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Prevalence of Depressive Disorder, Perceived Stress and their Associated Factors in Undergraduate Medical Students at the University of Caldas

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Abstract

Objective: To examine the presence of depression, perceived stress, and associated factors in a sample of medical students at the *Universidad de Caldas* (Colombia). **Materials and Methods:** A cross-sectional, quantitative, and descriptive study was conducted in 2018 with 211 medical students from the *Universidad de Caldas*, in Manizales (Colombia). Participants completed three self-report instruments: a questionnaire on demographic and clinical variables, the Beck Depression Inventory, and the Perceived Stress Scale. Statistical analyses were performed using the chi-square test and a binary logistic regression model. **Results:** Sixty-three percent of the participants presented some degree of depression; 17% showed severe depression. Statistically significant risk factors included high perceived stress (OR = 18.7; 95% CI: 4.4–80), perceived poor health status (OR = 6.7; 95% CI: 2.7–16.7), spending time alone (OR = 4.2; 95% CI: 1.4–12.8), female sex (OR = 4.2; 95% CI: 2.2–7.9), and

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a family history of suicide or suicide attempts (OR = 3.5; 95% CI: 1.6–7.7). **Conclusions:** A high prevalence of depression was found among medical students, mainly associated with elevated levels of perceived stress. It is necessary to implement support measures aimed at managing depression and stress. Future research should explore the coping strategies used by students to deal with stress and mood variations.

Keywords

Medical students, depression, stress, psychological adaptation, risk factors.

Prevalencia del trastorno depresivo, del estrés percibido y de sus factores asociados en estudiantes de Medicina de la Universidad de Caldas

Resumen

Objetivo: examinar la presencia de depresión, estrés percibido y los factores asociados en una muestra de estudiantes de medicina de la Universidad de Caldas - Colombia. **Materiales y métodos:** estudio transversal, cuantitativo, descriptivo, realizado con 211 estudiantes de Medicina de la Universidad de Caldas, en Manizales - Colombia en el año 2018. Los participantes respondieron tres instrumentos de autoinforme: cuestionario sobre variables demográficas y clínicas, el inventario de depresión de Beck y la escala de estrés percibido. Los análisis estadísticos fueron realizados utilizando la prueba de chi-cuadrado y un modelo de regresión logística binaria. **Resultados:** 63% de los participantes tuvo algún grado de depresión. El 17% presentó depresión grave. Se encontraron como factores de riesgo con asociación estadísticamente significativa la percepción elevada de estrés OR: 18,7 (IC 95% 4,4 - 80), la percepción de un mal estado de salud OR: 6,7 (IC 95% 2,7 - 16,7), pasar tiempo solo OR: 4,2 (IC 95% 1,4 - 12,8), el sexo femenino OR: 4,2 (IC 95% 2,2 - 7,9) y los antecedentes familiares de suicidio o de intentos de suicidio OR: 3,5 (IC 95% 1,6 - 7,7). **Conclusiones:** se encontró una alta prevalencia de depresión en los estudiantes de medicina, asociado principalmente a los altos niveles de estrés percibido, por lo cual es necesario implementar medidas adicionales encaminadas al manejo de la depresión y del estrés. En futuras investigaciones se requiere conocer las estrategias de afrontamiento que tienen los estudiantes para manejar el estrés y las variaciones en el estado de ánimo.

Palabras clave

Estudiantes de medicina, depresión, estrés, adaptación psicológica, factores de riesgo (Fuente: *DeCS*, *BIREME*).

Prevalência do transtorno depressivo, do estresse percebido e de seus fatores associados entre estudantes de graduação em Medicina da Universidade de Caldas

Resumo

Objetivo: Examinar a presença de depressão, estresse percebido e fatores associados em uma amostra de estudantes de Medicina da Universidade de Caldas (Colômbia). **Materiais e métodos:** Estudo transversal, quantitativo e descritivo realizado em 2018 com 211 estudantes de Medicina da Universidade de Caldas, em Manizales (Colômbia). Os participantes responderam a três instrumentos de autorrelato: um questionário sobre variáveis demográficas e clínicas, o Inventário de Depressão de Beck e a Escala de Estresse Percebido. As análises estatísticas foram realizadas com o teste do qui-quadrado e um modelo de regressão logística binária. **Resultados:** Sessenta e três por cento dos participantes apresentaram algum grau de depressão; 17% apresentaram depressão grave. Fatores de risco estatisticamente significativos incluíram alto estresse percebido (OR = 18,7; IC 95%: 4,4–80), percepção de estado de saúde ruim (OR = 6,7; IC 95%: 2,7–16,7), passar tempo sozinho(a) (OR = 4,2; IC 95%: 1,4–12,8), sexo feminino (OR = 4,2; IC 95%: 2,2–7,9) e histórico familiar de suicídio ou tentativa de suicídio (OR = 3,5; IC 95%: 1,6–7,7). **Conclusões:** Foi encontrada alta prevalência de depressão entre estudantes de Medicina, principalmente associada a níveis elevados de estresse percebido. É necessário implementar medidas de apoio voltadas ao manejo da depressão e do estresse. Pesquisas futuras devem explorar as estratégias de enfrentamento utilizadas pelos estudantes para lidar com o estresse e as variações de humor.

Palavras-chave

Estudantes de Medicina, depressão, estresse, adaptação psicológica, fatores de risco.

Introduction

In recent years, the burden of disease attributable to depressive and anxiety disorders has increased significantly, which highlights the urgent need to strengthen mental health systems (1). The global burden of mental illness has underscored its magnitude and contributed to its recognition as a priority in public health agendas. This burden is reflected not only in individual, familial, and social suffering but also in the substantial costs it imposes on healthcare systems (2, 3). Among these disorders, depression is particularly frequent and debilitating. It is characterized by persistent low mood, loss of interest in activities, and reduced energy that lasts at least two weeks. Other symptoms include diminished confidence or self-esteem, unwarranted guilt, impaired concentration, sleep and appetite disturbances, and, in some cases, recurrent thoughts of death or suicide (4).

According to the World Health Organization (WHO), an estimated 3.8% of the general population and 5% of the adult population are affected by depression. Approximately 280 million people worldwide live with this condition, with a global prevalence of 4.4% reported in 2017 (3). In Colombia, the lifetime prevalence of major depression is 4.3%, and the 12-month prevalence is 1.6% (5). Studies focused on medical students have reported prevalence rates ranging from 11% to 62%, significantly higher than in other population groups (6–17). Research conducted among medical students at the *Universidad de Caldas* revealed an increase in the prevalence of depressive disorders, from 24.6% in 2000 to 34.5% in 2014. These studies also identified associated factors such as poor academic performance, loss of affective relationships, marijuana use, and alcohol consumption (6–8).

Medical students face high academic demands, extensive workloads, and psychosocial pressures, generally greater than those in many other disciplines. Consequently, they often neglect their health and well-being during training. This situation contributes to both mental and physical stress, which can trigger depressive disorders and lead to negative outcomes in personal and professional life (18–20). The onset of depressive symptoms and stress has also been associated with excessive workloads, low career satisfaction, younger age, and rotations in intensive care units or emergency departments (21).

Depressive symptoms may manifest as bradypsychia, hypoprosexia, and indecisiveness, all of which can compromise academic performance, interpersonal relationships, and professional development (22, 23).

Additionally, feelings of worthlessness and difficulties coping with failure have been linked to psychoactive substance use and suicidal ideation (24).

Perceived stress—an individual's subjective evaluation of life circumstances—is directly associated with the development of depression in the university context. Medical students are exposed to high levels of stress due to the demanding and competitive nature of their academic environment, as well as challenges in everyday life and repeated exposure to pain and death, including suicide (25). Individual characteristics, such as personality traits, limited coping resources, fear of failure, anxiety about making patient-care decisions, and restricted opportunities for leisure and self-care, may further increase stress and reduce overall well-being (26–29).

Several studies have reported an average prevalence of 29.6% for psychological stress among medical students. Academic and psychosocial risk factors tend to intensify as students progress in their undergraduate studies. Some studies have also identified associations between stress and female sex, as well as socioeconomic factors such as low household income, which constitutes a risk factor for depression, anxiety, and stress (30). Conversely, resilience, effective coping strategies, personal well-being, and strong social support have been identified as protective factors against these conditions (31).

The student population at the *Universidad de Caldas* consists of approximately 70% individuals from other cities; 63% are between 15 and 23 years of age, 59% are women, and 68% belong to low-income households (socioeconomic strata 1 and 2) (32). In recent years, access to psychological and psychiatric services has improved due to the rising prevalence of depression among medical students. Considering this context, the present study had three objectives: (a) to determine the current prevalence of depression in medical students at the *Universidad de Caldas*, (b) to assess the association between depression and perceived stress, and (c) to identify the factors associated with an increased risk of depression in this population.

Methods

Participants

This cross-sectional study was conducted with 211 undergraduate medical students enrolled in the second semester of 2018 at the *Universidad de*

Caldas (Colombia). Participants were over 18 years of age and enrolled between the second and thirteenth semesters of the program. Students were excluded if they were minors, absent at the time of data collection due to out-of-town clinical rotations, or unable to participate because of academic workload assignments.

Procedure

The study was approved by the Bioethics Committee of the *Universidad de Caldas*. Participation was voluntary, and all students provided informed consent prior to completing the questionnaires. No student refused participation; however, approximately 40 students were absent from the classroom when the instruments were administered. Data confidentiality was guaranteed. The first 20 minutes of face-to-face classes were used to complete the questionnaires.

Each participant received three self-administered instruments, with the research team present to clarify questions. These included: (a) a survey on personal and sociodemographic information, (b) the Beck Depression Inventory-II (BDI-II) (33, 34), and (c) the 14-item Perceived Stress Scale (PSS-14) (35).

Instruments

The study variables were measured using three instruments: the sociodemographic questionnaire, the BDI-II (33, 34), and the PSS-14 (35). Both scales have been validated and adapted into Spanish, with adequate reliability and validity indices (34–36).

Personal and sociodemographic information form. Designed by the research team, this questionnaire included closed-ended questions on age, sex, socioeconomic status, marital status, semester, satisfaction with choice of major, social support (family, partners, friends, and peers), individuals with whom the student shared time, participation in groups (religious, academic, social, volunteer, sports, or artistic), psychoactive substance use in the past 15 days, self-perceived health status, personal or family history of mental illness, and family history of suicide or suicide attempts.

Depression. Depressive symptoms were assessed using the BDI-II (33). This instrument consists of 21 multiple-choice items self-reported by the participant, and it evaluates the severity of depressive symptoms. The following cut-off points were applied: ≤ 13 = no depression, 14–19 = mild depression, 20–28 = moderate depression, and ≥ 29 = severe depression.

Perceived stress. The PSS-14 (35, 37) was used to measure the degree to which individuals perceived their life situations as stressful. This scale comprises 14 items that evaluate feelings and thoughts during the previous month. The total score ranges from 0 to 56, with higher scores indicating greater perceived stress. The following categories were used: ≤ 18 = low perceived stress, 19–37 = moderate perceived stress, and ≥ 38 = high perceived stress.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics, version 20 (38). First, a univariate analysis was conducted through descriptive statistics. Next, bivariate analyses were performed to estimate risk, including Pearson's chi-square test (dichotomous categorical variables), Mann–Whitney U test (ordinal categorical variables), and Spearman's correlation (continuous variables), to identify significant associations with the dependent variable (depression). Independent variables with significant odds ratios (ORs) were entered into a binary logistic regression model for inferential risk estimation. Cox and Snell's R^2 and Nagelkerke's R^2 were used to assess model fit. Regression coefficients with $p < .05$ were considered statistically significant.

Results

Table 1 Participant personal and demographic characteristics (N= 211)

Variable	N	%
Average age 21.3 (DE = 2.335)		
Sex		
Female	96	45.5
Male	115	54.5
Marital Status		
Single	161	73.3
In a relationship	50	26.7
Socioeconomic status		
Low	26	12.9
Middle	124	61
High	53	26.1
Semester		
Beginning (second to fourth)	100	47.4
Intermediate (fifth to eighth)	82	38.9
Final (ninth to thirteenth)	29	13.7
Satisfaction with major choice		
Yes	200	94.8
No	11	5.2
Active participation in a group		
Yes	144	68.2
No	67	31.8
Social support		
Yes	183	86.7
No	28	13.3
Spends time alone		
Yes	29	13.7
No	182	86.3
Shares time with family		
Yes	119	56.4
No	92	43.6
Psychoactive substance consumption in the last 15 days		
Yes	100	47.4
No	111	52.6
Personal history of mental disorder		
Yes	48	22.7
No	163	77.3
Personal history of mental illness		
Yes	78	37
No	133	63
Family history of suicide or suicide attempts		
Yes	51	24.2
No	160	75.8
Self-perception of health status		
Good	157	74.4
Poor or bad	54	25.6

Source: own elaboration.

Demography

The study included 211 medical students enrolled between the second and thirteenth semesters of the program. Table 1 presents the sociodemographic and personal characteristics of the sample. Participants' ages ranged from 18 to 30 years ($M = 21.3$). Men accounted for 54.5% of the sample. A personal history of mental disorders was reported by 48 students (22.7%), while 78 (37%) reported a family history of mental disorders, and 51 (24.2%) reported a family history of suicide or suicide attempts. In addition, 100 students (47.4%) reported the use of psychoactive substances (alcohol, cigarettes, marijuana, cocaine, inhalants, and/or methamphetamines) in the 15 days prior to data collection.

Table 2. Depression and perceived stress evaluation (N = 211)

Variable	N	%
Depression level (BDI-II)		
Absent	78	37
Low	57	27
Moderate	40	19
Severe	36	17
Perceived stress level (EEP-14)		
Low	40	19
Moderate	125	59.2
High	46	21.8

BDI-II: Beck Depression Inventory II
EEP-14: 14-item Perceived Stress Scale

Source: own elaboration.

Table 3. Risk factors for depression (BDI-II ≥ 14 points) in the studied population (multivariate analysis)

Variable	P Value*	OR (IC 95%)
Age	0.13 ^a	
Sex (female)	0.00	4.27 (2.29-7.94)
Marital status (single)	0.24	0.66 (0.33-1.31)
Socioeconomic status (low)	0.32	0.66 (0.28-1.51)
Beginning semesters	0.57	1.17 (0.67-2.05)
Intermediate semesters	0.70	1.11 (0.62-1.99)
Final semesters	0.17	0.58 (0.26-1.28)
Dissatisfaction with major chosen	0.10	6.26 (0.78-49.87)
No active participation in a group	0.94	0.97 (0.53-1.78)
No social support	0.06	2.37 (0.92-6.15)
Spends time alone	0.00	4.28 (1.43-12.81)
Does not share time with family	0.04	1.80 (1.01-3.21)
PAS consumption in the last 15 days	0.57	1.17 (0.67-2.05)
Personal history of mental disorders	0.00	4.52 (1.91-10.67)
Personal history of mental illness	0.53	1.53 (0.85-2.78)
Family history of suicide or suicide attempts	0.00	3.53 (1.61-7.75)
Self-perception of health status (bad)	0.00	6.77 (2.74-16.74)
Perceived stress level	0.00	18.78 (4.40-80.06)

*Statistically significant with p value < 0.05

^a Numeric variable: Spearman's correlation

BDI-II: Beck Depression Inventory II

PAS: Psychoactive substances

Source: own elaboration.

Table 4. Binary variable regression model predicting depression*

Equation variables	B	Standard error	wald	P value	OR Exp(B)	IC 95%
Sex: Female	1.45	0.38	14.37	< 0.01	4.27	2.01-9.04
Spends time alone	1.69	0.63	7.07	< 0.01	5.42	1.56-18.85
Does not share time with family	0.72	0.38	3.62	0.05	2.07	0.97-4.38
Family history of suicide or suicide attempts	1.44	0.49	8.50	< 0.01	4.24	1.60-11.23
Self-perception of health status (bad)	1.74	0.52	11.30	< 0.01	5.74	2.07-15.91
Perceived stress level (high)	3.21	0.79	16.40	< 0.01	24.83	5.24-117.57

* Dependent variable: presence of depression (BDI-II ≥ 14 points)

gL: 1, P value < 0.001, Cox and Snell R² = 0.348, Nagelkerke R² = 0.475

Source: own elaboration.

Depression and perceived stress

Table 2 presents the prevalence of depression and perceived stress in the sample. Overall, 133 students (63%) reported some degree of depression (BDI-II ≥ 14). Mild depression was identified in 57 students (27%), moderate depression in 40 students (19%), and severe depression in 36 students (17%). High perceived stress was observed in 46 students (21.8%).

Table 3 summarizes the results of association tests and risk estimation for depression (BDI-II ≥ 14) according to personal characteristics, demographics, and perceived stress. The following were identified as significant risk factors: high perceived stress (OR = 18.7; 95% CI [4.4, 80]; $p < .001$), self-perception of poor health (OR = 6.7; 95% CI [2.7, 16.7]; $p < .001$), spending time alone (OR = 4.2; 95% CI [1.4, 12.8]; $p = .005$), female sex (OR = 4.2; 95% CI [2.2, 7.9]; $p < .001$), family history of suicide or suicide attempts (OR = 3.5; 95% CI [1.6, 7.7]; $p = .001$), and not sharing time with family (OR = 1.8; 95% CI [1.01, 3.22]; $p = .044$).

A statistically significant association was also found between personal history of mental disorders and depression; however, this variable reflects a diagnosis and therefore cannot be interpreted as a risk factor. Similarly, self-perception of poor health may be both an associated factor and a consequence of depression.

Binary logistic regression analysis indicated that significant predictors of depression included high perceived stress, self-perception of poor health, female sex, and family history of suicide. As shown in Table 4, the model explained 34.8% of the variance in depression according to Cox and Snell's R² ($p < .005$), and 47.5% according to Nagelkerke's R² ($p < .005$).

Discussion

The main findings of this study were the high prevalence of depression among medical students and the significant association between depression and perceived stress. Additional factors associated with depression included family history of suicide, personal history of mental disorders, female sex, and self-perceived poor health. The connection between elevated stress levels and depression may be explained by the reduced capacity of individuals with depression to employ effective coping strategies, which favors higher perceptions of stress. Previous research has also suggested that intolerance of uncertainty constitutes a risk factor for a wide variety of maladaptive psychological patterns (39).

Several studies have reported high rates of depression among medical students, exceeding those observed in the general population. These results are consistent with the findings of the present study (6–8, 40–42). Although some investigations have reported lower prevalence rates, they remain higher than those found in non-medical student peers (43). Previous research has also confirmed the association between depression and female sex (9, 43–46). Gender differences may be explained by historical cultural segregation, peer pressure, gender-based violence, or other stress-inducing factors disproportionately experienced by women.

Loneliness has been defined as a negative emotional state arising when there is “a discrepancy between desired and actual patterns of social interaction” (47). Weiss proposed a multidimensional concept of loneliness, distinguishing between social loneliness, caused by the absence of socially integrating relationships, and emotional loneliness, due to the

absence of close emotional attachment (48). Recent studies have highlighted associations between loneliness and adverse health outcomes, mediated by biological, psychological, and behavioral mechanisms (46, 49, 50). In 2016, Coentre *et al.* reported that living alone was associated with higher rates of depression among medical students (46).

Although loneliness and poor social support are increasingly recognized as determinants of physical and mental well-being, evidence of their direct relationship with mental health outcomes remains limited (51). Nevertheless, this study—consistent with previous findings (8)—identified a significant association between spending time alone and depression, suggesting the need for further research in this population.

Other studies have reported associations between depression and the initial semesters of medical training (9, 43–45). However, this study did not find a significant relationship between depression and semester of study, consistent with other investigations (52). This may be explained by the relatively uniform distribution of academic demands across semesters. These results suggest that depression is not determined solely by academic stage, but is also influenced by factors such as classroom environment, cooperative learning, and social support (43). Romantic breakups also warrant further investigation, as they represent one of the leading causes of suicide attempts in the department of Caldas (53).

In contrast to findings by Julio *et al.*, who reported no significant association between depressive symptoms and the use of alcohol or psychoactive substances (8), this study similarly found no such relationship.

The strengths of this study include its representative sample size and the use of validated instruments adapted into Spanish, which facilitated data collection. Limitations include the lack of analysis regarding patterns of psychoactive substance use, such as tolerance or dependence, which could be relevant in future research exploring associations between substance use disorders and depression. Similarly, romantic breakups should be examined in greater depth given their known association with suicidal behavior in this context. Additional factors that should be considered in future studies include workload intensity, clinical shifts, reduced sleep, limited leisure opportunities, and other psychosocial stressors.

Conclusions

This study identified a high prevalence of depression among medical students, mainly associated with elevated perceived stress. These findings highlight the need to implement measures aimed at managing both depression and stress. Interventions focused on identifying maladaptive psychological patterns may help reduce stress levels.

Future research should examine factors that heighten the perception of stress and evaluate intervention strategies designed to promote coping skills and stress tolerance.

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Conflicts of Interest

The authors declare no conflicts of interest.

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