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Original Research Article

Does Appearing for Exams Cause Stress? Evaluation the Stress Status among MBBS Students Influence of Examinations

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ABSTRACT

Students find the medical curriculum stressful and it has been shown in the most physiological studies. This study aims to assess the stress and correlation between stress levels and cardiovascular parameters, reaction times prior to their final internal assessment examination. The present study was carried out at Rajarajeswari medical college and hospital, Bangalore. A total of 230 healthy MBBS students were recruited, study group - 130 MBBS students appearing for their final internal assessment examination and control group - 100 MBBS students who did not have any examination. Subjects who had any medical and psychiatric illnesses, auditory and visual disturbance, smokers, with h/o alcohol intake were excluded. Students Stress Questionnaires were distributed first to all the students. Anthropometry was done. Pulse rate and blood pressure were recorded by palpating and sphygmomanometer respectively. Auditory and visual reaction times were recorded by using reaction time apparatus prior to their internal assessment examination. Approval from the Institutional ethical committee and written consent was obtained. Statistical analysis was done by using SAS 9.2, SPSS 15.0 software. Pulse rate, systolic and diastolic blood pressure, auditory and visual reaction time and stress scores were significantly increased in the study group as compared to control group prior to their examination. Our study showed positive correlation between stress score and age which was statistically significant.

Conclusion: It was observed that medical students are exposed to stress especially before the internal examination. Changes were seen in cardiovascular parameters and cognitive function which may affect their academic performance.

Key words: stress, cardiovascular parameters, auditory reaction time, visual reaction time.

INTRODUCTION

The curriculum studied by medical students is vast and the time in which they have to complete their studies is short, therefore medical students are thought to be under stress, especially before their examinations. Numerous studies have proved that compared to the general population medical students are the most distressed.[1]

Studies have confirmed that stress is highly prevalent among undergraduate

medical students.[2] Earlier studies have classified stressors into three categories: academic pressures, social issues and financial problems,[3] with academic issues being more stressful than non – academic one for the 1st MBBS students.[4] Stress of any form is known to produces definable mental and physiological reactions in the body like alterations in different biological functions, especially the heart rate and blood pressure.[5,6] Several other changes also occur in the human body which may be hormonal, immunological, psychological and behavioural in the time period followed by exam.[7]

There is highly significant difference between before and at the time of examination in vital meters like pulse rate, SBP, DBP due to examination stress.[8,9] Though in majority the pulse rate and blood pressure were significantly higher before examinations, there was no significant change in the electrocardiographic recordings, but there was significant correlation between the pulse rate and auditory reaction time (ART).[10]

Prolonged reaction time indicates that the consciousness and coordination of the subject is slow due to factors like stress, gender and arousal, hence it is a common practice to use reaction time as a tool to find out the effects of stress on cognitive function.[11,12] Many physiological studies have shown that stress can affect the cardiovascular parameter as well as cognitive function. Unlike the west, Indian researchers have not focused on this topic. A thorough understanding of this will help the educators to make exams less stressful to the students.

The objectives of our study were:

1. To assess the stress status among MBBS students prior to the third internal assessment examination.
2. To determine the correlation of anthropometry, cardio vascular parameters like (PR, SBP, DBP), auditory and visual reaction time (VRT) with their stress scores.

MATERIALS AND METHODS

The study was conducted in the department of Physiology, Rajarajeswari medical college and hospital, Bangalore, during the period of one year (May 2012 and May 2013). Approval from the Institutional Ethical Committee and written informed consent was obtained. A total of 230 healthy MBBS students, in the age group of 18-21 years were selected of whom 130 were appearing for their final internal assessment examination (study group) and 100 did not have any examination (control group). All students who had medical or psychiatric illnesses and those having auditory or visual disturbances were excluded from the current study.

All the students were asked come to the research laboratory at 8.45am prior to internal assessment examination without having any kind of caffeinated drinks like coffee or tea and were asked to rest for 15 minutes. In the experimental sessions, student's Stress Questionnaire, having 20 questions, was given to all the students to assess their stress score. The scores were interpreted as, 0-20: Good control over stress, 21-40: Low level of stress, 41-60: Medium level of stress, 60-80: High level of stress. Anthropometric measures like weight in kilograms and height in centimeters were done using standardised weighing machine and height measurement scale. The cardiovascular parameters like pulse rate (beats/min) and Blood Pressure (mmHg) were recorded in supine position by palpating radial artery and sphygmomanometer respectively. The Auditory and Visual Reaction time was recorded by using an in house built PC 1000 device with a 1000 Hertz square wave oscillator in quite surroundings in research

laboratory. A signal marker blue light for visual reaction time(VRT) with one tapping key and a signal marker sound for auditory reaction time(ART) with one tapping key and was connected to PC. ART and VRT were reported in milliseconds.

Statistical analysis: The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data. Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%).

A total 230 students enrolled in the study, 130 students selected for study group (male were 55 and 75 were female) and 100 were in control group (50 were male and 50 were female). TABLE I shows that anthropometry (age, height, weight and BMI) between two groups which is not statistically significant. TABLE II shows that the PR, SBP, ART and VRT are increased significantly in study group as compared to control group. The DBP and Stress score is also increased in study group but shows suggestive significant. TABLE III shows that the correlation between stress score and age statistically significant and negative correlation shows between stress score and DBP but suggestively significant.

RESULTS

TABLE I: Anthropometry between the two groups.

Parameters	Study group (n=130)	Control group (n=100)	P value
Age	18.33±0.62	18.90±1.19	0.248
Height	163.5±8.40	165.7±11.45	0.100
Weight	60.86±13.40	63.53±16.06	0.171
BMI	23.98±6.99	21.83±4.25	0.600

Data is mean±SD. Considered significant is *P<0.05; **P<0.01;
BMI-body mass index.

TABLE I shows that anthropometry (age, height, weight and Body Mass Index) between two groups which is not statistically significant.

TABLE II: Comparison of PR, SBP, DBP, Stress score, ART and VRT in two groups.

Parameters	Study group (n=130)	Control group (n=100)	P value
Pulse rate (beats/min)	86.60±12.13	78.41±12.84	<0.001**
Systolic blood pressure (mmHg)	125.45±10.99	119.16±10.14	<0.001**
Diastolic blood pressure (mmHg)	77.64±10.66	75.29±8.08	0.068+
Auditory reaction time (msec)	184.15±33.93	167.73±29.79	<0.001**
Visual reaction time (msec)	215.29±30.67	192.49±31.53	<0.001**
Stress score	27.01±9.46	24.87±7.85	0.068+

Data is mean±SD. Considered significant is *P<0.05; **P<0.01; +P value: 0.05<P<0.10

TABLE II shows that the PR, SBP, ART and VRT are increased significantly in study group as compared to control group. The DBP and Stress score is also increased in study group but shows suggestive significant.

TABLE III: Pearson correlation between Stress score (SS) verses anthropometry, cardiovascular parameters and reaction times.

Pair	Study group (n=130)		Control group (n=100)	
	r value	P value	r value	P value
SS Vs Age	0.339	<0.001**	0.150	0.137
SS Vs Height(cm)	-0.080	0.365	0.201	0.045*
SS Vs wt(kg)	0.059	0.505	0.113	0.261
SS Vs BMI(kg/+m2)	0.113	0.202	0.013	0.887
SS Vs PR(beats/min)	-0.127	0.151	-0.086	0.397
SS Vs SBP(mmhg)	-0.108	0.223	0.041	0.687
SS Vs DBP(mmgh)	-0168	0.057+	0.024	0.810
SS Vs ART(msec)	-0.124	0.160	0.108	0.287
SS Vs VRT(msec)	-0.159	0.072	-0.051	0.617

Data is mean±SD. Considered significant is *P<0.05; **P<0.01; +P value: 0.05<P<0.10

PR: Pulse rate, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, ART: Auditory reaction time, VRT: Visual reaction time

TABLE III shows that the correlation between stress score and age statistically significant and negative correlation shows between stress score and DBP but suggestively significant.

DISCUSSION

The present study showed that there was a significant increase in PR, SBP, and DBP in study group. This possibly was a result of increased sympathetic activation. This is consistent with the findings of those workers who thought that it was caused by increased epinephrine levels.[8,9,13] Various hormone secretions are increased in the presence of stressors like an examination where the outcome is unpredictable. This sympatho-adrenal response to stressful situation occurs in various forms including a raised PR and BP.[13-15]

Our study showed that the both ART and VRT were significantly prolonged in the study group. High levels of stress are known to affect cognitive function. It has an impact on concentration, memory and learning. It is proposed that stress affects cognitive functions via epinephrine and more slowly through glucocorticoid.[16] On the contrary observations were found where ART decreased prior to an examination.[8] Stress is a psycho-physiological arousal occurring in the body as a result of a stimulus which becomes a stressor by virtue of the cognitive function of the individual.[17] Stress (physiological and psychological) acting through the sympathetic nervous system and brain-pituitary-adrenocortical axis affects decision making and attention. Some of these factors could be altering the reaction time either directly or indirectly.

In the current study stress scores were significantly increased in the study group as compared to the control group. Similar findings were observed in medical students prior to practical examination.[6] Various studies have reported high levels of stress and psychological morbidity among medical students.[18] Many previous studies conducted on stress reveals that the prevalence of stress among MBBS students ranges from 30%-50 %.[19] This level is high in comparison to other study courses. One study showed that stress prevalence was higher among 1st year MBBS students and diminishes progressively by fourth year.[20] Many studies have confirmed that there is considerable amount of stress among medical student which is common and process oriented.[4,12,21]

Current literatures have not been able to establish extensively the correlation between stress and age, height, weight, BMI, PR, SBP, DBP, ART and VRT. Our study has shown the positive correlated between the stress and age and negative correlated between stress and DBP in study group which is a statistically significant. This positive correlated between age and stress could be due to the fact that age alters one's cognitive processing. The negative correlation between stress levels and DBP could be due to the action of epinephrine via beta receptor which needs further exploration.

CONCLUSION

As per our observation, the stress levels are high prior to examination which produces changes in cardiovascular parameters as well as cognitive function. It is important to take necessary steps to reduce the stress level so that there is improvement in academic performance. Different strategies can be used including mentoring, yoga, meditation, counselling (teenage issues, difficulties in studying), workshop also can be organized on personality development, achievement, stress and time management to reduce the stress levels.

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