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## Comparative evaluation of fatigue in medical and engineering students and their opinion on yoga as ameliorative agent: A questionnaire study

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### Abstract

**Background:** Medical and engineering courses are two prominent streams of studies preferred by Indian students at the undergraduate level and both are known to be strenuous and rigorous.

**Objectives:** The Objective of this study was to assess the levels of physical and mental fatigue among the final year Medical and Engineering undergraduate students and their opinion on including yoga as a stress reliever in academic curriculum.

**Methods:** The study was carried out among 19-21 yr old normal final year students of Engineering and Medical College. The participation was voluntary and willing students were requested to fill Fatigue Assessment Scale (FAS) questionnaire and a self designed questionnaire on inclusion of yoga as reliever of stress.

**Results:** A total of one hundred and eight final year students of medical and engineering students voluntarily completed the survey instruments. FAS score indicated that medical students had higher levels of stress than engineering students and was statistically significant ( $p < 0.001$ ). With regard to the most stressful academic phase, medical students rated undergraduate curriculum and preparing for postgraduate exams as toughest, while engineering students rated pre-university phase as strenuous. With respect to priorities in career, medical students emphasized on higher education (post graduation), while engineering student's preferred professional career. More than 50% of students of both professional courses opined yoga to be ideal and that it should be incorporated in school curriculum.

**Conclusion:** This study indicates that medical students incur more mental fatigue than the engineering students and that the students of both stream indicated that Yoga would be an ideal reliever of stress and fatigue. These observations if implemented by academic institutions could be of possible help in amelioration of the stress in students of these streams of studies.

**Keywords:** yoga, curriculum, Stress, Medical students, Engineering students, Fatigue

### Introduction

Young adulthood is a very important stage in an individual's life as in most cases this is the phase when they are on the verge of completing undergraduate education and planning for future career (Beard *et al.*, 1982) [5]. Considerable body of evidence suggest that tolerable amount of stress can be a motivation to study and learn, while too much stress for prolonged periods causes distress (LeBlanc, 2009; Hamza, 2008; Behere *et al.*, 2011) [20, 16, 7]. When managed poorly, stress can manifest in a variety of negative physical, mental, cognitive, psychological and behavioural outcomes and previous studies have also shown association between academic stress and adolescent distress (Lee & Larson, 2000; Verma, *et al.*, 2002; Misra and Castillo 2004) [21, 30, 25]. Additionally, academic pressure can lead to mental distress, anxiety, depression, poor memory and language skills, and lower academic achievement, resorting to substance abuse and in extreme cases to suicide (Haddad and Malak, 2002; Hingson *et al.*, 2005) [15, 18].

Recent trends indicate that the medical and engineering are the two prominent streams of professional studies being preferred by Indian students at the undergraduate level. Mangalore, a coastal city on the Arabian Sea coast of southern Indian state of Karnataka, is recognized as an educational hub in India (Figure 1). The city has large number of school, colleges, universities and institutes offering medical, engineering, nursing, paramedical, management, arts, professional, semi-professional,

non-professional courses and science colleges. Recent reports indicate Mangalore to be one of the sought after destinations for education and that it attracts students all over India and abroad (especially Gulf countries).

Previous studies have conclusively shown that students from professional courses feel a great amount of pressure in dealing with academic stress and factors like poor mental health, low social support, peer pressure, family pressure and poor sleep contribute to morbidity (Wallander *et al.*, 2007; Sajjan and Jejurkar, 2005; Leisa *et al.*, 2008) [32, 27, 22]. From educational perspective it is important for policy makers and educators to know the prevalence and the causes of student distress as this can help plan remedial actions to be implemented. In lieu of these observations the present study was conducted to evaluate the levels of perceived stress between the undergraduate students of medical and engineering courses and also assesses the various contributory factors causing/aggravating stress. In addition to this we also ascertained the opinion of the students on including yoga as a stress reliever in the curriculum and also on the stage of academic training.

### Methodology

The present study was conducted on a relatively heterogeneous population of final year students who were studying in Father Muller Medical College, Mangalore and St. Joseph Engineering College, Mangalore. The study was conducted after obtaining the Ethical approval from the institutional ethics committee. The required samples of students were chosen from the final year undergraduate curriculum and were enrolled only if they wished to participate in the study. The students who volunteered to participate in the study were informed about the objectives of the study and were assured that the information would be kept confidential. An informed consent was obtained from all the willing volunteers. The data were collected by using a self-administered questionnaire and requested information on the students' sociodemographic characteristics; the FAS scale (Michielsen *et al.*, 2004) [24] and the opinion on yoga as a stress reliever; other physical coping strategies were collected. Statistical analyses were made using the t test and chi square test.

### Results

A total of one hundred and eight final year students of medical and engineering student's courses voluntarily completed the survey instruments. Of these seventeen students submitted incomplete questionnaires and were excluded from the analysis. Therefore, a total of ninety one students formed the basis for all the analyses. The mean age  $\pm$  standard deviation (SD) of the study participants was  $20.8 \pm 0.8$  years, with a range of 19-21 years.

The Fatigue Assessment Scale (FAS), which measures the mental and physical aspects of fatigue, is one of the most widely used questionnaires. In this study, the mean FAS score was higher in the medical students ( $26.73 \pm 8.2$ ) than the engineering students ( $21.19 \pm 4.6$ ) (Figure 2) and was statistically significant ( $p < 0.001$ ). With respect to the subsection it was observed that the physical fatigue was almost equal in both and observed to be  $12.83 \pm 5.09$  in the medical and  $12.74 \pm 3.35$  in engineering students, respectively. However in the mental fatigue section it was observed that the scores were  $12.12 \pm 3.76$  in medical and  $8.45 \pm 2.11$  in engineering students clearly indicating that the

medical students were under more mental fatigue than the engineering students (Figure 2) and was statistically significant ( $p < 0.001$ ).

In the next section the students of both streams of professional studies were requested for their opinion as to which was the toughest academic phase in their academic life. Majority of the medical students (61.40%) rated the UG curriculum and preparing for the postgraduate exams as the toughest, while 57% of the engineering students rated pre-university (12<sup>th</sup>) as the toughest (Figure 3). With respect to their future priorities the medical students indicated that a post graduation in specialised fields was the antecedent, while for the engineering students an immediate job and initiation of professional career was the priority (Figure 4). With respect to the healthy coping mechanisms the engineering students adhered to outdoor sports/jogging (55.6%), swimming (36.7) and prayers (27%) as the most preferred, while the medical students followed sports/jogging (46.4%), prayers (32%) and swimming (26.1%) as the practised (Figure 5). With respect to yoga as a reducer of stress 55.60% of the medical and 54.30% of the engineering students were of the opinion that it was ideal and should be incorporated in school curriculum (Figure 6).



Fig 1: Geographical location of Mangalore in India

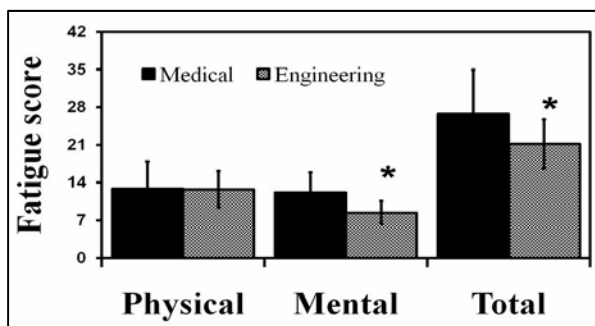


Fig 2: Physical and Mental fatigue in engineering and medical students ( $p > 0.001$ )

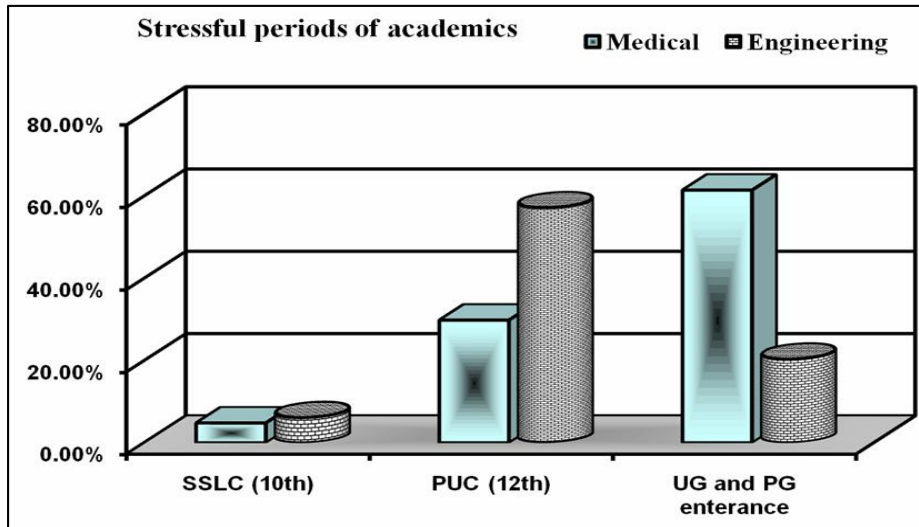


Fig 3: Students opinion on the most stressful period in their academic curriculum

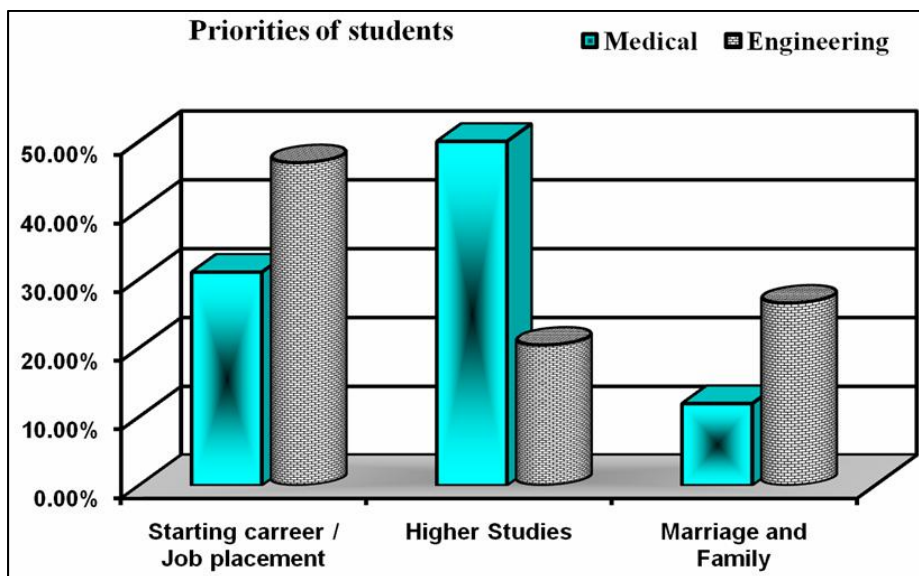


Fig 4: Priority of the students after undergraduate studies

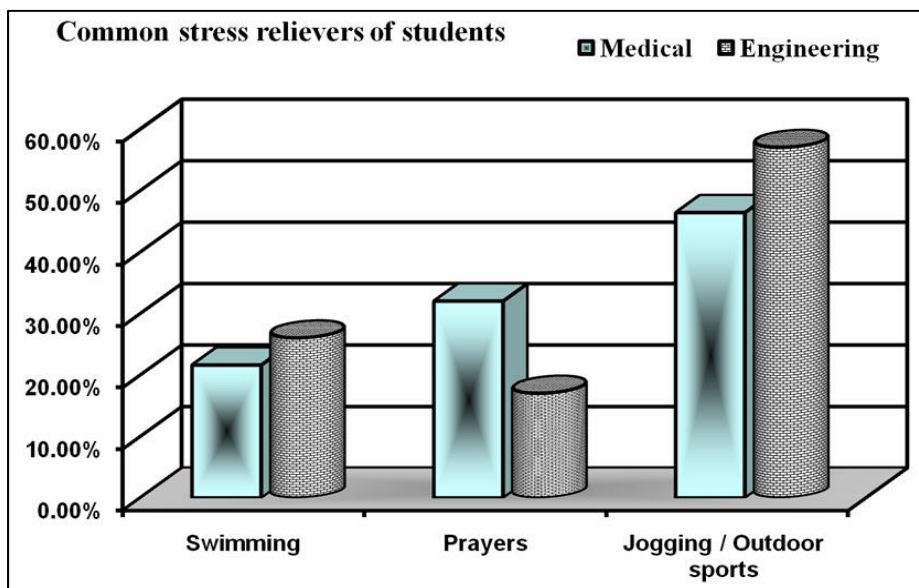


Fig 5: Healthy stress relievers of the undergraduate studies

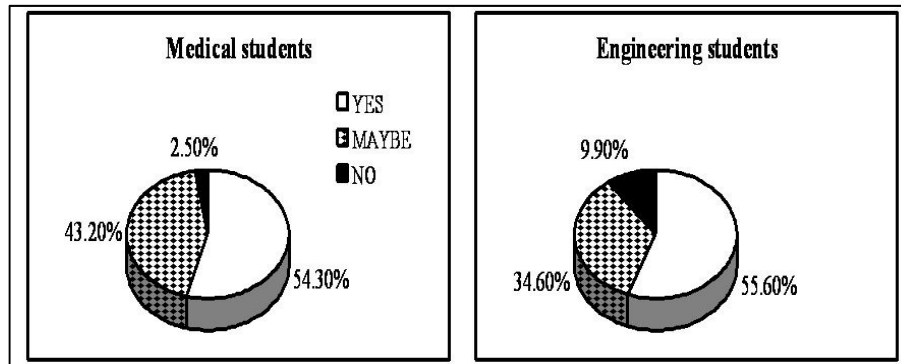


Fig 6: Opinion of students on inclusion of yoga as stress reliever in curriculum

## Discussion

The observations from our study indicate that medical students had a higher level of fatigue than the engineering students. Studies carried out in different parts of the world have unequivocally shown that students of medical profession have high level of stress and fatigue (Hernandez *et al.*, 2010; Voltmer *et al.*, 2012; Chang *et al.*, 2012; Al-Dubai *et al.*, 2011; Al-Dabal *et al.*, 2010; Sontag *et al.*, 2010; Shah *et al.*, 2010; Bittner *et al.*, 2011; Pottier *et al.*, 2011; Dyrbye *et al.*, 2010; Abdulghani *et al.*, 2011) [17, 31, 10, 3, 2, 29, 28, 8, 26, 11, 1] and our observations are in agreement to previous reports. The possible reason for this is that in addition of the rigours of the educational programme, medical students also face emotionally tense experiences like dealing with people with various illness, sufferings and death, and this is shown to render them more vulnerable to mental stress, depression, anxiety and fatigue (Dyrbye *et al.*, 2006; 2009; Elzubeir *et al.*, 2010; Mahajan 2010; Hamza, 2008) [12, 13, 14, 23, 16].

In this study the final year medical students were invited for the study and their duty mostly includes caring for the critically ill patients and mostly in departments like medicine, surgery, orthopaedics, paediatrics, obstetrics and gynaecology where medical emergencies are an integral part of health care. Earlier studies have shown that the emergency medicine physicians experienced significantly more intense and more frequent uncontrollable working situations, conflict between work and family roles, and unfavourable relationships with coworkers than physicians working in health centres and these observations further substantiate our observations.

In addition to the academic stress, the students are beset with non-academic stress especially, planning higher studies, obtaining a job or starting an independent career, marriage, family and children. In our study, it was observed that the students of engineering preferred securing job/starting career, marriage/family and postgraduate studies; while the medical students were strongly in favour of postgraduate studies, securing job/starting career and marriage/family. The possible reason for this difference is that specialisation in medical profession is very important for a better career and the emphasis of most students is to pursue postgraduate and super specialisation immediately after undergraduate studies. However the need for a postgraduate degree is not required for an undergraduate from the engineering stream in most cases as job placements are a routine process before the end of curriculum.

In this study it was also observed that the engineering students distressed through outdoor sports, swimming and

prayers, while the medical students practised outdoor sports, prayers and swimming. It was observed that many of the medical students were unable to regularly go for swimming due to on call patient care duty.

Yoga, which literally means "union" and refers to the union of mind and body, has been practiced in India for over 5,000 years. It is one of the world's oldest forms of exercise and healing, and involves postures, breathing, and meditation. By practicing yoga, a person is supposed to reach a state of mental equanimity, where responses to favourable or unfavourable external events are well under the individual's control, and responses are moderate in intensity (Bussing *et al.*, 2012) [9]. Earlier reports indicate that regular practice of yoga is shown to bring a feeling of well-being, a reduction in body weight, increase vital capacity, accelerate endocrinal functions; improvement memory and competitive performance; to reduce stress disorder, help achieve physical and metabolic stability, reduce anxiety and to increase attention/concentration (Kauts and Sharma, 2009; Bussing *et al.*, 2012) [19, 9]. Studies have also shown that meditation improve academic performance, reduces problems related to maladaptive behaviours, substance abuse, and to concomitantly improve the quality of life by increasing emotional, physical health and psychological well-being (Kauts and Sharma, 2009; Bussing *et al.*, 2012) [19, 9]. In our study it was observed that both medical and engineering students were of that the opinion that inclusion of yoga in high school curriculum and preferably in the middle or high school level.

## Conclusion

The results from this study indicate that both medical and engineering students had stress and that the levels were higher in the medical students. Majority of the students were of the opinion that yoga is an ideal reliever of stress and should be included in curriculum at the high school level during the early adolescent period to help them in their future academic and professional careers. This preliminary information may be useful in guiding the development of interventions aimed at improving the psychosocial and behavioural health of students and detail studies are warranted.

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