

Effect of Pranayama and Aerobic exercise on stress levels of medical students

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Abstract

Recently stress during medical education is increasingly reported. Unmanaged stress has a negative impact on quality of life and in medical students affect their academic performance and may develop stress related anxiety disorders and depression. Present study is to find out whether regular Pranayama or Aerobic exercise can relieve stress and improve their physical and emotional well being and improve their academic performance. Total 120, 1st year medical students participated in the study, 40 for Pranayama and 40 for Aerobics and 40 were controls. Stress level was measured by stress questionnaire before and after training. One group was doing Pranayama and other group was doing Aerobics every day in the morning for half an hour under expert guidance for 30 days. Statistical analysis was done. There was remarkable and significant decrease in stress levels. Pranayama and Aerobics act as stress relievers. These easily available tools should be part of stress management plan in medical curriculum.

Key Words: Pranayama, aerobic exercise.

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INTRODUCTION

Medical students especially 1st year students often are stressed due to various reasons. Mayo clinic studies (2006) showed that 1st year students begin to show higher rates of mental distress than their peers from other faculties. First year students worsen psychologically at the end of year which affects their academic performance, level and depth of study and results. Slavin¹ worked on this problem and tried to reduce the unnecessary stressors without compromising the quality of education. In 2009 SLU² implemented a number of curricular adjustments including pass / fail grading and reduction in hours students have to spend in the class. When students are

placed in the continuous evaluation process exhausting work hours along with enormous syllabus to be covered in a limited time period, sudden change in their style of studying lack of proper guidance, thought of exams, displacement from home, expectations of parents, peer pressure, inadequate hostel facilities, hostel food, all of these are causes of stress in medical students. Stressful situation as memorizing large portions of content in small period of time, grade competition, rigorous examination periods they are stressed. Stress and depression have been consistently linked to mental and physical health effects. Slow and deep breathing has a calming effect on the mind and helps to keep relaxed and alert state of mind which improves many mental functions of the brain. Regular Pranayama practice decreases the sympathetic tone which reduces stress. Physical exercise is also one of the most popular relaxation technique used now a days. Scott DS³ found a significant association between memory and mind activities and cardiovascular exercises. It improves emotional welfare. Any level of stress if left unattended can lead to sleeping disorders, burn out and dropout a fact presented by Dyrbye *et al*⁴ Chronic stress is also known to influence memory and learning especially problem solving abilities which require flexible thinking. Thus stress can affect medical decision and ultimately patient

care. Medical student are trained to improve the health of others, they themselves show higher rates of mental distress as they progress through medical college. Many medical schools in many countries have changed their institutional cultures, adjustment of curricula, pass / fail evaluations, which have been shown to reduce stress and anxiety without compromising the quality of education of first year medical students. Present study is carried out to find out the beneficial effects of Pranayama and physical exercise on stress levels of 1st year medical students.

MATERIAL AND METHODS

Total 120 students of 1st MBBS studying in Bharati Vidyapeeth Medical College and Hospital, Sangli were included in the study.

- 40 students in pranayama group
- 40 student in Aerobic exercise group
- 40 students as control not doing any exercise or pranayama.

Stress levels were assessed by a scoring system which has five points starting from 1 – i.e. never and 5 i.e. most of the time which included response patterns of 33 sources of stress and health related stressors. Everyday in the morning 7 to 7.30 am. One group was doing pranayama which included Omkar, Bhastrika, Kapalbhathi, Anulom - Vilom and Bhramari under expert guidance. The other

group was doing Aerobics at the same time, which included jogging and different Rhythmic exercises and few stretching exercises. This whole process continued for 4 weeks.

RESULTS

Statistical analysis was done, mean and Standard Deviations (SD) were calculated. Paired and unpaired 't' testes were applied in order to compare the results of pre-training and post-training groups, and to compare the pranayama and Aerobics groups with each other. It is seen from the table and graph that stress score has been significantly reduced after both pranayama and aerobics. There is very little difference in stress score after pranayama and Aerobics, though pranayama shows little better effect which is not statistically significant. So both training are equally effective in relieving stress.

Table 1: Paired Samples Statistics

	N	Mean	SD	SEM	Paired t	p value
Pranayam B T	50	62.66	13.68	1.93	18.797	0.00
Pranayam A T	50	46.34	12.48	1.77		
Exercise B T	50	63.60	8.39	1.19	21.917	0.00
Exercise A T	50	48.08	9.71	1.37		

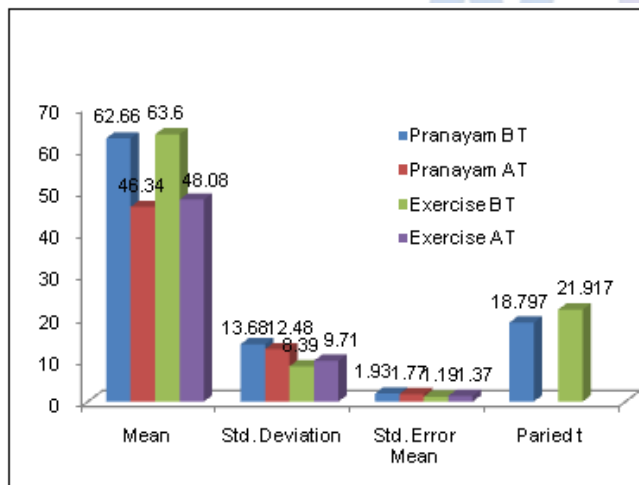


Figure 1: Stress Levels in different Groups

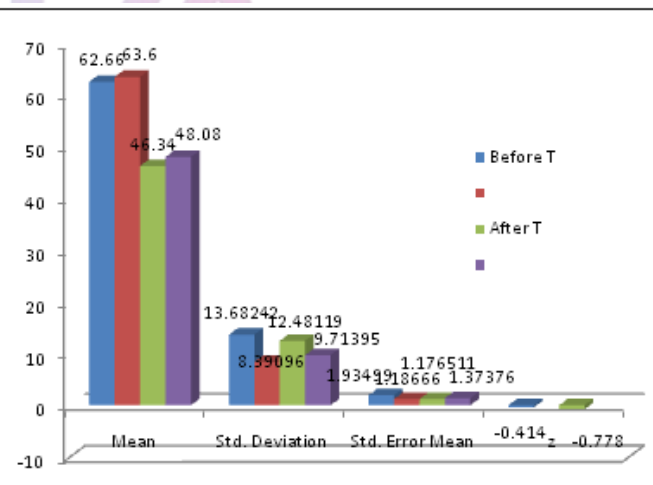


Figure 2

Table 2: Group Statistics

	Group	N	Mean	SD	SEM	z	p value
Before T	Pranayam	50	62.66	13.68242	1.93499	-0.414	0.68
	Exercise	50	63.60	8.39096	1.18666		
After T	Pranayam	50	46.34	12.48119	1.176511	-0.778	0.439
	Exercise	50	48.08	9.71395	1.37376		

DISCUSSION

Medical education is inherently stressful and demanding. Excess stress can impair concentration and performance during examination and produce negative effects on all personal, social and academic performance. Institutions have to change their cultures, adjustment of curriculum, evaluation methods to reduce stress without compromising the quality of education. Pranayama is known to increase O₂ supply to all tissues and prolonged exhalation causes a healthy level of CO₂ which helps in relaxation process. It causes reduction in stress hormones and activates the parasympathetic nervous system. Several studies have explored the exercise as technique for improving emotional welfare. Physical exercise improves and protects cerebral functions suggesting that physically active individuals have better cognitive function and are at a lower risk for developing anxiety disorders. When students are placed in stressful conditions as memorising large portions in a small period of time and frequent examinations, Mishra and MCK (2000)⁵ stated that they experience stress. According to them an optimal level of arousal is necessary to complete the task best, such as an exam performance or competitive effect. However when the stress or level of arousal exceeds that optimum the result is decline in performance. Pranayama seems to have significant positive effect to improve their test performance. Several studies have shown that proper breathing will calm and loosen the body and relax and focus the mind. Dr. Roger Mc-call⁶ in his book writes, rapid breathing activates sympathetic nervous system causing release of stress hormones. Many researches have shown that physical fitness has been found to be an important component of well being. It is one of the popular relaxation technique. An anxious and depressed nervous system frequently stimulates its stress centres through the clever use of peptides or molecules of emotions which triggers a cascade of stress hormones such as cortisol which increases blood pressure and reduces immunity. Recent medical studies have shown that regular yoga practices can tackle it by reducing level of stress hormone cortisol improving body mind integration, slowing down the constant rush of thoughts activating the parasympathetic nervous system. A little bit of tension or fear is normal and needed, so that we remain disciplined focused and dynamic. The problem starts when this fear become persistent and so intimidating as to start interfering with everyday life. Pranayama due to its inherent characteristics to cater, physical mental and spiritual well being, forms the most suited mechanism for psycho physiological health. When the whole brain is integrated one is less stressed more effective and happier. Robert Keith and Dr. Fred Travis⁷ state that this is a technique

anyone can do it. Herbert Benson⁸ coined the term Relaxation- response Hypometabolic state of parasympathetic predominance. In addition to bringing down the hormonal levels, sympathetic activity studies have demonstrated that practice of deep breathing enhances Melatonin along with well known circadian regulating effects is also associated with combating stress, feel good hormone antifree radical effect etc. Imaging studies have shown that long term practice of pranayama can increase the size of brain, better thalamocortical organization resulting in better sleep organization with enhanced slow wave sleep, REM sleep, and increase number of sleep cycles which is useful in neurological conditions like anxiety and depression etc. Several studies have proved that regular pranayama practice decreases sympathetic tone and reduces stress. In our study, students have experienced dramatic reduction in stress levels and remarkable emotional improvement. Our finding correlate with many others. The olfactory endings in upper part of nasal cavity when stimulated directs the input from outside world to the most primitive part of the brain the limbic system, the seat at emotion in man. Yoga modulates stress response system (Kirkwood)⁹. Practice of pranayama is only effective if it is done consistently and with awareness. An anxious nervous system stimulates its stress centers through peptides and it is controlled by yoga (Boforbes)¹⁰ purpose of pranayam is to increase quantum of life force (Prana). It helps in preventing human degeneration. It improves concentration and relieves stress and depression and thereby improves academic performance. How to use one's own breath to calm and regulate one's stressful mind is valuable. Yoga modulates the stress response system (Kirkwood)¹¹. Brown¹² described pranayama gives a sense of extreme excitement followed by a deep feeling of calmness. Aerobics is combination of rhythmic exercise with stretching. Boforbes¹³ advised yoga or exercise to relieve the stress of students. Exercise training elicits adaptive increase in mitochondrial content and respiratory capacity leading to delay in fatigue and increase enzymatic activity. Aerobic exercise may also protect CNS from oxidative stress by increasing oxidative enzymatic activity. Alterations in the level of certain neurotransmitters such as serotonin, norepinephrine and dopamine may play a key role in improving psychological well being. Schicht, Kim and Kim, and Berger and Motl¹⁴ have proposed exercise for improving emotional welfare. Bartholomo and Linder¹⁵ in their study stated that Aerobic exercise distracts the individual from stressful and anxiety provoking stimuli. Exercise do not involve competition, require a steady relaxed breathing pattern. Kleine¹⁶ analysed and showed that school children showed increased psychological well

being after regular Aerobic exercise. So in both Aerobics and Pranayama stress hormone cortisol level is reduced and there is improved integration of body and mind. Rapid breathing activates sympathetic nervous system causing release of stress hormones. One hypothesis presumed exercise improves anxious states because it distracts an individual from stressful and anxiety provoking stimuli (Bartholomew and Linder 1998)¹⁷. Exercise distracts individuals from problems because it regulates emotional and physiological reactions. Exercise incorporates repetitive movements, do not involve competition with others, is a predictable activity and requires a steady relaxed breathing pattern. The repetitiveness and rhythm associated with aerobic exercise lessen anxiety because these movements do not require exercise attention. Final mechanism of aerobic exercise focus on the use of rhythmic breathing during workout. Kleine 1994¹⁸ analysed anxiety related school stressors and showed decrease in anxiety due to aerobic exercises. In both Aerobic and Pranayama stress hormone cortisol level is reduced. There is improvement in body and mind integration slowing down constant rush of thoughts which activates parasympathetic N.S. In the present study the main finding main stressor is to adjust to the demands of the first year and in short space i.e. only one year. Purpose of yoga pranayama is to supply more O₂ and stimulate endocrine glands. Pranayama is readily available and so easy a technique. Lengthening of exhalation can help person achieve a healthy level of (CO₂) carbon dioxide in the blood stream that helps in the relaxation process. That relaxation can check sympathetic over activity. Regular use reduces level of stress hormone cortisol which improves body and mind integrate slowing down the constant flow of thoughts activating the parasympathetic system. Exercise distract the individual from stressful or stress provoking stimuli and there is steady breathing pattern and rhythmic action. Dr. Scott Rogers¹⁹ said it is perfectly okay to come here, study hard and do as well as you can but it is also okay to take care of yourself. While medical schools are challenging it also can be fun. Dr. Dyrbe²⁰ said it is certainly important for the student to learn right coping strategies, time management, skills and stress reduction techniques. Various public and government institutions presently are in the process of providing adjust clinical care through yoga and pursuing research as well.

SUMMARY AND CONCLUSION

Regular practice of pranayama and aerobic exercise has remarkable effect of reducing stress levels. Students experienced improvement and sense of well being, felt calm, cheerful and in good spirit without sleep disturbances. Medical colleges should take proactive measures to support the student's mental health and general wellness and find ways to support them when problems arise. Prevalence of stress is higher in first year medical students than 2nd and 3rd year students. Either pranayama or Aerobics exercise should be included in the curriculum in order to keep the medical student mentally and physically fit to face the challenge of the profession. This will result in all and well rounded physicians who are more connected and more emphatic and also will take better care of themselves and can serve as role model for their patients.

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