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An interventional study for assessing the impact of yoga on anxiety levels of medical students under stress

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Abstract
Context: Medical curriculum is extremely demanding in terms of students' effort especially since a vast syllabus has to be covered in a very short period. Anxiety encompassed during the course has unfavorable effects on the body that may progress into chronic conditions if left untreated and it becomes quite difficult for the students to cope with this highly stressful training. Yoga seems to be a rescuer in such a scenario. To find a way out which is both feasible and fruitful in the long run, this study was conducted with the aim to assess the influence of Yoga on anxiety levels of students with a follow up schedule.
Methods: The longitudinal study included fifty students within the age group of 18-24 years. Yogic sessions for the students were conducted at Arogyadham Health care research centre in Central India. The anxiety levels of students were assessed using Spielberger's anxiety scale before and after a follow-up of 6 months yoga practice.
Results: Levels of anxiety reduced to statistically significant values following yoga. A baseline state anxiety score of 46.8± 9.0 fell to 29.4 + 6.6 after 6 months. Similarly Trait anxiety score changed from baseline 47.0± 10.65 to 29.9 + 7.5 and there was an overall mean reduction of 34.6 in total.
Conclusion: This study among students with initially roaring anxiety levels showed not only drastic observable reduction in anxiety but also helped in inculcating a judicious acumen which is imperative to beat the highly competitive and stressful life of students.

Keywords: anxiety score, yoga, stress, pranayama, medical students

Introduction
Yoga comes from Sanskrit, and means to yoke or to join together [1]. A description of the physical yoga postures was found in the Yoga Sutras, which was apparently written in 3000 BC by Patajali, who was a Sanskrit scholar and an Indian physician.
Yoga practitioners have asserted its effect on balancing emotional, physical and spiritual health for decades, but only recently has there been a move to substantiate these claims through research [2]. In the ancient system of education various yogic practices like Suryanamaskar, Pranayama, meditation as well as good value systems were introduced with the formal education to enable the development of good physique, strong ethical values and good stress tolerance [3]. A state of mental tranquility is achieved by the practice of yoga as revealed by increase in alpha index of eletroencephalogram after short term yoga [3, 4]. At physical level consistent practice of asanas, pranayama confers a proportionate, flexible, typically relaxed body with an ability to combat stress efficiently [5].
Keeping in mind, the above stated facts, it was thought pertinent to probe an answer to the arising question as to whether long term yoga practice could prove to be a boon for the young generation of today's world with cut throat competition and intense academic aspirations.

AIM
The aim of study was to find out the influence of Yoga on anxiety levels of with a follow up schedule so as to assess its long term effect.

Material & Methods
The study included fifty students within the age group of 18-24 years with a mixed population among all the three years of MBBS course. in all there were 27 boys and 23 girls. Yogic sessions for the students were conducted at Arogyadham Health care research centre in Central India. The anxiety levels of students were assessed using Spielberger's anxiety scale before and after a follow-up of 6 months yoga practice. All of these students who were not having any medical or psychiatric illness and who gave a written informed consent were included in the study.

Study design
It was a Longitudinal study in which measurements of anxiety level were taken at baseline (Pre-test). Then we evaluated the anxiety scores after one month (Post –test) and then after a follow up period of 6 months during which the students were in self-practice.
All the students gave a written Informed consent for the study. Yoga practice was conducted under the guidance of trained

yoga physician available full time in the Arogyadham for 45 minutes every day in the evening from 5 to 6 pm.

Yoga class used to begin with Starting Prayer followed by Sukshma vyayama, Surya Namaskar, Asanas in various postures: Standing, Sitting, Supine, Prone positions, Pranayam including Kapalbhati, Anulom- vilom, Suryabhedan, Chandrabhedan, Bhramari, Relaxation, Shavasana and finally Meditation and Om Shanti mantra chanting. The session used to end with Closing Prayer.

Tool for assessment of anxiety

As guided by consultant psychiatry of out institute, we employed Spielberger's anxiety scale which is a standardized, validated and most widely used measure to determine the anxiety score of the students. It includes a questionnaire called the 'State Trait Anxiety Inventory' (STAI) [6] which is a self-report assessment device, that includes separate measures of state and trait anxiety to evaluate both transitory emotional state as well as stable individual differences in anxiety proneness. There are two separate subscales in STAI with 20 items each. The elemental qualities evaluated are feelings of apprehension, tension, nervousness, and worry. A 4-point Likert scale to allows the subject to express how often or how much each question applies to them in either circumstances.

Data Analysis

Data was collected and entered in Excel 2007. All statistical analysis was done using R (language and environment for statistical computing) [7]. After checking the combined scores for normal distribution it was found that several of these do not follow normal distribution. Therefore, we conducted Wilcoxon signed rank test, a non-parametric test used for comparing two means.

Results

Anxiety status was assessed by Spielberger's anxiety scale. In all there were three assessment points in which measurements of anxiety scores were taken at baseline (Pre-test), after one month (Post –test) and then after a follow up period of 6 months On comparison of mean total scores of before and after intervention, there was a decrease in the score from baseline. This difference was statistically significant (P <0.001) as is clear from Table 1 and its graphical representation is depicted as box-plot graph in Figure 1.

Table 1: Comparison of Mean± SD of Pre and Post Test scores

	Mean Anxiety Score		Difference in scores (Pre to Follow-up)	
	PRETEST (On Day 1)	Follow-up at 6 months	Mean	p value
State Anxiety scores	46.8±9.0	29.4 + 6.6	17.4 (14.7-20.2)	P<0.001
Trait Anxiety scores	46.96 ± 10.7	29.9 + 7.5	17.1 (14.5-19.8)	P<0.001
Total Anxiety scores	93.78 ± 17.7	59.3 + 12.9	34.6 (29.8-39.3)	P<0.001

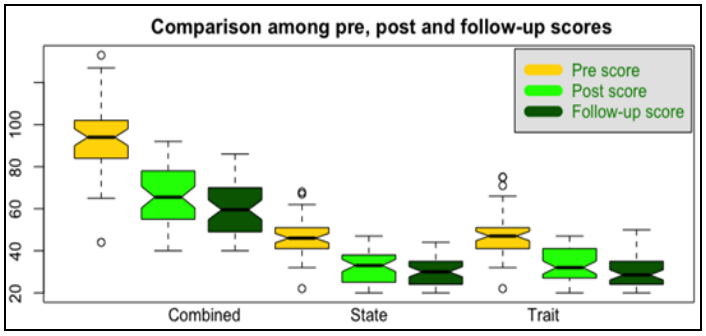

Fig 1: Box-plot Graph of Comparison of Mean± SD of Pre, Post Test & follow up scores

The Figures 2-4 display the individual combined, state and trait anxiety scores respectively for all study participants at baseline, at end of one month of intervention and at follow-up at 6 months. Invariably, there was a decline in the combined anxiety score from baseline to the end of intervention (range 2 to 72). From post-intervention to follow-up at 6 months, all participants except one showed a further decline in the anxiety scores (range -18 to 23).

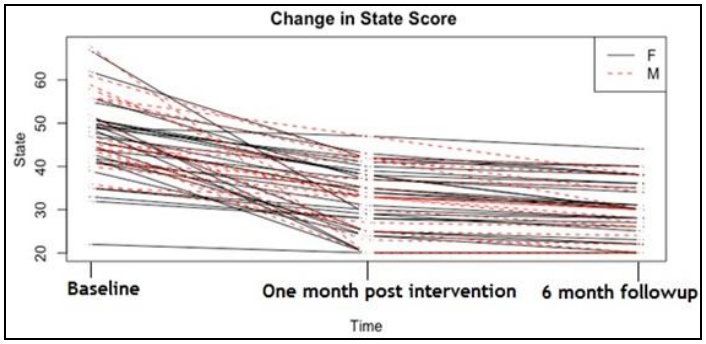

Fig 2: Individual State anxiety scores at baseline, one month post-intervention and at 6 month Follow-up.

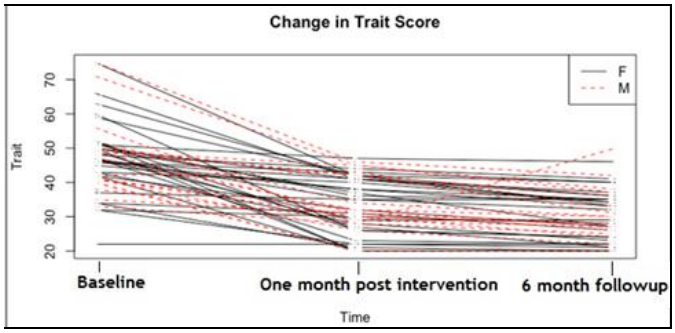

Fig 3: Individual Trait anxiety scores at baseline, one month post-intervention and at 6 month Follow-up.

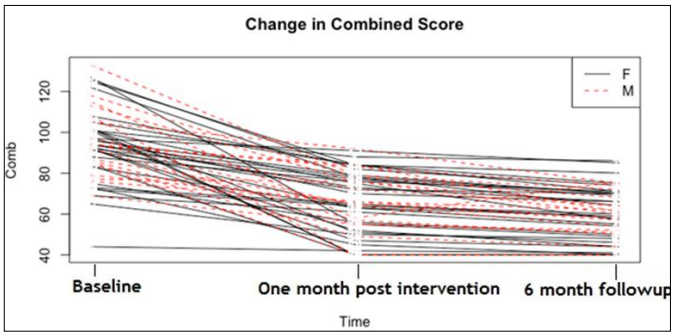

Fig 4: Individual Combined anxiety scores at baseline, one month post-intervention and at 6 month Follow-up.

Discussion

Anxiety and stress have unfavorable effects on the body that may progress into chronic conditions if left untreated. Yoga an ancient Indian art that is again getting importance in context of today's life with tight time schedule and chronic stress seems to be a savior in such a scenario. To find a way out which is both feasible and fruitful in the long run, this study was conducted on a cohort of students who initially manifested mounting anxiety scores but with the advent and practice of six months long yogic practice were able to curtail those flaring levels to considerably meagre ones.

The results of the present study are in agreement with a couple of earlier Indian studies [8-14] on medical students where the effects of yoga intervention have been reported however none of the study has incorporated a follow up or longitudinal design as we have and also there is significant variability in the samples across studies including issues of sample selection and sample size variables.

In a recent study [15] it was found physiological changes occurred following a 20-min yoga class. Heartrate increased during the session, as would be expected. Changes from pre to post session assessments included decreased anxiety and a trend for increased EEG theta activity, suggesting greater relaxation. It is very well documented that objective manifestations of anxiety are a racing heart, palpitations, tremors, sweating, increased blood pressure, dry mouth, avoidance behaviour, signs of restlessness, and heightened responsiveness. Yoga typically leads to increased heartrate, but following prolonged training, a decrease has occurred in exercise-induced heartrate and all the signs of anxiety decrease and slowly disappear. This notion stands in ardent support of the drastic fall in levels of anxiety of participants obtained in our study.

Similar supportive results have been reported in one prolonged yoga study [16] where heart rate was monitored. After two months of yoga training consisting of physical postures, the exercise-induced increases in heartrate and systolic blood pressure were significantly reduced.

So far, from the findings of our long term study in students, the result has been definitive posing a significant evidence of the broad ranging benefits of yoga, both as a treatment and as a preventative form of medicine and health care. Probing into potential underlying physiologic mechanisms for yoga effects it seems the positive effects of yoga may be mediated by increased vagal activity and decreased cortisol. Vagal activity significantly increases after yoga. This likely happens via stimulation of dermal and/or subdermal pressure receptors that are innervated by vagal afferent fibers, which ultimately project to the limbic system including hypothalamic structures involved in cortisol secretion. These pathways are supported by anatomical studies indicating that baroreceptors and mechanoreceptors within the dermis (i.e. Pacinian corpuscles) are innervated by vagal afferent fibers.

Meditation which was the mainstay of the intervention in our study and very well appreciated by the participants emerged as a strong stress reliever that tremendously helped in reducing anxiety in participants. Various Yogasanas also bestowed positive effects on the psychology of participants.

For yoga to be adopted into wider practice it needs to be established as a more effective exercise as compared to other forms of exercise.

Conclusion

This longitudinal study among students with initially soaring anxiety levels showed not only drastic observable reduction in anxiety but also helped in inculcating a judicious acumen in them which is vital in a highly competitive and stressful life of the students. It is probably one of its kinds in a low resource rural set up wherein changes reported by participants have been evaluated. As there was a significant decrement in anxiety after doing yoga so it may be included in the daily routine by the students so that this may also help them to improve their overall proficiency.

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