from each of the two campuses, representing an overall response rate of 75.5%.

The questionnaire was completed by 147 women (56.1%) and 115 men (43.9%). The mean age of participants was 23.0 years (SD = 3.3). Most of the surveyed subjects were single (91.6%), whereas 7.3% were married and 1.1% were divorced. Few had children (4.2%), and 24% had at least one parent with

TABLE 1
Association of prevalence of anxiety and depression among medical students and studied variables.

Variables	Anxiety			Depression		
	Yes n (%)	No n (%)	P	Yes n (%)	No n (%)	P
Gender						
Male	31 (27.0)	84 (73.2)	0.011	27 (23.5)	88 (76.5)	0.004
Female	62 (42.2)	85 (57.8)		59 (40.1)	88 (59.9)	
Age (Median)						
Up to 22 years	54 (37.8)	89 (62.2)	0.401	45 (31.5)	98 (68.5)	0.608
Above 22 years	39 (32.8)	80 (67.2)		41 (34.5)	78 (65.5)	
Father education						
Up to 15 complete years	47 (38.5)	75 (61.5)	0.341	43 (35.2)	79 (64.8)	0.432
Above 16 complete years	45 (32.8)	92 (67.2)		42 (30.7)	95 (69.3)	
Mother education						
Up to 15 complete years	44 (38.9)	69 (61.1)	0.276	42 (37.2)	71 (62.8)	0.205
Above 16 complete years	48 (32.4)	100 (67.6)		44 (29.7)	104 (70.3)	
Parents physicians						
Yes	10 (20.8)	38 (79.2)	0.019	9 (60.0)	6 (40.0)	0.021
No	83 (38.8)	131 (61.2)		77 (31.2)	170 (68.8)	
Campus						
1 (North)	52 (39.7)	79 (60.3)	0.156	48 (36.6)	83 (63.4)	0.188
2 (South)	41 (31.3)	90 (68.7)		38 (29.0)	93 (71.0)	
Stage of course						
First half	55 (39.6)	84 (60.4)	0.143	45 (32.4)	94 (67.6)	0.864
Second half	38 (30.9)	85 (69.1)		41 (33.3)	82 (66.7)	
Pressure from parents						
Always/often	24 (49.0)	25 (51.0)	0.029	24 (49.0)	25 (51.0)	0.008
Never/rarely/sometimes	69 (32.4)	144 (67.6)		62 (29.1)	151 (70.9)	
Concern for the future						
Always/often	73 (38.8)	115 (61.2)	0.072	71 (37.8)	117 (62.2)	0.007
Never/rarely/sometimes	20 (27.0)	54 (73.0)		15 (20.3)	59 (79.7)	
Total	93 (35.5)	169 (64.5)	–	86 (32.8)	176 (67.2)	–

a medical occupation. In total, 95.8% reported feeling pressure from parents, and 68.7% expressed frequent concern for their professional future.

The prevalence of anxiety was 35.5% (95% CI: 29.7, 41.3) with the following distribution: 24.8% mild to moderate, 8.8% moderate and 1.9% severe, having a clinically significant anxiety rate of 8.5%. The observed prevalence of depression was 32.8% (95% CI: 27.2, 38.4), with the following distribution: 28.2% mild to moderate, 4.2% moderate to severe, and 0.4% severe.

Examination of the association between sociodemographic variables and prevalence of anxiety and depression showed strong association with female gender ($p = 0.011$ and $p = 0.004$, respectively). There were no statistically significant associations with age, parental education and semester of medical school or campus where they studied. High pressure from parents was associated with anxiety ($p = 0.029$) and depression ($p = 0.008$). Students' concern for the future was also associated with depression ($p = 0.007$) (Table 1).

The results of the multivariate analysis for anxiety (Table 2) showed that women had a 14% higher prevalence [OR =

1.14 (95% CI: 1.02, 1.27)] ($p = 0.025$) than men. Students whose parents were not physicians showed a 23% higher prevalence [OR = 1.23 (95% CI: 1.67, 1.43)] ($p = 0.006$) compared to students whose parents were physicians. Similarly, those who were always or often pushed by their parents had a 22% higher prevalence [OR = 1.22 (95% CI: 1.06, 1.42)] ($p = 0.006$) compared to those who did not feel parental pressure. South campus students had a 13% higher prevalence of anxiety [OR = 1.13 (95% CI: 1.01, 1.26)] ($p = 0.044$) than those attending classes on the North campus.

The results of multiple regression analysis for depression (Table 3) showed that women had a 16% higher prevalence [OR = 1.16 (95% CI: 1.04, 1.30)] ($p = 0.006$) than men. Students whose parents were physicians had a 29% higher prevalence [OR = 1.29 (95% CI: 1.02, 1.63)] ($p = 0.034$) compared to students whose parents were not physicians. Those who were always or often pushed by their parents had a 19% higher prevalence [OR = 1.19 (95% CI: 1.03, 1.37)] ($p = 0.016$) compared to those who did not feel parental pressure ($p = 0.016$). Students who showed concern for the future had a 15% higher preva-

TABLE 2
Results of multivariate analysis. Final model for anxiety among medical students.

Variables	PR _c (CI95%)	p	PR _a (CI95%)	P
Gender				
Male	1.00	0.010	1.00	0.025
Female	1.16 (1.04-1.31)		1.14 (1.02-1.27)	
Parents physicians				
Yes	1.00	0.018	1.00	0.006
No	1.20 (1.03-1.39)		1.23 (1.67-1.43)	
Pressure from parents				
Never/rarely/sometimes	1.00	0.027	1.00	0.006
Always/often	1.18 (1.02-1.37)		1.22 (1.06-1.42)	
Concern for the future				
Never/rarely/sometimes	1.00	0.071	#	#
Always/often	1.12 (0.99-1.28)			
Campus				
1 (North)	1.00	0.154	1.00	0.044
2 (South)	1.09 (0.97-1.22)		1.13 (1.01-1.26)	
Stage of course				
First half	1.00	0.143	#	#
Second half	1.36 (1.25-1.48)			

PR_c = Crude prevalence ratio.

PR_a = Adjusted prevalence ratio.

CI = Confidence interval.

= Removed from the model due loss of significance.

lence [OR = 1.15 (95% CI: 1.03, 1.31)] (p = 0.017) than those who showed no concern for the future.

TABLE 3

Results of multivariate analysis. Final model for depression among medical students.

Variáveis	PR _c (CI95%)	p	PR _a (CI95%)	p
Gender				
Male	1.00	0.004	1.00	0.006
Female	1.18 (1.05-1.32)		1.16 (1.04-1.30)	
Parents physicians				
Yes	1.00	0.020	1.00	0.034
No	1.33 (1.05-1.70)		1.29 (1.02-1.63)	
Pressure from parents				
Never/rarely/sometimes	1.00	0.007	1.00	0.016
Always/often	1.22 (1.06-1.41)		1.19 (1.03-1.37)	
Concern for the future				
Never/rarely/sometimes	1.00	0.006	1.00	0.017
Always/often	1.19 (1.05-1.35)		1.15 (1.03-1.31)	
Campus				
1 (Norte)	1.00	0.187	#	#
2 (Sul)	1.08 (0.96-1.21)			

PR_c = Crude prevalence ratio.

PR_a = Adjusted prevalence ratio.

= Removed from the model due loss of significance.

DISCUSSION

The aim of this study was to estimate the prevalence of anxiety and depression symptoms, and to analyze factors associated with these morbidities among medical students at a university

in southern Brazil. For that purpose, widely used psychometric inventories⁷⁻⁸ were administered under the supervision of a trained psychologist.

Depression is notably more common among medical students than in the general population⁹. It is possible that medical students face more difficult situations of emotional imbalance, such as death within a family or termination of relationships, compared to the general population¹⁰. In southern Brazil, the estimated prevalence of depression in the general population of the same age group of that in this study is 12.6%¹¹. The present study showed a prevalence of 32.8%, which is similar to that found in other studies that have used the BDI for the analysis of depression among medical students^{3,12-15}. The observed prevalence rate was higher than that found in two studies that, while using the same cut-off points, reported prevalence rates of depression of 23.1%¹² and 26.8%¹³ among medical students. Similar prevalence rates were observed in a research conducted on 481 medical students in Sao Paulo (Brazil), which showed a prevalence of 38.2%¹⁴. Depression scores were 28.6% for Arab students³, 36.2% for Mexicans¹⁵, and 39.8% for Persians¹⁶, using the same methodology.

Anxiety is another psychiatric morbidity which characteristically occurs more frequently among medical students than in the general population⁵. Factors such as pressure to learn, excessive study load, amount of new information and long work hours during residency, along with anxious personality traits,

explain this characteristic association^{4,17}. The prevalence of anxiety found in this study (35.5%) stood considerably above the prevalence rate found in the literature^{3,18}. Studies using similar methodology found prevalence rates of 28.7% in Arab medical students³ and between 24.1% and 25.1% in Indian students¹⁸.

Stressors that might be contributing to the high rates of depressive and anxiety symptoms included high pressure from parents, concern for the future, and gender, females being more prone than males to suffer from depression and anxiety disorders. Of these variables, only concern for the future was not linked to both anxiety and depression. Being associated with both morbidities may be due to the high correlation between them. High level of anxiety during adolescence has been viewed as a predictor of depression in adulthood¹⁹. Ahmed et al.³ detected significant correlation between anxiety and depression in medical students, which suggests a possible relationship of cause and effect in this population.

There is a consensus in the psychiatric literature that women tend to have more depressive and anxiety symptoms than men^{1,13,15-22}. The present study corroborates this finding, since it showed that women had 14% higher prevalence of anxiety and 16% higher prevalence of depression compared to men. In studies with similar methodology^{1,13} women had higher scores of depressive symptoms than men. Blanch et al.²² observed the behavior of 141 American students in their third year of medical school during an important practical test and found that women demonstrated lower self-confidence and greater frequency of anxiety behavior than men. Several reasons could explain the higher prevalence rates of depression and anxiety in women compared to men, including greater social freedom for expression of feelings, greater exposure to situations of risk for depression, and physiological and hormonal factors^{21,23}.

The family environment is seen as an important protective factor against the development of depressive disorders^{1,12,14,24-25}. A study conducted on medical students in Colombia²⁴ observed an increased risk of depression as the quality of family relationships decreased. In fact, the quality of parental bonding has demonstrated to be able to reduce the deleterious effects of stressors among medical students, leading to a functional adaptation¹. It is noteworthy that in this study the vast majority of students (95.8 %) reported that they often felt their parent's pressure upon them, which may be due to the high cost of medical school, leading parents to put pressure on their children to excel academically. At first, one might think that this would be beneficial for student achievement, but the findings in this study revealed that high parental pressure were associated with 22% higher prevalence of anxiety and 19% higher prevalence of depression in medical students compa-

red to their counterparts. Sreeramareddy et al.²⁶ investigated various sources of psychological stress in 407 medical students in Nepal, and found that high parental expectation was among the top stressors, along with the lack of time and the large number of tests and examinations. The continued search for parental approval can be a strong stressor leading to anxiety and depression. Having physician parents was a protective factor for anxiety but not for depression in medical students. Children of physician parents may have lower expectations of medical school than their counterparts²⁶ and are more likely to develop social and affective coping skills²⁷, which could explain the lower prevalence of anxiety. It is possible, however, that having physician parents could generate greater pressure for academic achievement and even greater concern for the future, which are two variables significantly associated with depression as demonstrated in this study.

Similar findings on concern for the future found in this study were observed in other studies in the sense that the heavy demands of the medical curriculum are important stressors both for anxiety and for depression^{3,25,28}. Concern for academic achievement, along with personal and financial issues are potentially aggravating stressors affecting medical students¹⁴. Academic requirements for medical students are higher than those for other students, and include preparation for tests, job interviews, and medical residency exam, which is very stressing²⁹.

Some authors believe that there are different stressors over a college program, depending on the level or semester at which the student is^{2-3,9,12,14}. The structure of medical education programs varies from one country to another²⁰. There are many variations in the total number of years and many programs have early clinical practice, which impairs a clear division between clinical and pre-clinical stages¹⁴. The transition from the pre-clinical to clinical training has been identified as a crucial stage in relation to psychological stressors in medical school⁹. During that period, medical students undergo psychological transformations, are still immature and feel insecure about their responsibilities as future physicians³. However, similarly to what had occurred in the two mentioned studies,^{2,12} there was no statistical significance between the medical school semester and psychiatric disorders in this study.

CONCLUSIONS

The prevalence of depressive and anxiety symptoms found among medical students in this study was higher than the average found in the general population. There is indication that the psychosomatic injuries provided by depressive and anxiety morbidity inflicted to medical students are resulting from constant exhaustion and various stressors inherent to

medical school, as previously explained. Prevalence of anxiety was higher in women than in men, and among those whose parents were not physicians and put much pressure on student achievement. Prevalence of depression was higher in women than in men, and among those who felt more parental pressure, with the difference that there were higher prevalence rates among those who had physician parents and were more concerned over the future than their counterparts.

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CONTRIBUTION OF AUTHORS

Tabalipa FO, Souza and MF Traebert J participated in the study conception and its design. Tabalipa FO, Souza and MF Pfützenreuter G collected data. Tabalipa FO, Souza MF, Traebert E, Lima VC and J Traebert participated in the data analysis. Tabalipa FO, Souza MF, Lima VC, Traebert E and J Traebert participated in the drafting of the manuscript in its different versions. All authors approved the final version.

CONFLICT OF INTERESTS

None of the authors have any conflict of interest to disclose.

CORRESPONDENCE

Jefferson Traebert
Universidade do Sul de Santa Catarina
Campus Grande Florianópolis – Unidade Pedra Branca
Avenida Pedra Branca, 25 – Cidade Universitária – Pedra Branca – Palhoça
CEP 88137-270 – SC
E-mail: jefferson.traebert@gmail.com