



# ASSOCIATION BETWEEN ANXIETY AND DEPRESSION IN MEDICAL STUDENTS AT THE RICARDO PALMA UNIVERSITY DURING THE YEAR 2021

ASOCIACIÓN ENTRE ANSIEDAD Y DEPRESIÓN EN ESTUDIANTES DE MEDICINA DE LA UNIVERSIDAD RICARDO PALMA DURANTE EL AÑO 2021

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## ABSTRACT

**Introduction:** The mental health of medical students around the world has been affected by the presence of anxiety and depression. According to the World Health Organization, more than 260 million people suffer from anxiety and approximately 300 million people suffer from depression. **Objective:** To determine the association between anxiety and depression in medical students at Ricardo Palma University during the 2021-II academic year. **Methods:** Observational, analytical, cross-sectional and quantitative study. From a population of 2046 medical students from the first to the seventh year of studies, the size of the sample obtained was 110 students. The data obtained was collected through Google Forms. **Results:** Of the medical students, 85.46% manifested some degree of anxiety and 50% manifested some degree of depression. These pathologies occurred more frequently in the female sex, low socioeconomic level and in those who had clinical courses. A statistically significant association was found between anxiety and depression ( $p: 0.038$ ), and between low socioeconomic status and depression ( $p: 0.004$ ). No statistically significant association was found between female sex and depression, nor between pre-clinical courses and depression. **Conclusions:** High prevalences of anxiety and depression were found in medical students at the Ricardo Palma University. In addition, a statistically significant association between anxiety and depression was evidenced ( $p: 0.038$ ). For this reason, it is recommended to implement a psychological accompaniment throughout the medical university career.

**Keywords:** Anxiety; Depression; Medicine students; Mental health (Source: MESH-NLM)

## RESUMEN

**Introducción:** La salud mental de los estudiantes de medicina alrededor del mundo ha sido afectada por la presencia de ansiedad y depresión. Según la Organización Mundial de la Salud, más de 260 millones de personas padecen ansiedad y aproximadamente otros 300 millones depresión. **Objetivo:** Determinar la asociación entre ansiedad y depresión en estudiantes de medicina de la Universidad Ricardo Palma durante el ciclo académico 2021-II. **Métodos:** Estudio observacional, analítico, transversal y cuantitativo. De una población de 2046 estudiantes de medicina del primer al séptimo año de estudios, el tamaño de la muestra obtenida fue de 110 estudiantes. Los datos obtenidos se recolectaron por medio de Google Forms. **Resultados:** De los estudiantes de medicina el 85.46% manifestó algún grado de ansiedad y 50% manifestó algún grado de depresión. Estas patologías se presentaron con mayor frecuencia en el sexo femenino, nivel socioeconómico bajo y en aquellos que llevaban cursos de clínica. Se encontró asociación estadísticamente significativa entre ansiedad y depresión ( $p: 0.038$ ), y entre nivel socioeconómico bajo y depresión ( $p: 0.004$ ). No se encontró asociación estadísticamente significativa entre sexo femenino y depresión, ni entre cursos de pre clínica y depresión. **Conclusiones:** En los estudiantes de medicina de la Universidad Ricardo Palma se encontró prevalencias de ansiedad y depresión elevadas. Además, se evidencio una asociación estadísticamente significativa entre ansiedad y depresión ( $p: 0.038$ ). Por ello, se recomienda implementar un acompañamiento psicológico a lo largo de la carrera universitaria de medicina.

**Palabras Claves:** Ansiedad; Depresión; Estudiantes de Medicina; Salud mental (Fuente: DeCS- BIREME)

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## INTRODUCTION

Around the world, university medical education is considered one of the most demanding academic and emotional training programs. This has tarnished the mental health of medical students with the high prevalence of anxiety and depression<sup>(1)</sup>.

Clark and Beck define anxiety as a complex response system that overestimates a situation as potentially lethal for the individual<sup>(2)</sup>. The World Health Organization (WHO) estimates that more than 260 million people suffer from this pathology<sup>(3)</sup>. In Peru, around 44.64% of university students study anxiety<sup>(4)</sup>. The prevalence of anxiety in medical students around the world has a wide range of variability, from 37.2% in Brazil<sup>(5)</sup>, 58.5% in Mexico<sup>(6)</sup>, to 75.4% in Peru<sup>(7)</sup>. On the other hand, the WHO characterizes depression as sadness, loss of interest or pleasure, guilt or lack of self-esteem, sleep or appetite disorders, feelings of tiredness, and lack of concentration; approximately 300 million people worldwide suffer from it<sup>(8)</sup>. When comparing the prevalence of depression among Peruvian university students, those of health sciences are the first with 54.9%<sup>(9)</sup>. The prevalence of depression in medical students is different around the world, in Malaysia, it is 11%<sup>(10)</sup>; in Brazil it is 41%<sup>(11)</sup>, while in Peru, it is 32.5%<sup>(12)</sup>.

Due to the high prevalence of these pathologies, their association was studied at the University of Rochester, New York, concluding that adolescents with a negative anxiety response style longitudinally have a greater probability of presenting with depressive symptoms, and it increases in these the association between anxiety and depression<sup>(13)</sup>. Due to the high prevalence of anxiety and depression, and the probable association between both pathologies in medical university students around the world, it has been considered to carry out the present study to determine the association between anxiety and depression in medical students of the Ricardo Palma University during the academic cycle 2021-II.

## METHODS

### Design and study area

Observational, analytical, cross-sectional and quantitative study in medical students from the first

to the seventh year of study at Ricardo Palma University during the 2021-II academic cycle, who met the following inclusion criteria: being older 18 years old and sign the informed consent. Students who answered the questionnaire completely were excluded.

### Population and sample

Of the total number of medical students (2046), a sample of 110 students was obtained by using a calculator provided by IINIB, according to the Analytical Transversal design. Through stratified probabilistic sampling, it was determined that from the sample obtained, 42 students had to take pre-clinical courses, 58 students had to take clinical courses, and 10 students had to be in the medical internship.

### Variables and instruments

The Beck Anxiety Inventory (BAI) and the Beck Depression Inventory (BDI) were applied to medical students between November and December 2021. Data were obtained through a data collection form in Google Forms virtual survey format, in addition, the following sociodemographic data were obtained: age, sex, university study cycle, and socioeconomic level.

The anxiety variable was measured using the Beck Anxiety Inventory (BAI), which has four scales: no anxiety (0-7 points), mild anxiety (8-15 points), moderate anxiety (16- 25 points), and severe anxiety (26-63 points); with a Cronbach's alpha coefficient of 0.88. To measure the depression variable, the Beck Depression Inventory (BDI) was used, which has four scales: the subject does not suffer from depression (0-13 points), the subject suffers from mild depression (14-19 points), the subject suffers from a moderate depression (20-28 points), the subject suffers from severe depression (29-63 points); with a Cronbach's alpha coefficient of 0.889.

### Statistical analysis

A descriptive analysis was performed using absolute frequency tables and percentages; Likewise, two bivariate analyzes and a multivariate analysis were carried out. In the latter, crude and adjusted prevalence ratios (PR) were shown, performed with a confidence interval > 95% (95% CI) and a significance level of  $p \leq 0.05$ . The data were stored and processed in a database in Excel and STATA version 16.

## Ethical Aspects

For the present investigation, approval was obtained from the Research Ethics Committee of the Faculty of Human Medicine of the Ricardo Palma University, as stated in the PG record. 136-021 (approved December 5, 2021). The ethical principles of biomedical research in human beings of the Declaration of Helsinki 2013<sup>(14)</sup>, informed consent was obtained from each participant, keeping their anonymity, as well as the confidentiality of the data.

## RESULTS

En la muestra se encontró predominio del sexo

In the sample, a predominance of the female sex was found at 59.09%. Likewise, it was reported that 30% of the students were of low socioeconomic level, 40.91% of medium socioeconomic level, and 29.09% of high socioeconomic level. 39.09% of the students took pre-clinical courses, 52.73% took clinical courses, and 8.18% attended medical internships.

Table 1 shows that, regarding anxiety, 33.64% was moderate and 32.73% severe; that is to say: anxiety was moderate or severe in 66.37%. Regarding depression: moderate in 19.09% and severe in 13.64%; that is to say: depression was moderate or severe in 33.73%.

**Table 1.** Prevalence of anxiety and depression in medical students at the Ricardo Palma University in the period 2021-II.

Characteristics	n	%
<b>Anxiety</b>		
Does not suffer from anxiety	16	14.54
Mild anxiety	21	19.09
Moderate anxiety	37	33.64
Severe anxiety	36	32.73
<b>Depression</b>		
Does not suffer from depression	55	50.00
Mild depression	19	17.27
Moderate depression	21	19.09
Severe depression	15	13.64

Table 2 shows that of the students who suffered from depression, 65.45% were female, 47.27% were of

low socioeconomic status and 52.73% had clinical courses.

**Table 2.** Factors related to Depression.

Related factors	Suffer from depression		No Suffer from depression		P* value
	n	%	n	%	
<b>Sex</b>					
Male	19	34.55	26	47.27	0.192
Female	36	65.45	29	52.73	
<b>Socioeconomic status</b>					
Low socioeconomic status	26	47.27	7	12.73	0.002



Medium socioeconomic level	18	32.73	27	49.09	0.621
High socioeconomic level	11	20	21	38.18	
<b>Academic cycle</b>					
Pre-clinical courses	22	40	21	38.18	0.727
Clinical courses	29	52.73	29	52.73	0.767
Medical Internship	4	7.27	5	9.09	

Table 3 shows that of the students who suffered from anxiety, 59.57% were female, 72.34% were of low and medium socioeconomic status, and 55.32% had clinical courses.

**Table 3.** Factors related to Anxiety.

Related factors	Suffer from anxiety		No Suffer from anxiety		P* value
	n	%	n	%	
<b>Gender</b>					
Male	38	40.43	7	43.75	
Female	56	59.57	9	56.25	0.806
<b>Socioeconomic status</b>					
Low socioeconomic status	31	32.98	2	12.5	0.131
Average socioeconomic level	37	39.36	8	50	0.914
High socioeconomic level	26	27.66	6	37.5	
<b>Academic cycle</b>					
Pre-clinical courses	38	40.43	5	31.25	0.069
Clinical courses	52	55.32	6	37.5	0.063
Medical internship	4	4.26	5	31.25	

In table 4, in relation to the bivariate analysis, the probability of suffering from depression in the group of students who suffer from anxiety was 4.5 times with respect to the group of students who do not suffer from anxiety (PR=4.51; CI95% 1.21 – 16.79, p=0.025). And the probability of suffering from depression in the group of students with a low socioeconomic level was 2.29 times compared to the group of students with a high socioeconomic level (PR=2.29; CI95% 1.37 - 3.8; p=0.002)..

Regarding the multivariate analysis, the probability of depression in those who suffer from anxiety is 4.52 times compared to those who do not suffer from anxiety. This was statistically significant (p: 0.038). In addition, the probability of depression in those with a low socioeconomic level is 2.02 times that of those with a high socioeconomic level. This was statistically significant (p:0.004).





**Table 4.** Bivariate and multivariate analysis associated with depression.

Related factors	Crude PR	95% CI	value	adjusted PR	95% CI	p* value
Anxiety						
No	Ref			Ref		
Yes	4.51	1.21 - 16.79	0.025	4.53	1.09 - 18.86	0.038
Sex						
Male	Ref			Ref		
Female	1.31	0 1.97	0.192	1.33	0.92 1.92	0.129
Socioeconomic level						
Low socioeconomic level	2.29	1.37 - 3.83	0.002	2.02	1.26 - 3.25	0.004
Medium socioeconomic level	1,16	0.64 2.12	0.621	1.11	0.64 - 1.93	0.718
High socioeconomic level	Ref			Ref		
Academic cycle						
Pre-clinical courses	1.15	0.52- 2.54	0.73	0.61	0.35 - 1.06	0.08
Clinical courses	1.13	0.52 2.45	0.77	0.59	0.33 - 1.06	0.077
Medical Internship	Ref			Ref		

## DISCUSSION

In the present study carried out on the medical students of the Ricardo Palma University during the period 2021-II, the prevalence of anxiety was 85.46% and depression was 50%.

With regard to anxiety, studies conducted before the pandemic, that is, up to 2019, show a lower prevalence of anxiety, Mexico with 58.5%<sup>(6)</sup>, Colombia with 26.5% for trait anxiety<sup>(15)</sup>, Brazil with 37.2%<sup>(5)</sup> and in Peru, a multicenter study of three universities, from the coast, mountains and jungle, showed anxiety of 10.5%<sup>(16)</sup>. On the contrary, studies carried out during the pandemic to date show a prevalence of anxiety in Spain of 24.71% for Anxiety state (anxiety state) and 21.53 for Anxiety trail (anxiety trait)<sup>(17)</sup>, in the United States 30.6%<sup>(18)</sup>, in Peru a thesis carried out in Piura found that 64.7% of medical students suffer from anxiety<sup>(19)</sup>, and a study carried out a year earlier at the same university in the present sample found a prevalence of anxiety of 75.4%<sup>(20)</sup>. The high prevalence of anxiety in medical students at Ricardo Palma University in the period 2021-II is not different from that in medical students in the post-COVID-19 era around the world.

In relation to depression, the studies carried out in the pre-pandemic era found the following prevalences, in Mexico 26.8%<sup>(6)</sup>, in Colombia 30.15%<sup>(15)</sup>, in Brazil 27.6% were reported from the first to the sixth year of studies<sup>(21)</sup>. In comparison, a multicenter study in Peru revealed a prevalence of depression of 3.9%<sup>(16)</sup>. And the studies carried out during the pandemic to date show a prevalence of depression in Spain of 41%<sup>(17)</sup>, in the United States of 24.3%<sup>(18)</sup>, in Mexico a longitudinal study described that the prevalence of depression increased from 19.84% to 40.08% between April and December 2020<sup>(22)</sup>. In Peru, a study conducted at the same university in the sample a year earlier found 78.8% depression<sup>(20)</sup>. Great variability in the prevalence of depression is observed in medical students around the world both before the COVID-19 pandemic and during it.

When performing the chi-square test, a p-value ( $p$ : 0.038) was obtained, which shows a significant association between anxiety and depression in the medical students of Ricardo Palma University in the period 2021-II. This result is similar to the study by Ivana Damásio et al., where Brazilian medical students from

different academic semesters were surveyed, obtaining a significant association between anxiety and depression<sup>(5)</sup>. Similarly, a cross-sectional study conducted on Chinese medical students in 2020 determined that there was a significant positive correlation between anxiety and depression<sup>(23)</sup>. Similarly, the Spanish multicenter cross-sectional study conducted in 43 different medical schools in 2021 showed a statistically significant association between Anxiety Trail (anxiety trait) and depression<sup>(17)</sup>.

Likewise, depression is associated with a history of mental illness<sup>(24)</sup>, a history of psychiatric disorder<sup>(25)</sup> and the presence of a mental illness<sup>(26)</sup>. Similarly, anxiety is statistically associated with a history of mental illness<sup>(27)</sup> and psychiatric disorder<sup>(25)</sup>.

The literature indicates that the female sex and the presence of depression have a statistically significant association; This statement is supported by publications from Brazil<sup>(21)</sup>, the United States<sup>(28)</sup>, and Saudi Arabia<sup>(24)</sup>. The present study determined that the female sex had a 31% greater probability of suffering from depression but without a statistically significant association. Similar occurred in other Peruvian studies, the first carried out in Huánuco in 2020, with a sample that included medical students from the first to the fifth academic year; this showed that the female sex was a risk factor of 1.03 times more to have depression, but without significant association<sup>(29)</sup>. The second also carried out in 2020, was a multicenter study, where medical students from the first to the sixth year were evaluated in the cities of Lima, Cusco and Ucayali, as a representation of the Peruvian coast, mountains and jungle. This publication also demonstrated that there was no significant association between sex and depression in their sample<sup>(16)</sup>.

Likewise, a Mexican study in 2020, which compared first and last-year medical students with students from other careers except those in the health area, showed that female medical students had a higher probability of suffering from depression, but this was not statistically significant<sup>(6)</sup>. This lack of statistically significant association between the female sex and depression in medical students has been suggested that may be due to the contribution that medical training gives to gender equality in the area of health<sup>(6)</sup>.

In this study, the significant association between low





socioeconomic status and depression was determined. Similar occurred in Egypt (2020); it was shown that being dissatisfied with your socioeconomic level is associated with depression<sup>(26)</sup>. In turn, Çelik et al. supported that poor economic status is associated with depression<sup>(30)</sup>.

In the present study, no statistically significant association was found between pre-clinical courses, clinical courses and medical internships with depression. A similar occurred with the 2020 Peruvian study that took as a sample three universities from the coast, mountains, and jungle; it did not find a statistically significant association between year of study and major depression<sup>(16)</sup>. Similarly, a Brazilian study from 2017 showed no significant association between the academic semester (pre-clinical, clinical, and internship) and depression<sup>(5)</sup>.

Similarly, various publications indicate that depression may be associated with pre-clinical courses or the first 3 years of study, such as the United States study that took 40 medical schools as a population, which showed a significant association between depression and pre-

clinical courses<sup>(18)</sup>. Likewise, a Peruvian study from 2020 showed that depression was statistically associated with the first year of studies<sup>(29)</sup>.

The results are diverse. Thus a Mexican study carried out in 2020, which compared medical students in their first and last year of medicine with students from other careers except those in the health area, showed an association between depression and their last year of medicine<sup>(6)</sup>.

## CONCLUSIONS

The findings of this study show a high prevalence of anxiety and depression among medical students at Ricardo Palma University. Likewise, according to the bivariate analysis, there is a statistically significant association between anxiety and depression, and between low socioeconomic status and depression. For this reason, it is recommended that students receive psychological support during their university career, and include mental health courses in the undergraduate curriculum that provide effective and efficient tools to prevent and combat these pathologies.

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