

Original Research Article

## Assessment of physiological parameters in medical graduates under examination stress

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**Abstract:** Medical graduates experiencing stress at various phases of academic activities. Pre examination stress is so happening condition among medical graduates. Several studies have been conducted, still it is poorly understood that which changes are specific to stress. This study carried out to assess the physiological parameters in medical students under examination stress. A total 120 exam going medical students and 60 age, sex matched control subjects were included. Pulse rate in exam stress shows a raise before examination (90.1) and quite less after examination (84.2). Diastolic Blood pressure rises significantly after exams (80.06). Systolic blood pressure shows a raise before examination (134.8) and quite less after examination (127.9). Respiratory rate was high in before examination (18.02) and significantly decreased after examination (14.79). There was significant rise in pulse rate, systolic blood pressure and diastolic blood pressure in before examination. Total red blood cells and leucocytes were significantly more in before exam and reduced after examination.

**Keywords:** Pre examination stress, Pulse rate, systolic blood pressure (SBP) and diastolic blood pressure (DBP), Respiratory rate

### INTRODUCTION

The journey of medical students is highly extensive and stressful due to a vast and complex medical curriculum they undergo. Stress is a condition that arouse anxiety or fear [1]. The main cause of stress in medical students is abrupt change from pre university courses to medical profession, moulding themselves in to new professional life and at the time of academic examination[2].

Stress can affect the physiological parameters includes increase in RBC, platelets and neutrophils count whereas eosinophils, lymphocytes and monocytes are decrease in number. Physiological studies have suggested that stress from any kind can influence the immune system, hemopoietic and endocrine systems[3].

Pre examination stress is a most common condition faced by all medical students. Several studies found the changes in stress markers in students during examination sessions [4,6]. Still it is poorly understood that which changes are specific to stress, is it all

physiological parameters undergo same level of changes in all stressors. Hence, the present study designed to assess the physiological parameters in medical students under examination stress.

### MATERIALS AND METHODS

The present study was conducted in Department of Physiology, Alluri sitaramaraju academy of medical sciences, Eluru during December 2015 to January 2017. A total 120 Healthy students of 17-21 years age group appearing for examination and 60 age and sex matched control subjects who did not appearing for any kind of examination were considered. Healthy students without chronic illness were included. Informed consent was obtained from all the students. Pulse and blood pressure was measured, for analysis of data in students taking exams that is both before and after exams.

Blood sample was collected under aseptic conditions in to EDTA tubes. Counting of RBC, Leucocytes and platelets was done by using neubaure chamber. Red blood cells (RBC) were counted by making 1:200

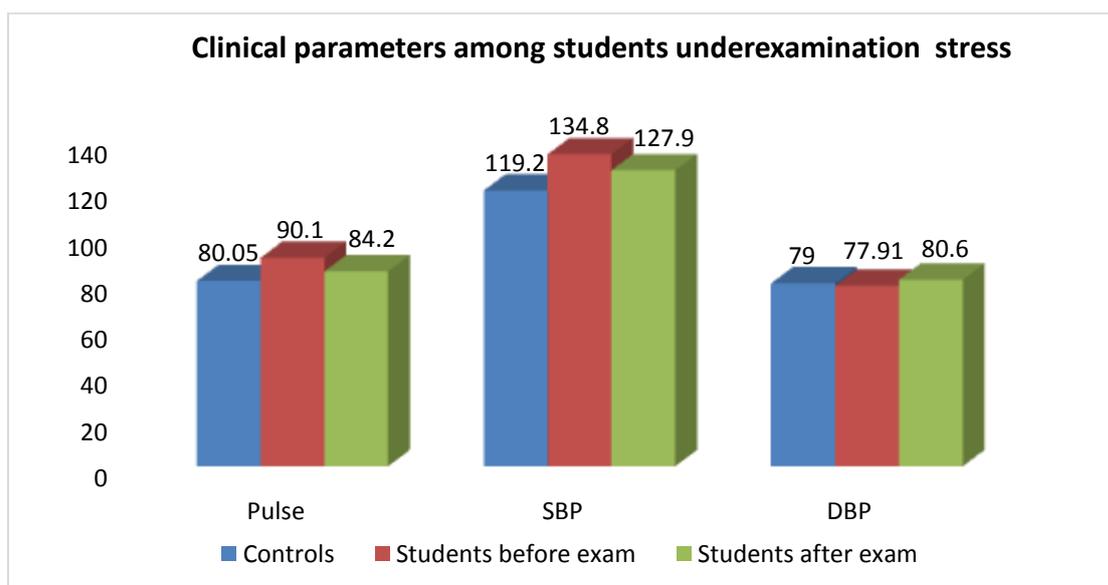
dilution of blood hymen's solution. Leucocytes count was done by making 1:20 dilution in Thomas solution. Counting of platelets was carried out making 1:20 dilution with 1% ammonium oxalate solution. For differential leucocytes count, blood film were stained with Wright's stain.

**RESULTS**

A total 120 medical students with 60 age, sex matched controls were included in this study. All study participants were between age group of 17-21 years.

**Table 1. Hematological parameters in medical students and controls before and after examination.**

Parameters	Control	Before Exam
Neutrophils (%)	61.01 ± 7.12	66.74 ± 2.62
Leucocytes (%)	29.81 ± 7.02	22.89 ± 2.49
Monocytes (%)	5.45 ± 0.99	6.03 ± 0.82
Eosinophils (%)	4.48 ± 1.72	4.52 ± 0.72
Basophils (%)	0 ± 0	0 ± 0
Hemoglobin (gm %)	14 ± 1.91	13.52 ± 1.54
TLC/cumm	8452 ± 1893.2	9028 ± 1438.4
TEC/cumm	288.3 ± 59.69	361.5 ± 39.1
TRBC (mi/cumm)	4.6 ± 0.91	4.71 ± 0.84



**Fig-1: Clinical parameters in medical students and controls before and after examination**

**Table 3. Hematological parameters in medical students and controls before and after examination.**

Parameters	Controls	After Exam
Neutrophils (%)	61.01 ± 7.12	68.1 ± 4.22
Leucocytes (%)	29.81 ± 7.02	23.8 ± 4.53
Monocytes (%)	5.45 ± 0.99	4.99 ± 1.18
Eosinophils (%)	4.48 ± 1.72	4.01 ± 0.81
Basophils (%)	0 ± 0	0 ± 0
Hemoglobin (gm %)	14 ± 1.91	13.8 ± 0.99
TLC/cumm	8452 ± 1893.2	9834.4 ± 1080.34
TEC/cumm	288.3 ± 59.69	293.7 ± 24.80
TRBC (mi/cumm)	4.6 ± 0.91	4.2 ± 0.62

**Table 4: Effect of examination stress on respiratory rate of medical students and controls before and after examination.**

Parameters	Controls	Before Exam	After Exam
Respiratory rate	13.98 ± 2.82	18.02 ± 2.11	14.79 ± 1.81

**DISCUSSION**

Stress is a condition that puts mind in a state of anxiety. Exams in medical schools are particularly stressful as they involve much study and also that the results do affect the future study or training of the student. Pre examination stress is most common among the students especially in medical field, globally. Fresh medical students are commonly under stress as they are exposed to professional course for the first in their life time. So, Fresh medical students probably face a major stress especially during university examination [7,9]. The present study on Physiological Parameters in fresh medical students of M.B.B.S. undergoing University exams. Clinical and physiological data was collected during both pre-examination and post-exam.

The physiological mechanism in stressful conditions viz. Hypothalamus acts on Adrenal glands to produce adrenalin and cortisol and release them in to the blood stream, which leads to increases the heart rate, breathe rate, BP and metabolism.

The clinical parameter like pulse rate in exam stress shows a raise before examination (90.1) and quite less after examination (84.2). Increase in pulse rate and blood pressure is important sympatho-adrenal responses to physiological stressful experience [10]. Diastolic Blood pressure rises significantly after exams (80.06). Systolic blood pressure shows a raise before examination (134.8) and quite less after examination (127.9). These results are similar to the findings of Frey schuss et al (1988) who attributed this to increased epinephrine secretion and findings of other studies [11,13]. Increased levels of plasma epinephrine and nor-epinephrine during stress by their action on beta receptors of heart increases heart rate and systolic blood pressure [14-17].

Deshpande et al observed significant increase in heart rate and shortening of reaction time subsequent to a viva-voce examination. Results similar to present observations have also been reported by shukla et al, Hazlet et al, Siegel ova and Boregowda wherein significant increase in Pulse rate and blood-pressure is seen in students during mental stress [18].

Stress of academic examinations also significantly affects the erythron variables. There is increase in

number of large red blood cells with increased hemoglobin, which cannot be explained by shifts of fluid out of the intravascular space, concentrating non-diffusible blood constituents [19]. Stress can influence on the endocrine, hemopoietic and immune systems by cytokines and cortisol mechanism [20].

**CONCLUSION**

Physiological stress may increase symphoadrenal activity which leads in to rise in heart rate and blood pressure. Pulse rate in exam stress shows a raise before than after examination. Diastolic Blood pressure rises significantly after examination. Systolic blood pressure shows a raise before examination than after examination. Leucocytes was significantly more in before examination and decreased after exams.

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