# ASSESSING THE VULNERABILITY OF STRESS AMONG MEDICAL STUDENTS AND THE ROLE OF COPING THERAPY IN THE IMPROVEMENT OF COPING ABILITY

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## ABSTRACT

**Background:** It has been reported that tremendous stress is seen in medical students at various times in their course of MBBS. Some students cope well with the stress, whereas others break down imparting the vitality of various coping therapies in these students.

**Aim:** The present study aimed to assess the vulnerability of stress among medical students by assessing changes in cardiovascular parameters in stress and resilience scores. The study also assessed student's views on the role of music therapy in the improvement of coping ability.

**Methods:** Mental and orthostatic stress were given to first-year medical students by making them read and present an unknown article in fixed time and with quick position change respectively. Cardiovascular parameters were assessed using standard techniques and stress sources with stress coping strategies and resilience was done with a structured questionnaire. Music therapy was given to these students using Mozart's symphony after college hours.

**Results:** The primary stress factor in 100% of students was academic factors. Whereas, social, emotional, and physical factors were considered by 52%- 60%. The most effective relieving strategy was talking to friends. The subjects had reaction time in the normal range and were resilient to a considerable extent. Both mental and orthostatic stress caused increased cardiovascular parameters compared to rest with more significant alterations with mental stress. Nearly 78% of subjects reported music therapy to be highly effective for the improvement of coping ability.

**Conclusions:** The present study concludes that in first-year medical students, talking to friends is the most effective mode of relieving stress. Significant changes in cardiovascular parameters are seen with both mental and orthostatic stress with higher changes with mental stress, and music therapy is an effective mode of stress coping.

**Keywords:** Autonomic activity, coping, medical students, music therapy, stress

## INTRODUCTION

For medical students, medical school is both a challenging and exciting period. Medical school is also associated with a lot of stress and anxiety sources along with excitement owing to the emotional difficulty and workload associated with medical education. Students in the college, particularly the freshers, are prone to stress owing to the transitional state of college life. These students have various pressures of adjusting to the new social environment, achieving a high level in academics, and being away from home for the first time. Stress usually results from the interaction between the perception of the individual and stressors and the reaction to such stressors.[1]

The existing literature data has reported that communication abilities may lead to cardiovascular risk which plays a mediator in the relationship of stress and coping. An Indian study assessing stress in medical students previously reported that medical students face extreme stress at various stages of their medical study. The study also suggested that medical students from the first year of the MBBS curriculum are more stressed from the emotional factors. It was also reported that the stress was process-oriented and not trait-oriented in these subjects.[2,3]

Stress is a physiological and emotional response to a stressor that aggravates the sympathetic division of the ANS (autonomic nervous system) into penetration for alterations based on the literature of 1994 by Hayes.[4] According to the reactivity hypothesis of cardiovascular diseases, characteristically greater cardiovascular activity is seen in some people compared to others in behaviorally stress-causing conditions, and such increased reactivity is associated with an increased risk of cardiovascular diseases. It is also reported that atherogenesis is promoted by this cardiovascular hypersensitivity under stressful conditions which depicts an existing link between atherosclerotic diseases and behavioral factors.[5]

Various psychophysiological assessments done on human subjects have reported that subjects showed marked variations in their magnitude of autonomic responses to various stressors. Stress-induced increase in heart rate, systolic blood pressure, and subjective anxiety is shown to be reduced with the relaxing music in healthy adult females and males. Music has also been shown to facilitate the recovery of blood pressure from stressors and stress.[6]

Autonomic responses in different adults can vary depending on the mental and physical stress. The resilience capacity of recovering from stress is largely personalized and individualized with a very complex mechanism of operating. However, the association of mental and orthostatic stress leading to changes in cardiovascular parameters is not clear in the identification of the vulnerability of an individual to mental stress.[7]

The present study aimed to assess the vulnerability of stress among medical students by assessing changes in cardiovascular parameters in stress and resilience scores. The study also assessed student's views on the role of music therapy in the improvement of coping ability.

## MATERIALS AND METHODS

The present study aimed to assess the vulnerability of stress among medical students by assessing changes in cardiovascular parameters in stress and resilience scores. The study also assessed student's views on the role of music therapy in the improvement of coping ability. The study was done at after the clearance was given by the concerned Institutional Ethical committee. The study subjects were the first-year MBBS students of the Institute. Verbal and written informed consent was taken from all the subjects before study participation and after explaining the detailed study design to all the subjects.

The study included 50 healthy medical undergraduate students from the first year who were selected by an experimental randomized cohort pattern. The inclusion criteria for the study were first-year MBBS students who were willing to participate in the study. The exclusion criteria for the study were subjects with no history of any disease in the past 3 months, no chronic medication history in the past 3 months, no history of previous psychiatric illness, schizophrenia, or depression, and no family history of any psychiatric illness.

After the final inclusion of study subjects, detailed history was recorded along with the measurement of various parameters including physiological measurements such as reaction time, blood pressure, and pulse rate. The questionnaire assessment included the stress coping ability, self-perceived source of stress in the life of the student, resilience test, and GHQ-12. All the parameters were assessed at rest and using the standard technique.

Orthostatic stress was imparted by asking the subject to stand up very quickly from the lying down position after which blood pressure and pulse rates were assessed immediately. The mental stress was imparted by asking the subject to read an unknown scientific article within 5 minutes and presenting it to three classmates and experimenters.

Music therapy was given to all 50 included subjects for 21 21-day duration, from Monday to Friday for 30 minutes each day. Music therapy was given to the students after their college hours. A music compact disc (CD) from Mozart's symphony was played to medical students. All included 50 study subjects who had no previous exposure to Western music.

During the study protocol, 4 students did not complete the study and were excluded making the final sample size of 46 student study participants. The data gathered were analyzed using the SPSS software version 21.0 (IBM Corp., Armonk, NY, USA) with a paired t-test, chi-square test, and student's t-test. For significant variables, multivariate analysis was done. The data were expressed as mean and standard deviation and frequency and percentage. The p-value of $<0.05$ was taken as a statistical significance level.

## RESULTS

The present study aimed to assess the vulnerability of stress among medical students by assessing changes in cardiovascular parameters in stress and resilience scores. The study also assessed student's views on the role of music therapy in the improvement of coping ability. The

study included 50 healthy medical undergraduate students from the first year who were selected by an experimental randomized cohort pattern. During the study protocol, 4 students did not complete the study and were excluded making the final sample size of 46 student study participants. On assessing the cardiovascular parameters in the study subjects at rest, it was seen that mean arterial pressure was 85.83±2.14 mmHg, mean pulse pressure was 46.24±1.60 mmHg, diastolic blood pressure was 70.37±1.89 mmHg, systolic blood pressure was 116.63±2.7 mmHg, and mean pulse rate was 78.07±1.35 beats/minute. All these parameters at rest were within the normal limits as shown in Table 1.

On assessing the source of stress and reaction time in study subjects, it was seen that social factors were the cause of stress in 24 study subjects, emotional factors in 28 study subjects, physical factors in 28 study subjects, and academic factors in 46 study subjects respectively making it a source of stress in the majority of study participants. Concerning the coping strategies adopted by study subjects, the most common coping strategy was talking to a friend in 36 study subjects followed by the help of the teacher and peer help in 34 study subjects each, and exercise in 34 study subjects respectively as described in Table 2.

Concerning the resilience scores, the study subjects had a resilience score of 77.41±7.61 depicting considerable resilience in the study subjects. For the reaction time, the mean reaction time was 0.265±0.01 seconds in the study subjects which was within the normal limit of 0.2 to 0.4 seconds as shown in Table 3.

It was seen that both orthostatic stress and mental stress caused changes in the cardiovascular parameters of study subjects compared to rest. The change in mean arterial pressure with physical and mental stress was found to be 96.65±2.21 and 108.86±2.09 from 85.83±2.14 at rest. This difference was statistically significant with $p<0.01$. The change in diastolic and systolic pressure from baseline after application of mental and physical stress was statistically significant with $p<0.01$. The mean pulse rate at rest was 78.07±1.35 beats/minute which changed to 95.81±1.72 after application of physical stress and to 100.1±2.11 on application of mental stress. Both these changes were statistically significant with $p<0.01$. The mean pulse pressure was 46.24±1.60 at rest which on application of physical and mental stress changed to 95.81±1.72 and 100.1±2.11 beats/minute. The change was statistically non-significant with $p>0.01$ (Table 4).

The study results showed that for subjective responses of study participants concerning the role of music therapy as a stress reliever, it was noted that music therapy was found to be non-effective in 13.04% (n=6) study subjects, somewhat effective in 8.69% (n=4) study subjects, and real effective in 78.26% (n=36) study subjects respectively as depicted in Table 5.

**DISCUSSION**

The present study included 50 healthy medical undergraduate students from the first year who were selected by an experimental randomized cohort pattern. During the study protocol, 4 students did not complete the study and were excluded making the final sample size of 46 student study participants. On assessing the cardiovascular parameters in the study subjects at

rest, it was seen that mean arterial pressure was 85.83±2.14 mmHg, mean pulse pressure was 46.24±1.60 mmHg, diastolic blood pressure was 70.37±1.89 mmHg, systolic blood pressure was 116.63±2.7 mmHg, and mean pulse rate was 78.07±1.35 beats/minute. All these parameters at rest were within the normal limits. These results were comparable to the studies of Manuck SB et al[8] in 1980 where authors reported normal blood pressure, heart rate, and pulse pressure in medical students at rest.

Concerning the source of stress and reaction time in study subjects, it was seen that social factors were the cause of stress in 24 study subjects, emotional factors in 28 study subjects, physical factors in 28 study subjects, and academic factors in 46 study subjects respectively making it a source of stress in the majority of study participants. Concerning the coping strategies adopted by study subjects, the most common coping strategy was talking to a friend in 36 study subjects followed by help from the teacher and peer help in 34 study subjects each, and exercise in 34 study subjects respectively. These results were consistent with the previous findings of Bughi SA et al[9] in 2006 and Chafin S et al[10] in 2004 where authors also reported academic factors as a major cause of stress in medical students and talking to friends as the most effective therapy in their study subjects.

On assessing the resilience scores, the study subjects had a resilience score of 77.41±7.61 depicting considerable resilience in the study subjects. For the reaction time, the mean reaction time was 0.265±0.01 seconds in the study subjects which was within the normal limit of 0.2 to 0.4 seconds. These findings were consistent with the results of Dishman RK et al[11] in 2000 and Little L[12] in 2005 where a similar resilience score and normal reaction time similar to the present study was reported by the authors in their respective studies.

The study results showed that both orthostatic stress and mental stress caused changes in the cardiovascular parameters of study subjects compared to rest. The change in mean arterial pressure with physical and mental stress was found to be 96.65±2.21 and 108.86±2.09 from 85.83±2.14 at rest. This difference was statistically significant with p<0.01. The change in diastolic and systolic pressure from baseline after application of mental and physical stress was statistically significant with p<0.01. The mean pulse rate at rest was 78.07±1.35 beats/minute which changed to 95.81±1.72 after application of physical stress and to 100.1±2.11 on application of mental stress. Both these changes were statistically significant with p<0.01. The mean pulse pressure was 46.24±1.60 at rest which on application of physical and mental stress changed to 95.81±1.72 and 100.1±2.11 beats/minute. The change was statistically non-significant with p>0.01. these results were in line with Steptoe S et al[13] in 1999 and Hjortskov N et al[14] in 2004 where authors reported similar changes in heart rate, pulse pressure, mean arterial pressure, systolic blood pressure, and diastolic blood pressure after applying mental and orthostatic stress as seen in the results of the present study.

It was seen that for subjective responses of study participants concerning the role of music therapy as a stress reliever, it was noted that music therapy was found to be non-effective in 13.04% (n=6) study subjects, somewhat effective in 8.69% (n=4) study subjects, and real

effective in 78.26% (n=36) study subjects respectively. These results agreed with the findings of Salamon E et al[15] in 2003 where authors reported a positive influence of music therapy in reducing stress in medical students as seen in the present study.

## CONCLUSIONS

Considering its limitations, the present study concludes that in first-year medical students, talking to friends is the most effective mode of relieving stress. Significant changes in cardiovascular parameters are seen with both mental and orthostatic stress with higher changes with mental stress, and music therapy is an effective mode of stress coping. However, further studies on MBBS students of all the years are needed to conclude.

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## TABLES

| Parameter | Mean ± S. D |
|---|---|
| Mean arterial pressure (mmHg) | 85.83±2.14 |
| Pulse pressure (mmHg) | 46.24±1.60 |
| Diastolic blood pressure (mmHg) | 70.37±1.89 |
| Systolic blood pressure (mmHg) | 116.63±2.7 |
| Pulse (beats/min) | 78.07±1.35 |

**Table 1: Cardiovascular parameters in study subjects at rest**

| Stress sources | Number (n) | Coping strategies | Number (n) |
|---|---|---|---|
| Social factors | 24 | Teacher's help | 36 |
| Emotional factors | 28 | Peer help | 34 |
| Physical factors | 28 | Exercise | 34 |
| Academic factors | 46 | Friends | 42 |

**Table 2: Stress sources and coping strategies in study subjects**

| S. No | | Mean |
|---|---|---|
| 1. | Reaction time (seconds) | 0.265±0.01 |
| 2. | Resilience scores | 77.41±7.61 |

**Table 3: Resilience scores and reaction time in study subjects**

| Parameter | Rest | Physical stress | Mental stress |
|---|---|---|---|
| MAP | 85.83±2.14 | 96.65±2.21 | 108.86±2.09 |
| PP (mmHg) | 46.24±1.60 | 49.72±2.61 | 50.37±2.22 |
| DBP | 70.37±1.89 | 81.07±2.01 | 92.07±2.01 |
| SBP | 116.63±2.34 | 130.81±3.33 | 142.46±2.7 |
| Pulse (beats/min) | 78.07±1.35 | 95.81±1.72 | 100.1±2.11 |

**Table 4: Changes in pulse and blood pressure on the application of mental and orthostatic stress**

| Rating | Number (n) | Percentage (%) |
|---|---|---|
| Not effective | 6 | 13.04 |
| Somewhat effective | 4 | 8.69 |
| Real effective | 36 | 78.26 |

**Table 5: Subjective responses of study participants concerning the role of music therapy as a stress reliever**