

## Original article

# The Influencing Factors for Anxiety Among Fifth-Year Medical Students During Exam Periods at The Faculty of Medicine, University of Zawia

Sobhia Draibi<sup>1</sup> , Hala Araibi<sup>2</sup> , Fatma Alatrags<sup>2</sup> , Ebtehal Eshiak<sup>2</sup> , Aida Belag<sup>1</sup> 

<sup>1</sup>Department of Medicine, Faculty of Medicine, University of Zawia, Zawia, Libya

<sup>2</sup>Department of Physiology, Faculty of Medicine, University of Zawia, Zawia, Libya

Corresponding email. [s.draibi@zu.edu.ly](mailto:s.draibi@zu.edu.ly)

## Abstract

Exam periods are known to induce significant stress and anxiety among medical students, potentially affecting both their psychological well-being and physiological health. This study aimed to investigate the influencing factors for anxiety during exam periods, with a focus on physiological responses (blood pressure and heart rate) and demographic factors such as gender, age, family history of hypertension (HTN), and daily internet use. A cross-sectional study was conducted with 70 medical students in the fifth year of the Faculty of Medicine at Zawia University (ZU). Physiological parameters, including diastolic and systolic blood pressure and heart rate, were measured before and after the exam. Anxiety levels were assessed using the Zung Self-Rating Anxiety Scale (SAS). The study revealed statistically significant decreases in diastolic blood pressure, systolic blood pressure, and heart rate after the exam period. Female students reported significantly higher stress levels compared to males and were more likely to experience mild to moderate and moderate to severe anxiety. Age was significantly associated with exam anxiety, with students aged 25 and above showing higher anxiety levels. Daily internet use and family history of HTN did not show significant associations with anxiety levels. Exam periods induce measurable physiological stress responses in medical students, with significant reductions in blood pressure and heart rate post-exams. Gender and age are critical factors influencing anxiety levels, with female students and older students experiencing higher stress.

**Keywords:** Anxiety, Student, Blood Pressure, Heart Rate.

## Introduction

Anxiety is a prevalent psychological condition that significantly affects individuals' mental and physical health, mainly among students in high-stress academic environments such as medical schools [1]. Furthermore, stress and anxiety levels are rising among medical students due to the challenging nature of their education, which requires extensive coursework and subjects them to the pressure of potentially failing high-stakes examinations [2].

Stress can significantly impact students' academic performance, psychological well-being, and overall quality of life, potentially affecting their future professional success and personal development. Therefore, to reduce stress and anxiety levels during the exam period and improve student well-being, it is crucial to understand the factors that influence anxiety during exam period [3,4]. This study aims to examine the influencing factors of anxiety level among fifth-year medical students at the Faculty of Medicine UZ during their final exam periods. Specifically, we investigate physiological and psychological factors, which include blood pressure, heart rate, and stress level.

## Material and methods

### Study design and participants

This study employed a cross-sectional design to assess the effect of stress level during exam time on blood pressure and heart rate. A total of 120 medical students were invited to participate. Ninety students consented and were enrolled in the study, with a response rate = 75%. Twenty students did not complete the study and were excluded, leaving a final sample of 70 students for analysis. Among the 70 students included in the analysis, 37.1% (N= 26) were male and 62.8 % (N = 44) were female. The mean age of the students was between 24 - 26 years old. Exclusion criteria included a history of diagnosed anxiety disorders or any other psychiatric disorders that could confound the results. Students who did not agree to participate or did not complete the study requirement were also excluded.

### Data collection

Data were collected by using a structured, validated questionnaire that collected information regarding sociodemographic data, past medical history, leisure time activity, and assessed stress level. Socio-demographic and health data include gender, age, history of any psychological illness, family history of HTN, and daily internet use. Anxiety levels were assessed using an English version of the Zung Self-Reported, which categorized anxiety into four levels: normal, mild to moderate, moderate to severe, and severe. A study survey was filled out before the exam, and blood pressure and heart rate were measured before and after the exam. Heart rate was measured using electronic pulse oximetry, and blood pressure was measured by electronic sphygmomanometer after calibration.

### Statistical analysis

A descriptive and inferential statistical analysis was conducted using SPSS V27. Continuous variables were analyzed using paired and independent t-test, and Categorical variables. Statistical significance was determined at  $P < 0.05$ . Descriptive statistics included mean, standard deviation, and percentage calculations to characterize the sample and provide comprehensive insights into the data distribution and variations among medical students during exam periods.

### Ethic consideration

This study was ethically approved by the ethics board in the research unit at the faculty of medicine, University of Zawia, and verbal consent was obtained from each student before enrolment in this study. Data is stored securely and kept confidential.

### Results

The study results revealed statistically significant changes in medical students' vital signs during the exam period. Overall, diastolic blood pressure decreased from a mean of 85.31 to 82.43 ( $P = 0.027$ ), while systolic blood pressure dropped from 124.49 to 119.57 ( $P < 0.001$ ). In addition, heart rate showed a substantial decline from 108.57 to 100.46 beats per minute ( $P < 0.001$ ) with the differences being statistically significant across all measured parameters (Table 1).

**Table 1. Comparison of Blood Pressure and Heart Rate Before and After Exam Period Among Medical Students**

Variable	N	Mean	Std	T value	P value
Diastolic Blood Pressure before	70	85.31	10.786	2.258	0.027
Diastolic Blood Pressure after	70	82.43	11.664		
Systolic Blood Pressure before	70	124.49	14.575	3.453	< 0.001
Systolic Blood Pressure after	70	119.57	14.787		
Heart rate before	70	108.57	17.507	3.643	< 0.001
Heart rate after	70	100.46	17.871		

However, when comparing stress scores with blood pressure readings (both before and after the exam), no statistically significant correlation was found between perceived stress scores and diastolic blood pressure before ( $0.005 \pm 0.966$ ) or after ( $0.091 \pm 0.453$ ) the exam. Similarly, systolic blood pressure before the exam showed no significant correlation with stress ( $0.020 \pm 0.868$ ), while after the exam, there was a marginal but non-significant negative correlation ( $0.218 \pm 0.070$ ). Moreover, there was no significant correlation between stress and heart rate, either before the exam ( $r = 0.170 \pm 0.161$ ) or after the exam ( $r = 0.133 \pm 0.273$ ). Overall, the findings suggest that stress scores were not significantly correlated with blood pressure (diastolic or systolic) or heart rate, either before or after the exam. The only notable trend was a slight inverse relationship between stress and post-exam systolic blood pressure, though it did not reach statistical significance (0.070) (Table 2).

**Table 2: Relation between stress score and BP, HR before and after the exam**

Variable	Stress score	
	Pearson correlation	P value
Diastolic Blood Pressure before	0.005	0.966
Diastolic Blood Pressure after	-0.091	0.453
Systolic Blood Pressure before	-0.020	0.868
Systolic Blood Pressure after	-0.218	0.070
HR before	0.170	0.161
HR after	0.133	0.273

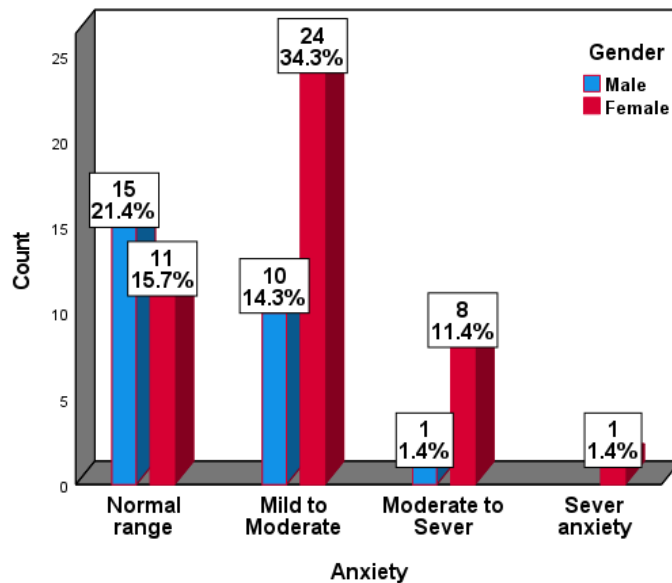
The exam period revealed a statistically significant difference between genders ( $P = 0.003$ ), where female students reported significantly higher mean stress levels ( $51.09 \pm 10.492$ ) compared to male students ( $43.77 \pm 7.334$ ) (Table 3).

**Table 3: Effect of anxiety score by gender**

Gender	N	Mean	Std	T value	P value
Male	26	43.77	7.334	-3.131	0.003
Female	44	51.09	10.492		

Further analysis using the chi-square test revealed a statistically significant difference between gender and exam anxiety levels among medical students ( $\chi^2 = 8.776$ ,  $P = 0.032$ ). Female students demonstrated a

notably different anxiety distribution compared to males, with higher proportions experiencing mild to moderate (34.3% vs. 14.3%) and moderate to severe (11.4% vs. 1.4%) anxiety levels. Conversely, males predominantly maintained normal anxiety levels (21.4%), suggesting significant gender-based variations in psychological stress responses during academic examinations (Bar chart 1).



**Figure 1. Effect of anxiety levels on scores by gender**

The analysis revealed a statistically significant association between age and exam anxiety among medical students ( $X^2 = 13.560$ ,  $P = 0.035$ ). The anxiety distribution varied across age groups, with the 25-year-old cohort showing the most diverse anxiety levels. Students aged 24 and 25 predominated in the mild to moderate anxiety category, while severe anxiety was predominantly observed in the  $\geq 26$  age group. This suggests that age may influence exam anxiety patterns among medical students (Table 4).

**Table 4: Anxiety level differs in age group,  $P = 0.035$ .**

Anxiety	Age						Chi square	P-value
	24		25		>= 26			
	Count	%	Count	%	Count	%		
Normal	7	10.0	18	25.7	1	1.4	13.560	0.035
Mild to moderate	13	18.6	14	20.0	7	10.0		
Moderate to severe	5	7.1	3	4.3	1	1.4		
Sever	0	0.0	0	0.0	1	1.4		

The chi-square analysis showed no statistically significant association between daily internet use and exam anxiety among medical students ( $X^2 = 2.850$ ,  $P = 0.415$ ). Students using more than 6 hours of daily internet had a slightly higher proportion of mild to moderate (34.3% vs. 14.3%) and moderate to severe (11.4% vs. 1.4%) anxiety levels compared to those using less than 6 hours, but these differences were not statistically significant. This suggests that daily internet usage may not be a strong predictor of exam anxiety in this student population (Table 5).

**Table 5: Association of Daily Internet Use with Exam Anxiety Among Medical Students,  $P = 0.415$ .**

Anxiety	Daily internet use				Chi square	P-value
	< 6 hours		> 6 hours			
	Count	%	Count	%		
Normal	10	14.3	16	22.9	2.850	0.415
Mild to moderate	10	14.3	24	34.3		
Moderate to severe	1	1.4	8	11.4		
Sever	0	0.0	1	1.4		

The stress score approached marginal significance ( $P = 0.051$ ), with students with a family history of HTN reporting slightly higher mean stress levels ( $M = 50.85$ ) compared to those without ( $M = 46.16$ ). There were no relationships between having a family history of HTN and level of stress, and blood pressure and heart

rate changes during the exam time. While diastolic blood pressure, systolic blood pressure, and heart rate exhibited slight variations between groups, none reached statistical significance ( $P > 0.05$ ). (Table 6).

**Table 6: Comparison of blood pressure, heart rate, and stress score for family history of HTN among medical students during exam period.**

Variables	Family History of HTN	N	Mean	Std	T value	P value
Diastolic Blood Pressure before	No	37	83.43	9.344	-1.562	0.123
	Yes	33	87.42	11.997		
Diastolic Blood Pressure after	No	37	80.81	11.990	-1.233	0.222
	Yes	33	84.24	11.189		
Systolic Blood Pressure before	No	37	123.92	16.920	-0.349	0.728
	Yes	33	125.12	11.626		
Systolic Blood Pressure after	No	37	119.73	16.748	0.096	0.924
	Yes	33	119.39	12.485		
Heart rate before	No	37	107.59	17.440	-0.492	0.625
	Yes	33	109.67	17.788		
Heart rate after	No	37	100.27	15.455	-0.092	0.927
	Yes	33	100.67	20.490		
Stress score	No	37	46.16	8.358	-1.991	0.051
	Yes	33	50.85	11.259		

## Discussion

This study aimed to assess the influencing factors of anxiety among fifth-year medical students during their final examinations, focusing on physiological (blood pressure and heart rate) and psychological (stress level) responses. In line with this aim, our findings revealed that both systolic and diastolic blood pressure showed a significant reduction in the post-examination period compared with pre-examination values, and heart rate also demonstrated a marked decline. These findings suggest that examination-related anxiety triggers acute physiological responses that are likely to subside once the stressor has passed [5]. These findings have been reported in previous studies, indicating that exam periods induce measurable physiological stress responses [5,6]. The significant decrease in blood pressure and heart rate after the exam period suggests that the stress associated with exams may temporarily elevate these physiological parameters [5]. This is consistent with the body's natural stress response, which typically involves increased heart rate and blood pressure during periods of acute stress [7].

Male and female students exhibit different patterns of anxiety and physiological stress responses. The findings of this study revealed that female students reported higher levels of anxiety compared to male students, which is consistent with existing literature [8,9]. On the other hand, some previous studies reported that male students were more stressed as compared to their female counterparts [10]. Meanwhile, other studies show that gender did not have any significant association with stress level [11,12]. Various factors, such as differences in coping strategies, societal expectations, and hormonal influences, may contribute to this gender difference [8]. In addition, female medical students are generally more competitive and worry about achieving high grades on tests, which can exacerbate their feelings of sadness [13].

Our research shows that stress significantly increases with age, and older students, especially those who are 26 years of age or older, are more likely to experience severe anxiety. This result is consistent with other studies that found stress levels increased gradually throughout the course of study and reached their highest point at the end of the clinical training phase [12,14]. The strong correlation between age and exam anxiety highlights the complex relationship between demographic characteristics and psychological stress reactions [11,15], which may be brought on by the pressures and responsibilities that come with progressing in medical school [14,16].

Despite the physiological changes that have been observed due to anxiety during the exams, interestingly, daily internet use did not show a significant relationship with exam anxiety. Even though students who used the internet for more than six hours per day had a slightly higher percentage of anxiety compared with those who used it for less than six hours, these differences were not statistically significant. Contrary to some previous findings revealed that stress exhibits a positive association with internet addiction [17,18]. This suggests that while excessive internet use may contribute to general stress levels, it may not be a primary factor in exam-related anxiety among medical students [17,19].

In this study, blood pressure and heart rate were unaffected by a positive family history of hypertension. Our results are consistent with previous studies that found no evidence of a consistent relation between stress and a positive family history of hypertension [20,21]. The lack of significant differences indicates that genetic predisposition to hypertension may not play a major role in acute stress responses during exam periods [21]. However, the marginal significance of the stress score suggests that further research with larger sample sizes is needed to explore this relationship more thoroughly.



## Conclusion

This study provides valuable insights into the factors influencing anxiety among medical students during exam periods. The findings underscore the importance of gender and age as key determinants of exam-related anxiety, while also highlighting the need for further research into the role of family history of HTN and daily internet use. These results have important implications for educators and healthcare professionals, who should consider implementing targeted interventions to support the mental and physical well-being of medical students, particularly during high-stress periods such as exams.

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## Conflicts of Interest

The authors declare no conflicts of interest

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