

## Simple Exercise Tolerance in Male 1st Year MBBS Students- a probable indirect effect of mental stress

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**Abstract:** Mental stress in medical students is a global phenomenon. In the present study searching for any indirect effect of mental stress we measured mental stress level through SRQ 20 and also the resting pulse rate, BP and ECG tracings of 158 medical students (cases) and 165 students pursuing non professional academic courses (controls), all of whom were found healthy through detailed clinical examination. We then allowed them to exercise on bicycle ergometer with maximal speed for 30 minutes. We again measured pulse rate BP and ECG tracings 5 minutes after exercise. There were significant increases in pulse rate, BP and decrease in RR intervals in ECG in both cases and controls post exercise, but there was significant increase in pre & post exercise pulse rate, BP & decrease in RR intervals in cases as compared to controls. Moreover there was strongly positive co-relation in between mental stress scores and pulse rate and SBP in cases. Both of these findings indicate that mental stress is actually attributable for higher pulse rate, SBP and decreased RR intervals in cases.

**Keywords:** Mental Stress, SBP, DBP, Pulse rate, RR interval

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### I. Introduction

Mental stress in medical students is observed in different studies across the globe. Stress level measured by general health questionnaire, were assessed in 4th year medical students at British universities. Mean scores were higher than other groups within the general population without any sex differences (1). Medical students at the University of Oslo reported a lower level of general self-esteem than the general population. The male students reported more nervous symptoms and a less general self-esteem than the female students compared with the general population (2). Medical students in the Faculty of Medicine, Ramathibodi Hospital, Thailand underwent Thai Stress Test (TST). The results showed that majority of students had some degree of stress. The prevalence of stress is highest among third-year medical students (3). A cross-sectional study conducted among medical students, selected by stratified random sampling method with Modified Life Events Inventory (LEI) questionnaire among 3rd year MBBS students at SVMCH & RC, Ariyur, Puducherry, India showed that the majority of medical students suffered from mental stress without any appreciable sex difference(4).

The present study is aimed at observing any effect of mental stress on simple cardiovascular parameters both pre and post exercise on medical students as compared to similar students in non professional streams of academic curricula.

### II. Methodology

1<sup>st</sup> year medical students belonging to three separate batches of three consecutive years 2013,2014 & 2015, residing at college hostels in Burdwan Medical College, Burdwan, India were taken as cases & were compared to nearly equal no. of similar students pursuing general academic courses like BA, BSc, BCom. etc in different colleges in Burdwan city, who were considered as controls. Hostler students at the end of 1<sup>st</sup> year have been chosen for relatively easy availability & exposure to greater amount of stress due to staying away from home. Male students were chosen because of much higher incidence of cardiovascular illnesses than in reproductive age female (5).

At first all the students underwent detailed general & systemic clinical examination with elicitation of detailed clinical history to detect the presence of any existing serious illnesses & addictions which were the exclusion criteria. 158 MBBS and 165 other healthy students who were free from addictions were chosen for the study.

All of the selected students were given simple stress questionnaire (WHO SRQ 20) (6) & mean values of stress scores were determined both for cases & controls. Every student was then asked to exercise on the

bicycle ergometer model no. E50-E400HK COSMED with maximal speed for 30 minutes. Their pulse rate, blood pressure & ECG tracings were recorded both pre & 5 minutes post exercise. ECG tracings were recorded using BPL CARDIART 6108T ECG Machine. Results obtained were then analyzed using paired t test, student's independent t test & Pearson's co-relation study.

### III. Results and Discussions

This study has grossly showed that the exercise performed by the students is of moderate in nature as per the guidelines led by Qureshi IA. (7). There is significant increase in pulse rate & systolic blood pressure in both cases & controls immediately after exercise with strongly positive co-relation, whereas there is no significant increase in diastolic blood pressure. These are in accordance with findings of Pescatello et al (8). As healthy subjects has minimal pulse deficits even after most strenuous exercise, RR interval in ECG reflecting heart rate remains almost parallel to pulse rate & the change in values of RR intervals after exercise also remains significant.

The most interesting finding of this study is that the pre exercise pulse rate, RR interval & systolic blood pressure in cases and their proportionate increase immediate post exercise are greater than the corresponding values in controls. These parameters in cases also bear strongly positive co-relation with mean stress scores. So the changes in pulse/heart rate and systolic blood pressure in cases can well be attributed to as an indirect effect of greater mental stress. As post exercise changes of heart rate and blood pressure are directly proportional to future incidence of cardiovascular diseases as per findings of Miyai et al (9), Erikssen et al (10), Arena et al (11) & **Mégnyen et al (12)**, it can be concluded that MBBS students are exposed to increased risk for development of future cardiovascular diseases owing to increased mental stress right from 1<sup>st</sup> year. This is an observation of great concern & needs to be analyzed by future longitudinal follow up studies.

### IV. Tables

**Table 1: Comparison of co-relation between Pulse rate & BP of cases & controls before & after exercise**

Parameters	Co-relation coefficient(r)	p value	Significance level
HR & SBP of cases before exercise	.925	.000	Significant
HR & SBP of cases after exercise	.964	.000	Significant
HR & DBP for cases after exercise	.616	.000	Significant
HR & DBP for controls after exercise	.413	.000	Significant

**Table 2: Comparison of co-relation between mean stress scores with pulse rate, SBP DBP and RR intervals of cases & controls before exercise**

Parameters		Value of r	P value	Significance level
Pulse rate & mean stress score	case	.862	.000	Significant
	control	.065	2.15	Non significant
SBP & mean stress score	case	.748	.000	Significant
	control	.038	.1.73	Non significant
DBP & mean stress score	case	.029	.3.14	Non Significant
	control	.013	4.57	Non Significant
RR interval & mean stress score	case	-3.142	.000	Significant
	control	-.097	1.78	Non Significant

**Table 3: Comparison of values of pulse rate & BP of cases & controls before exercise**

Parameters	Cases before exercise	Controls before exercise	Independent t test	Degree of freedom	p value	Significance level
Heart rate	Mean 80.51 SD 4.61	Mean 75.21 SD 4.5	7.116	148	.000	Significant
Systolic blood pressure	Mean 127.52 SD 6.36	Mean 120.45 SD 7.91	6.031	148	.000	Significant
Diastolic blood pressure	Mean 78.11 SD 4.16	Mean 77.38 SD 4.38	1.147	148	.000	Significant
RR interval in ECG	Mean 18.72 SD 1.14	Mean 20.03 SD 1.20	-6.871	148	.000	Significant

**Table 4: Comparison of values of pulse rate & BP of cases & controls after exercise**

Parameters	Cases after exercise	Controls after exercise	Independent t test	Degree of freedom	P value	Significance level
Heart rate	Mean 119.97 SD 4.79	Mean 114.23 SD 5.42	6.879	148	.000	Significant
Systolic blood pressure	Mean 147.68 SD 6.55	Mean 140.43 SD 7.54	6.264	148	.000	Significant
Diastolic blood pressure	Mean 79.25 SD 4.68	Mean 78.32 SD 4.75	1.211	148	.000	Significant
RR interval in ECG	Mean 12.39 SD 0.47	Mean 13.28 SD 0.36	-13.075	148	.000	Significant

Conflict of interest-nil

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