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A PROSPECTIVE STUDY OF EFFECT OF PRE-EXAMINATION STRESS ON PULSE RATE AND BLOOD PRESSURE OF FIRST YEAR UNDER GRADUATE MEDICAL STUDENTS

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Abstract

Introduction: The modern age has been called the age of anxiety. All things, events, conditions or situations that demand a change or adjustment in the physical and emotional functions are termed as stressors. Examination that is a specific stressor. Medical students are usually under stress due to a variety of reasons like vast curriculum, academic competition, examinations etc. During these stressful situations there might be increase in anxiety level and sympathetic discharge. The study of Medicine is extensive, time-consuming and very stressful. In every five-years study period students are subjected to endless working hours, and exams add an extra stress quotient.

Materials and methods: The present study was carried out at Govt Medical College, Nandyal among the 1st MBBS students of 2022-2023 batch. 150 students participated in the study. Three months prior to the academic examination, the BP of the students were recorded using mercury sphygmomanometer in sitting position, Pulse rate by counting one minute during the practical class i.e 2-4 p.m for the control. Then, one week prior to academic examination, the students were invited to come to the department in groups within four days during the practical class hour. After explaining the purpose of the study, height in centimeter, weight in kilogram, were recorded using standardized weighing machine and height measuring scale. The BP was again recorded using mercury sphygmomanometer and also the pulse rate.

Results: The mean age of the student was 20.52 ±1.013 yrs. Out of 100 students, 66.31 % were boys and 33.68 % were girls. The systolic blood pressure for all individual when there was no exam was 112.50±4.90 mmHg while during pre- examination, it rose to 120.07±11.70 mm Hg (P= < 0.0001). The diastolic blood pressure record when there was no exam was 72.19±3.60mm Hg, while near exam it was 71.5±6.61 mmHg with no significant difference for all the individuals.

Conclusion: Majority of the undergraduate medical students were observed to be under stressed prior to examination. Stress produced a significant elevation in the systolic blood pressure as

well as the pulse rate among the students. This alteration can be controlled by the systemic defense mechanism that are naturally present in our body. Students can be recommended relaxation techniques like meditation, yoga, breathing exercises, appropriate diet and physical exercises. Counseling sessions could be provided to overcome stress.

Key Words: anxiety, sphygmomanometer, diastolic blood pressure, Systolic blood pressure.

INTRODUCTION

The modern age has been called the age of anxiety. All things, events, conditions or situations that demand a change or adjustment in the physical and emotional functions are termed as stressors.[1] Examination that is a specific stressor. Medical students are usually under stress due to a variety of reasons like vast curriculum, academic competition, examinations etc. During these stressful situations there might be increase in anxiety level and sympathetic discharge. The study of Medicine is extensive, time-consuming and very stressful. In every five-years study period students are subjected to endless working hours, and exams add an extra stress quotient.[2]

Studies indicate that medical students face unique academic challenges that make them more vulnerable to stress and anxiety than students in other faculties. The time of academic examinations is a known model of mental stress in students, as performance in examinations determines their future prospects. Several studies have reported changes in markers of stress in students during the time of examinations.[3]

Physiological studies have shown that stress from any source can influence on the endocrine, haemopoietic and immune systems. Psychological stress increases the activity of hypothalamic-pituitary-adrenocortical (HPA) axis leading to increase circulating levels of glucocorticoids.[4] Hypothalamic-pituitary-adrenocortical (HPA) axis that includes sympathetic activation leading to changes in heart rate, blood pressure, rate and depth of respiration, body temperature, reaction time, galvanic skin resistance.[5] This study was undertaken to observe the influence of examination stress on blood pressure and pulse rate on students undergoing academic Examination particularly the 1st MBBS students.

MATERIALS AND METHODS

Study design: A prospective study.

Study Duration: January 2023 to November 2023.

Study location: Govt Medical College, Nandyal.

The present study was carried out at Govt Medical College, Nandyal among the 1st MBBS students of 2022-2023 batch. 150 students participated in the study. Three months prior to the academic examination, the BP of the students were recorded using mercury sphygmomanometer in sitting position, Pulse rate by counting one minute during the practical class i.e 2-4 p.m for the

control. Then, one week prior to academic examination, the students were invited to come to the department in groups within four days during the practical class hour. After explaining the purpose of the study, height in centimeter, weight in kilogram, were recorded using standardized weighing machine and height measuring scale. The BP was again recorded using mercury sphygmomanometer and also the pulse rate. Some of the students do not turn up in the department for the measurement saying that they have to study a lot for the coming examination. The data collected was analyzed using Student's t- test. Significant values were recorded at a level where $p<0.05$.

RESULTS

The mean age of the student was 20.52 ±1.013 yrs. Out of 100 students, 66.31 % were boys and 33.68 % were girls.

The systolic blood pressure for all individual when there was no exam was 112.50±4.90 mmHg while during pre- examination, it rose to 120.07±11.70 mm Hg (P= < 0.0001). The diastolic blood pressure record when there was no exam was 72.19±3.60mm Hg, while near exam it was 71.5±6.61 mmHg with no significant difference for all the individuals.

Total number of 100 males participated in the study and the pre-examination record of the systolic BP was 119.77 ± 11.83 mm Hg while it was 112.31 ± 5.06 mmHg during no examination (P= <0.0001). The diastolic BP for males was not significantly altered in the pre-examination with that of the record during no examination. The systolic pre-examination record for females was 120.71 ± 11.4 mmHg while it was 113.12 ± 4.65 mmHg when there was no exam (P= <0.0001).The diastolic blood pressure for females was also not significantly altered as in males (P= > 0.05)

Demographic variable	**Population particulars**	**Boys**	**Girls**	**Total**
		N (%)	**N (%)**	**N (%)**
Weight of students(Kgs)	40-50	-	18 (36%)	18 (12%)
	51-60	46 (46%)	32 (66%)	78 (53%)
	61-70	54 (54%)	-	54 (36%)
		100	50	150 (100%)
Heights of students (Cms)	140-150	-	8 (16%)	8 (5.33%)
	151-160	10 (10%)	30 (60%)	40 (36.66%)
	161-170	80 (85%)	10 (20%)	90 (60%)
	171-180	10 (10%)	-	10 (6.6%)
	Total	100	50	150 (100%)

Table 1: Age distribution

BMI (Kg/m²)	Boys		Girls		Total	
	N	%	N	%	N	%
16-18.5	-	-	-	-	-	-
18.5-25	100	100	50	50	150	100
25-30	-	-	-	-	-	-

Table 2: Sex wise distribution of the students according to Body Mass Index (BMI)

Parameters		Females (n=50) Mean ± SD	P Value	Males (n=100) Mean ± SD	P Value	Total (n=95) Mean ± SD	P Value
Pulse rate	No Exam	72.10 ± 2.10	0.001	72.25±2.80	0.001	72.21±2.60	0.001
	Pre Exam	80.20 ± 6.70		80.70±7.40		80.60±7.20	
SBP	No Exam	113.10±4.50	0.001	112.21±5.10	0.001	112.50±4.90	0.001
	Pre Exam	120.60±11.5		119.70±11.80		120.07±11.70	
DBP	No Exam	72.65±3.80	0.001	71.91±3.67	0.001	72.19±3.60	0.05
	Pre Exam	71.80±6.30		71.35±6.80		71.5±6.61	

Table 3: Systolic blood pressure, Diastolic blood pressure and Pulse rate records in students

DISCUSSION

Stress is a condition that puts mind in a state of fear or anxiety. Stressors can be physical conditions such as heat or inflammation, exercise, etc. or psychological like examination, interview, etc [8] (2006). Pre-examination stress is one of the most widely suffered problems in medical students throughout the world.[6] MBBS students are at more stress as they are exposed to professional course first time in their life with a lot of expectations. The students of 1st year M.B.B.S. probably face a major stress especially during the 1st term credit examination.[7]

This study supports many findings of the previous studies in that majority of the medical students experience some levels of anxiety before examinations.

The systolic blood pressure was significantly higher in the pre-examination period than the record when there was no exam. This could be explained by the stimulation of the adrenergic nervous system that lead to release of catecholamine in particular nor-adrenaline at the post synaptic neuron and adrenaline or epinephrine from adrenal medulla that result in activation of $\alpha 1$,$\beta 1$ and $\beta 2$ receptors consequently elevation of systolic blood pressure.[8]

The diastolic blood pressure which is considered as the minimum pressure during the ventricular diastole and its normal range is 60-90 mmHg with an average of 90 mmHg in adults was within the normal value with the pre-examination period and the period when there was no exam.

The present study observed a significant increase in pulse rate near the examination (P= <0.0001).The significant increase in both systolic blood pressure and pulse rate observed prior to exam possibly as a result of Effect of Pre-Examination Stress on Blood Pressure and Pulse Rate of sympathetic activation. This is in consistent with the findings of Freychuss et al and Malathi et al who contributed it to increased epinephrine levels.[9]

The dropping of the systolic blood pressure once the student complete his or her examination can be explained that the reduction results from decreased in peripheral arteriolar resistance and or cardiac output by a variety of mechanism at a variety of sites such as : Dilatation of resistance vessels, the heart pumps against lower resistance. Dilatation of capacitance vessels, reduction of venous return to the heart to reduce cardiac output. Reduction of sympathetic drive to the heart leads to lower cardiac output especially in response to stress.[10]

CONCLUSION

Majority of the undergraduate medical students were observed to be under stressed prior to examination. Stress produced a significant elevation in the systolic blood pressure as well as the pulse rate among the students .This alteration can be controlled by the systemic defense mechanism that are naturally present in our body. Students can be recommended relaxation techniques like meditation, yoga, breathing exercises, appropriate diet and physical exercises. Counseling sessions could be provided to overcome stress.

REFERENCES

1. Hashmat S, Hashmat M, Amanullah F, Aziz S. Factors causing exam anxiety in medical students. Pak Med Assoc 2008;54 : 167-170.
2. Pradhan G, Mendonca NL, Sahajanand S, Vardhan VG, Jayaranjan P, Rekha KN. Does appearing for exam cause stress? Evaluation the stress status among MBBS students influence of examination. Intl J Health Sc & Res 2013;3:38-42.
3. Freychuss U, Hjemdahl P, Juhlin Dannfelt A, Linde B.Cardiovascular & Sympathoadrenal responses to mental stress- Influence of β- Blockade. Am J Physiol 1998;255: 1443-51.
4. Parkerson GR Jr, Broadhead WE, Tse CK. The health status and life satisfaction of the first year medical students. Acad Med 1990;65: 586-8.
5. Rosal MC, Ockene IS, Ockene JK, Barret SV,Ma Y, Hebert JR.A longitudinal study of students depression at one medical school. Acad Med 1997;72:542-8.

6. Shaikh BT, Kahloon A, Kazim M,Khalid H, Nawaz K, Khan N et al.Students,stress and coping strategies: a case of Pakistani medical school. Educ Health(Abingdon) 2004;17:346-53.
7. Siapanish R. Stress among medical students in a Thai medical school. Med Teach 2003;25:502-6.
8. Al-Sandook TA, AL- Nuaimy Karama MT, Al- Saffar MT. Effect of stress on arterial blood pressure in dental students. Al-Rafidain Dent J 2007;7:118-21.
9. Kathrotia R, Kakaiya M, Parmar D,Vidja K, Sakariya K, Mehta N. Variable response of 1st MBBS students to exam stress.NJIRM 2010;1:1-4.
10. Malathi A, Vidhya G Parulkar. Evaluation of anxiety status in medical students prior to examination stress. Indian J Physiol Pharmacol1992;36:121-22.