AFGHAN MEDICAL JOURNAL
KABUL UNIVERISITY OF MEDICAL SCIENCES ABU ALI IBN SINA
Vol 1, Issue 2 | November 2024 AMJ e-ISSN: 3007-0805

EVALUATION OF EXAM STRESS ON BLOOD PRESSURE AND HEART BEATS AMONG MEDICAL STUDENTS

Lutfullah Ariapoor[1*], Sayed Aminullah Sadaat [2], Farzad Rnjbar [3], Abdulrahim Ghafari[4*]
[1, 2, 3,4]Department of physiology, Kabul University of Medical Sciences.

Abstract

Background: Blood pressure is the pressure that the blood produces on the blood vessels wall while passing through the vessels, which have two components, systolic blood pressure which is mainly related to the cardiac output and diastolic blood pressure which is mainly related to the resistance of the peripheral vessels wall. High blood pressure is one of the main causes of cardiovascular diseases and strokes so should be very careful when checking the blood pressure. This study aims to evaluate the effect of exam stress on blood pressure and heart rate among second grade medical students.

Method and materials : This is a cross-sectional study design, which data were obtained from 37 students second grad students of Kabul University of Medical Sciences mean age was (20±1.2) who were randomly selected, 24 were male and 13 were female. At the beginning, the blood pressure and heart rate of the students were examined before the Anatomy and Histology subjects' exam. Subsequently, the blood pressure and the heart rate of students were also checked with the same blood pressure device and the same examiner after the exam. The right arm of the student was selected for assessing of blood pressure.

Results: The results of this study shows in Histology subject, (mean ± SD) of systolic and diastolic blood pressure before the exam was (123.5±1.9) and (78.1±1.3), and students' heart rate was found (76.4±1.05) per minute. And systolic and diastolic blood pressure after the exam in the mentioned subject is (114.3±1.7) and (72.1±1.3mmHg), and the heart rate after the exam of the mentioned subject is (75.6±0.9) per minute. Paired T test was used to evaluate the difference between means before and after exam in histology exam which indicate the difference of means of blood pressure before and after exam is statistically significant with (p-value<0.05 CI 95%) and means of heart rate before and after exam indicate that there is no significant changes in heart rate before and after exam with (p-value>0.05 CI 95%). In Anatomy subject, (mean± SD) of systolic and diastolic blood pressure before the exam was (123.2±1.6) and (77±1.3), and students' heart rate was found (76.8±1) per minute. And systolic and diastolic blood pressure after the exam in the mentioned subject is (113.5±1.5) and (71.8±1.3mmHg), and the heart rate after the exam of the mentioned subject is (75.9±0.9) per minute. Paired T test was used to evaluate the difference between means before and after exam in histology exam which indicate the difference of means of blood pressure before and after exam is statistically significant with (p- value<0.05 CI 95%) and means of heart rate before and after exam indicate that there is no significant changes in heart rate before and after exam with (p- value>0.05 CI 95%).

Conclusion: Overall, the body of research confirms that exam stress significantly affects cardiovascular parameters, emphasizing the need for strategies to mitigate these effects.

Keywords: Exam, Stress, Blood pressure, Medical students.

1. Introduction

Blood pressure is the pressure that the blood produces on the blood vessels wall while passing through the vessels, which have two components, systolic blood pressure which is mainly related to the cardiac output and diastolic blood pressure which is mainly related to the resistance of the peripheral vessels wall [1].

The classification of blood pressure is as bellow [2].

Blood pressure stage	Systolic BP(mmHg)	Diastolic BP(mmHg)
Normal	<120	**<80**
Prehypertension	120-139	**80-89**
Hypertension stage I	140-159	**90-99**
Hypertension stage II	≥160	**100≥**

High blood pressure is the main cause of death in the world and more than one Billion people are affected by it. In the United States 78 million people have high blood pressure [2, 3].In terms of causes, there are two types of high arterial blood pressure: Primary hypertension, which constitutes 95 percent, which the main cause is unknown and the secondary hypertension, which constitutes five percent, and various factors are involved in its creation, including stress and anxiety [4].

[*] **Correspondence: Lutfullah Ariapoor**
Department of physiology, Kabul University of Medical Sciences.

Received 10 Nov 2024; Received in revised form 16 Nov 2024; Accepted 22 Nov 2024; published Online 27 Nov 2024.

High blood pressure is one of the main causes of cardiovascular diseases and strokes so should be very careful when checking the blood pressure. So that high pressure is not mistakenly presented in the report to prevent the prescription of dangerous medicines. Therefore, the following conditions and tactics should be considered at the time of examination, [2,3]. During the blood pressure examination, the person being examined should be completely comfortable and not stressed, the person's position during the examination should also be taken into consideration, the blood pressure should be taken in a sitting position with support on the back, and the patient's arm should be parallel to his/her heart and should be supported during the examination has not been active for 5 minutes, has not used cigarettes for about 15 minutes, and has not taken food for 30 minutes [2].

Stress is a non-descriptive reaction that disrupts the stability of the internal environment of the body and has disturbing effects on the mental conceptual condition. During stress, the secretion of catecholamine's and cortisol from the adrenal glands increases, thus causing changes in blood pressure and heart rate [1].

Numerous studies show that stress has an effect on high blood pressure and heart rate. Andreas Zeller and his colleagues conducted a study on 121 doctors who were subject to pass the final exam of the medical council, which shows that their blood pressure increased during the exam compared to the time before the exam [5]. Also, the results of the research by Zhihong Zhang and his colleagues on 64 students showed an increase in blood pressure during the exam compared to the time before the exam [6]. Another research conducted by Thanler Alves De Oliveira and his colleagues on 109 medical students shows that the blood pressure at the time of the exam was 121.75 mmHg which after the exam the blood pressure test reached 112.76 mmHg. [7]. Also, Florence L has done a research on the students' blood pressure in two stages, in the first stage three months before the exam and in the second stage one week before the exam; as a result, she found that the approach to the exam time Blood pressure has increased [8]. Also, N. O. Ajayi and his colleagues found that exam stress increases blood pressure [9].

Experiences during exams in Kabul University of Medical Sciences show that a number of students cannot study because of stress and anxiety before and during the exam and cannot properly answer the questions well, whereas they have well prepared for the exam. Researches has been done on the effects of exam stress on students in different countries, but there has been no research on this issue in Afghanistan, so this research has been launched and the results will be shared with the research committee and the students in order to reduce the stress and anxiety during the exams necessary measures should be taken.
This study aims to evaluate the effect of exam stress on blood pressure and heart rate among second grade medical students.

2. Method

This is a cross-sectional study design, which data were obtained from 37 students second grad students of Kabul University of Medical Sciences mean age was (20±1.2) who were randomly selected, 24 were male and 13 were female (Using Raosoft sta tool for sample size calculation). At the beginning, the blood pressure and heart rate of the students were examined before the Anatomy and Histology subjects' exam. Subsequently, the blood pressure and the heart rate of students were also checked with the same blood pressure device and the same examiner after the exam. The right arm of the student was selected for assessing of blood pressure using Mercury blood pressure device (Model He 1101 Germany) and stethoscope (model zhin china).

- **Inclusion criteria:** Students who appears to be healthy, students of classes where physiology is not taught and in the male and female section.
- **Exclusion criteria:** Students who appears to be sick or have fever or hyperthermia, anemia, thyroid disorders, patients who have a history of hypertension, cardio-respiratory diseases, students who take medicine due to illness, or if the student does not want to participate in research.

3. Results

The data in this study was obtained from 37 students of Kabul University of Medical Sciences mean age was (20±1.2). The results of this study shows in Histology subject, (mean ± SD) of systolic and diastolic blood pressure before the exam was (123.5±1.9) and (78.1±1.3), and students' heart rate was found (76.4±1.05) per minute. And systolic and diastolic blood pressure after the exam in the mentioned subject is (114.3±1.7) and (72.1±1.3mmHg), and the heart rate after the exam of the mentioned subject is (75.6±0.9) per minute. Paired T test was used to evaluate the difference between means before and after exam in histology exam which indicate the difference of means of blood pressure before and after exam is statistically significant with (p- value<0.05 CI 95%) and means of heart rate before and after exam indicate that there is no significant changes in heart rate before and after exam with (p- value>0.05 CI 95%). Tab (1). Fig. (1).
In Anatomy subject, (mean± SD) of systolic and diastolic blood pressure before the exam was (123.2±1.6) and (77±1.3), and students' heart rate was found (76.8±1) per minute. And systolic and diastolic blood pressure after the exam in the mentioned subject is (113.5±1.5) and (71.8±1.3mmHg), and the heart rate after the exam of the mentioned subject is (75.9±0.9) per minute. Paired T test was used to evaluate the difference between means before and after exam in histology exam which indicate the difference of means of blood pressure before and after exam is statistically significant with (p- value<0.05 CI 95%) and means of heart rate before and after exam indicate that there is no significant changes in heart rate before and after exam with (p- value>0.05 CI 95%). Tab (1). Fig. (2).

Tab. (1): Shows the descriptive statistics

STAT	ANTOMY						HISTOLOGY					
	SBP BE	**DBP BE**	**SBP AE**	**DBP AE**	**HR BE**	**HR AE**	**SBP BE**	**DBP BE**	**SBP AE**	**DBP AE**	**HR BE**	**HR AE**
Mean	123.2	77.02	113.5	71.8	76.8	75.9	123.5	78.1	114	72.1	76.4	75.6
Standard Error	1.6	1.3	1.5	1.3	1	0.9	1.9	1.3	1.7	1.3	1.05	0.9
Median	120	80	110	70	70	70	120	80	110	70	75	75
Mode	120	80	120	70	70	70	120	80	120	80	70	70
Standard Deviation	9.7	8.1	9.1	8.1	5	5	12.06	8.4	10.4	8.2	6.4	5.6

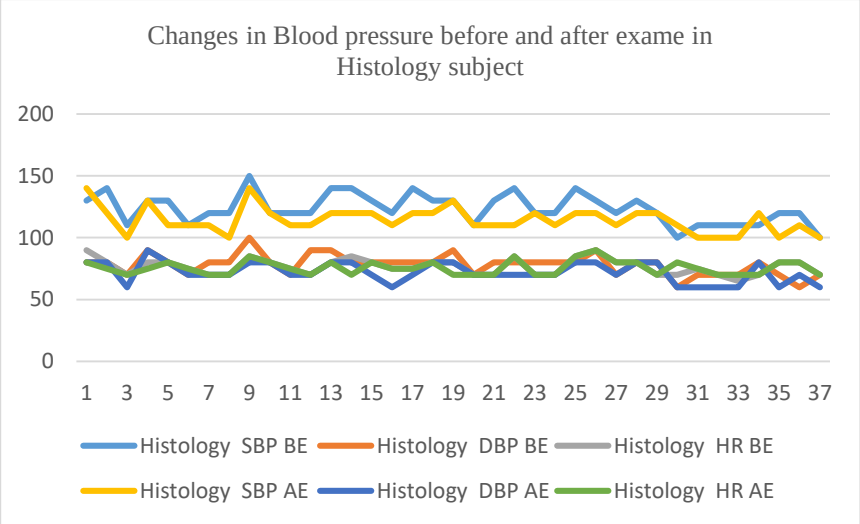

Fig (1) shows the changes in blood pressure before and after exam in Histology subject

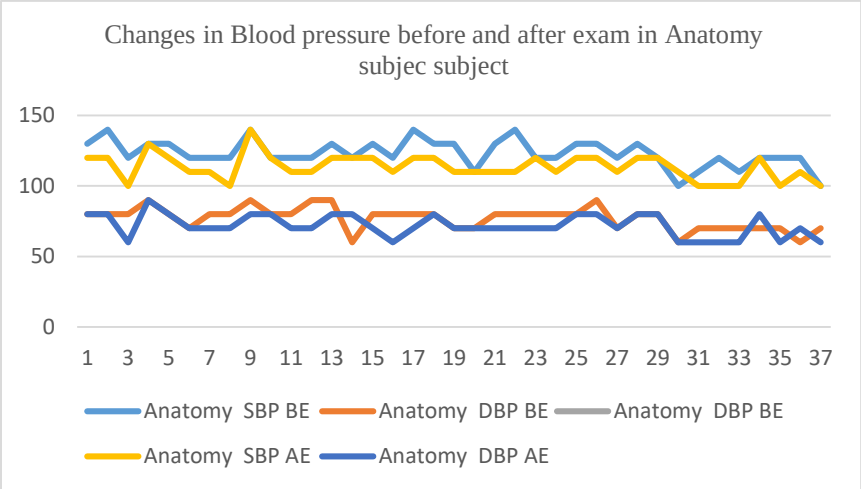

Fig (2) shows the changes in blood pressure before and after exam in Anatomy subject

4. Discussion

The research highlights the physiological impact of exam stress on students, particularly focusing on increases in blood pressure and heart rate. This aligns with findings from several .Andreas Zeller and his colleagues conducted a study on 121 doctors who were about to pass the final exam of the medical council, which shows that their blood pressure increased during the exam compared to the time before the exam [5].

Also, the results of the research by Zhihong Zhang and his colleagues on 64 students also show an increase in blood pressure during the exam compared to the time before the exam [6]. Another research conducted by Thanler Alves De Oliveira and his colleagues on 109 medical students shows that the blood pressure at the time of the exam was 121.75 mmHg, which after the exam the blood pressure test reached 112.76 mmHg, [7]. Florence L has also done research on the same purpose, she checked the blood pressure of the students in two stages, in the first stage, three months before the exam and in the second stage, one week before the exam, as a result, she found that the approach of the exam time causes an increase in blood pressure [8]. Also, N. O. Ajayi and his colleagues found that exam stress causes increase of blood pressure [9]. This studies underline the importance of addressing exam stress as a public health concern. Educational institutions might consider implementing stress management programs to help students cope better, potentially improving both their academic performance and overall health. However, small sample size may be a limitation of this study. Future

research should involve a larger group and diverse themes for more comprehensive results

5. Conclusion

Overall, the body of research confirms that exam stress significantly affects cardiovascular parameters, emphasizing the need for strategies to mitigate these effects.

Ethical approval: The research proposal of this study was accepted by research committee of KUMS and all ethical issues war observed in this study. The informed consent from all individuals.
Was obtained.

Declaration of interest: The authors declare that they have no interest for publication of this work.

References

[1]. John E, Hall, Arthur, C. Guyton. The circulation, blood pressure. In: Textbook of medical physiology. 13th ed. New York: Elsevier; 2016. p. 174-178.

[2]. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. JAMA. 2003;289:2560-72.

[3]. Ramchandran S, Vasan M, Martin G, Larson E, Leip P, Chrestopher J, et al. Impact of high-normal blood pressure on the risk of cardiovascular disease. N Engl J Med. 2001;345(18):1291-7. doi: 10.1056/NEJMoa003417.

[4]. Michael S. Systemic hypertension. In: Current medical diagnosis and treatment. 55th ed. New York: Lange Medical; 2018. p. 437-440.

[5]. Zeller A, Handschin D, Gyr N, Martina B, Battegay E. Blood pressure and heart rate of students undergoing a medical licensing examination. Scand J Prim Health Care. 2004;22(2):101-5. doi: 10.1080/08037050310026645.

[6]. Zhang Z, Su H, Peng Q, Yang Q, Cheng X. Exam anxiety induces significant blood pressure and heart rate increase in college students. J Occup Health. 2011;53(6):485-90. doi: 10.3139/10641963.2010.531850.

[7]. Oliveira T, Rosa K, Nunes O, Oliveira G, Manzi F. Does the stress of exams influence medical students' blood pressure? A longitudinal study. Gen Med (Los Angeles). 2018;6(1):1-5.

[8]. Banik U, Basanti N, Th P, Devi M. Effect of pre-examination stress on blood pressure and pulse rate of undergraduate medical students. J Dent Med Sci. 2014;13(12):101-3.

[9]. Ajayi NO, Adegboro JS. Effect of examination stress on the blood pressure of secondary school students in Oroke High School. Eur J Med Health Sci. 2020;2(3):1-5.