

ORIGINAL ARTICLE

Good Mental Health Status of Medical Students: Is There A Role for Physical Activity?

Deepthi R^{1*}, Ashakiran S², Thota Venkat Akhilesh³, Mohan Reddy³

¹Department of Community Medicine, ESIC-MC & PGIMSR, Rajajinagar, Bangalore-560010

(Karnataka) India, ²Department of Biochemistry, Saptagiri Institute of Medical Sciences & Research Centre, Bangalore-560010 (Karnataka) India, ³Department of Psychiatry, Sri Devaraj Urs Medical College, Kolar-563101(Karnataka) India

Abstract:

Background: Mental health problems are more commonly seen in youth, more so in medical students. Physical activity though known to improve mental health is difficult to follow among medical students. *Aims & Objectives:* This study aimed to investigate self-reported levels of anxiety and depression and compare these with self-reported physical activity among medical students in an institution of India. *Material & Methods:* A Cross sectional study was done among 430 medical students and interns of a medical college of rural Karnataka, India. Hospital Anxiety and Depression Scale (HADS) and International Physical Activity Questionnaire (IPAQ) were administered to assess mental health status and physical activity levels respectively. *Results:* The prevalence of anxiety (65.1%), depression (39.5%) and anxiety with depression (34.4%) was high among medical students. Only 18.1% of students were highly active while 35.9% were inactive when physical activity levels were measured. Students who were highly active and minimally active in physical activity showed lower levels of depression and anxiety compared to low physical activity group. *Conclusion:* Mental health problems are high and physical activity levels are low among medical undergraduate students. Engagement in physical activity can be an important contributory factor in positive mental health of future doctors.

Keywords: Anxiety, Depression, Physical activity, Medical students

Introduction:

Mental health disturbances, including nonclinical depression, anxiety traits, feelings of sadness, or

temporary mood disorders are associated with morbidity and mortality in the adolescent and youth population [1-4]. The prevalence of mental health disturbances among children and adolescents remain significantly high [1-4] and were almost similar to that of adult population [5]. The prevalence of depression among adolescents in South East Asian region has been found to be 15 – 20% mainly due to inability to cope with intense emotions, aggressiveness, isolation from family, inability to keep one's disappointments in perspective and academic stress. Research has consistently shown that doctors with healthy personal lifestyle and habits are more likely to impart healthy behaviours to their patients [6].

Physical activity is proven to improve mental health among normal individuals and in people suffering from mental illness [7]. The positive association between physical activity, mental health and treatment of mental health problems, has been demonstrated in various studies [7, 8]. Studies have demonstrated that physical activity has a beneficial effect on mild to moderate depression [9, 10] and public health recommendations for aerobic physical activity have been found to be an effective treatment for mild to moderate depressive disorder [11]. Research on the effect of physical activity on anxiety has been studied in a systematic review which showed a positive association with low physical activity [12]. This has led to the

promotion of physical activity, within health policy and practice, for the improvement of both physical and mental health in the general population.

In medical field, amount of study students must undergo is vast and its education process is characterized by many psychological changes among them. This is evidenced by high prevalence of mental disorders among medical students as observed in various studies [13-16]. Some studies have identified that anxiety and depression are common problems, with students likely to suffer mental health problems because of concerns regarding their studies [16]. One study has reported that 60% of undergraduate students had elevated levels of anxiety and depression [17]. Though Medical Council of India has laid down regulations that it is mandatory that all medical colleges should have facilities for sports and recreation, its utilization is doubtful. As a consequence of the findings from this limited amount of research among medical students in India, this study aimed to investigate self reported levels of anxiety and depression and compare these with self-reported physical activity among medical students in a medical college. Since presence of examinations and term of study may also have effect on mental health status, this study also aims at assessing the association of examinations in the next 2 months and academic term of study of the student with anxiety, depression and physical activity levels.

Material and Methods:

It was a cross sectional study done among medical students and interns of a medical college of rural Karnataka, India. Institutional ethical committee clearance was obtained from Sri Devraj Urs Medical College, Kolar. Study duration was one year from May 2011 to April 2012. All 600 students were requested to participate, of which 430 students consented to participate in the study. Questionnaire containing general information,

Hospital Anxiety and Depression Scale (HADS) and International Physical Activity Questionnaire (IPAQ) was administered to all the students after taking informed written consent. Students were asked not to write their name to maintain confidentiality and promote getting correct information. General information including age, gender, are they facing exams in the next two months was collected.

Mental state was measured using Hospital Anxiety and Depression Scale (HADS) [18] having a 14-item self-report questionnaire with seven questions relating to anxiety and seven questions relating to depression. Scoring was based on a 4-point likert scale (0-3) with a maximum score for each subscale being 21. For both subscales, scores of 0–7 indicated the absence of clinical symptoms of anxiety and depression; scores of 8–10 indicated mild symptoms, 11–14 moderate symptoms and 15–21 severe symptoms. The scale was originally designed to detect elevated levels of anxiety and depression amongst patients in non-psychiatric hospital clinics, and therefore was thought suitable to be use with any population who did not have a clinically defined psychiatric disorder. This scale was observed to have good psychometric properties in terms of factor structure, inter-correlation and internal consistency [19].

Physical activity was measured using International Physical Activity Questionnaire (IPAQ). The IPAQ [20] was an instrument designed primarily for population surveillance of physical activity among adults [21]. The validity and reliability of the instrument was established in various studies [22] Questions on time spent included physical activities done at work, house and yard, to get from place to place, and spare time for recreation, exercise or sport in the last 7 days. Activities were classified as vigorous and moderate physical activities [20]. The total duration of physical activity, per week, was calculated to the nearest minute, metabolic equivalents (MET) were

calculated. Students with 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-min/week were classified as “minimally active”. Students with 7 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 3000 MET-minutes/week were classified as “highly active” category or health enhancing physical activity (HEPA). Students with less than 5 days of any combination of walking, moderate-intensity or vigorous intensity activities or having less than 600 MET-min/week were classified as “inactive”.

Data Analysis:

Proportions of students with various levels of anxiety, depression and physical activity profile were calculated. Association between mental status and fitness was assessed using chi square test. Odds ratios with their confidence intervals were calculated. Pearson's correlation and co association of anxiety and depression scores were found out. Correlation between anxiety scores and depression scores was done with the academic term of study subjects.

Results:

Anxiety and Depression:

For depression, the mean score was 6.85 (S.D. = 3.8). This fell within the normal range of depressive classification. (Table 1) The mean anxiety score for the student cohort was 8.99 (S.D. = 4.2). This fell within the mild symptom range. Considering the percentage of students who fell within the different severity band ratings of anxiety and depression, 34.9% of students were considered normal on the anxiety subscale and 60.5% on the depression subscale. Only 9.3% of students were considered to have severe anxiety, with 4.2% falling into severity range for depression. Prevalence of anxiety among females was 70.8% as compared to males which was 57.8% and this difference was found to be statistically significant ($\chi^2=9.13$, $df=2$, $p=0.005$). Prevalence of depression among males (40.1%) and females (39.1%) were similar.

Overall combined prevalence of anxiety and depression among students was 34.42%. Prevalence among males (34.8%) and females (34.2%) were observed to be similar. Co presence of depression and anxiety among males and females were significantly more compared to presence of just depression or anxiety or being normal ($\chi^2=115.3$, $df=2$, $p=0.000$).

Table 1: Proportion of Anxiety and Depression among Medical Students

	Males N (%)	Females N (%)	Total N (%)
Depression			
Normal	112 (59.9)	148 (60.9)	260 (60.5)
Mild	44 (23.5)	62 (25.5)	106 (24.7)
Moderate	21 (11.2)	25 (10.3)	46 (10.7)
Severe	10 (5.3)	8 (3.3)	18 (4.2)
Anxiety			
Normal	79 (42.2)	71 (29.2)	150 (34.9)
Mild	44 (23.5)	82 (33.7)	126 (29.3)
Moderate	42 (22.5)	72 (29.6)	114 (26.5)
Severe	22 (11.8)	18 (7.4)	40 (9.3)
Total	187 (100)	243 (100)	430 (100)

Physical Activity:

Table 2 shows physical activity levels among medical students. Considering the percentage of students who fall within the different grades of physical activity, 18.1% of students were highly active, 46% were minimally active and 35.9% were inactive. As shown in table 2 more females were physically inactive (41.6%) compared to that of males (28.3%) and this difference was statistically significant ($\chi^2=34.6, df=2, p=0.000$).

(34.1%) as compared to students who were physically inactive (49.4%). Anxiety among physically inactive students was 66.9%, which is slightly higher as compared to students who were physically active (64.1%). Students engaging in physical activity were significantly less likely to be suffering from both depression and anxiety (31.2%) as compared to students who were physically inactive (40.3%).

Table 5 shows the association of anxiety,

Table 2: Physical Activity Levels among Medical Students

Physical Activity	Males N (%)	Females N (%)	Total N (%)
Highly Active	57 (30.5)	21 (8.6)	78 (18.1)
Minimally active	77 (41.2)	121 (49.8)	198 (46.0)
Inactive	53 (28.3)	101 (41.6)	154 (35.9)
Total	187 (100)	243 (100)	430 (100)

Table 3 shows association of anxiety, depression and physical activity levels between males and females. Anxiety was 1.22 times more associated with females than compared to males. Males were 1.8 times more physically active than compared to females.

depression and physical activity with appearing for exams in the next two months. Anxiety was more commonly observed among students appearing for exams (OR = 1.59) compared to those who did not. Figure 1 shows the correlation between different variables. Anxiety and

Table 3: Association of Gender with Anxiety, Depression and Physical Activity among Students

Mental status	Males (N=187)	Females (N= 243)	p value	OR (CI)
Depression	75 (40.1)	95 (39.1)	0.83	0.97 (0.77 - 1.23)
Anxiety	108 (57.8)	172 (70.8)	0.005	1.22 (1.05 -1.42)
Depression & anxiety	65 (34.8)	83 (34.2)	0.896	0.98 (0.76 - 1.28)
Physically Active	134 (71.7)	142 (58.4)	0.005	1.8 (1.19 – 2.70)

Association between physical activity and mental health:

Table 4 shows that students engaging in some physical activity were significantly less depressed

depression scores significantly decreased with increase in the term of studies of students. As the depression scores increased anxiety scores also increased significantly.

Table 4: Association of Physical Activity Levels with Anxiety and Depression among Students

Mental status	Physically Active (N=276)	Physically Inactive (N= 154)	p value	OR(CI)
Depression	94 (34.1)	76 (49.4)	0.002	1.89 (1.26 - 2.82)
Anxiety	177 (64.1)	103 (66.9)	0.56	1.13 (0.75 - 1.71)
Depression & anxiety	86 (31.2)	62 (40.3)	0.057	1.49 (0.99 - 2.25)

Table 5: Association of Proximity of Exams with Anxiety, Depression and Physical Activity among Students

Variables	Exams in 2 months (N=209)	No Exams (N= 221)	P value	OR (CI)
Depression	91 (43.5)	79 (35.7)	0.098	1.14 (0.98 - 1.32)
Anxiety	153 (73.2)	127 (57.5)	0.001	1.59 (1.21 - 2.08)
Depression & anxiety	80 (38.3)	68 (30.8)	0.1	1.12 (0.98 - 1.29)
Physically Active	139 (62.9)	137 (65.6)	0.57	1.12 (0.76 – 1.67)

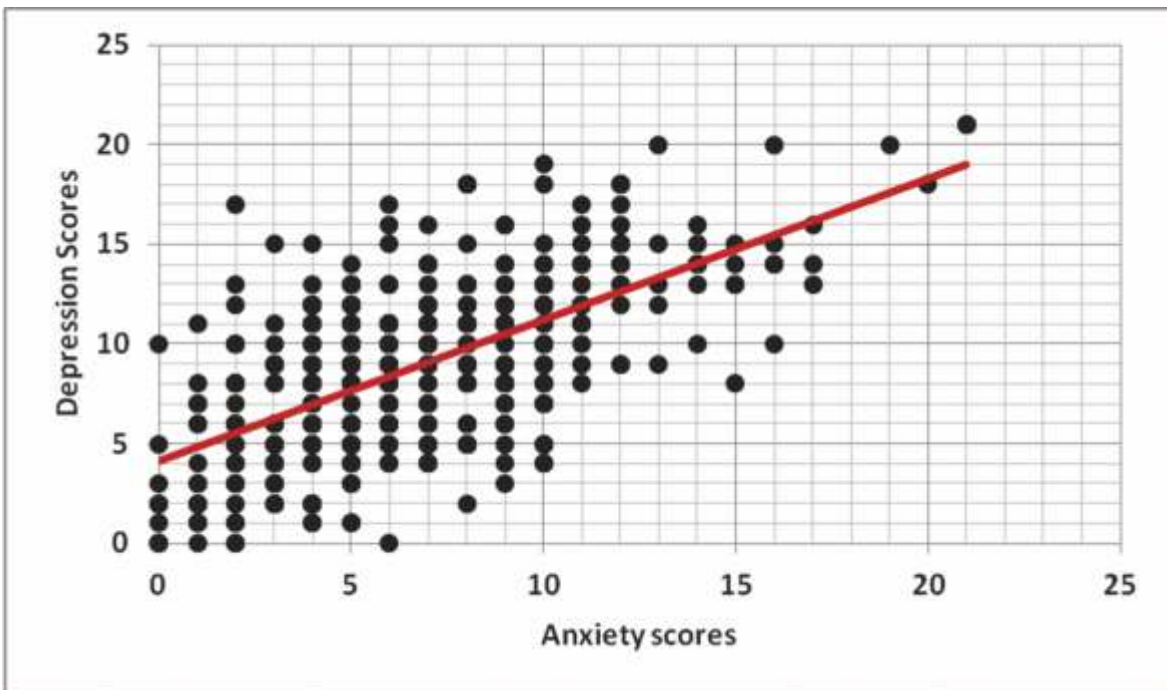


Fig 1a: Correlation between Variables Associated with Anxiety and Depression Scores.

R=0.64, p < 0.01

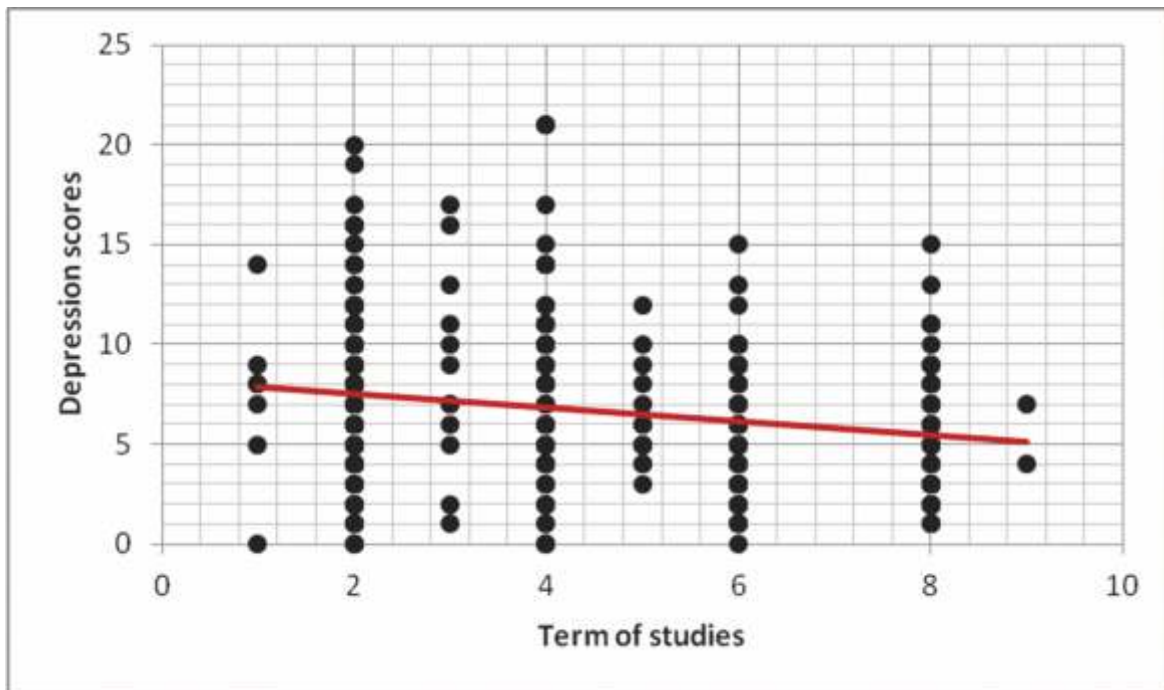


Fig 1b: Correlation between Variables Associated with Term of Studies and Depression Scores.

$$R=-0.20, p < 0.01$$

Discussion:

The prevalence of anxiety (65.1%), depression (39.5%) and anxiety with depression (34.4%) was high among medical undergraduate students. It is distributing to note that 9.3% of students reported to have severe anxiety and 4.2% severe depression. Only 18.1% of students were highly physically active while 35.9% were inactive. Tyson *et al* reported a much lower prevalence of depression (10%) and a similar prevalence of anxiety (60%) among medical students [23]. Previous studies which have looked at the mental health of students have concluded that they are at an increased risk of anxiety and depression [16, 17]. Prevalence of anxiety was more among students appearing for exams in two months as compared to those who did not. Though the goal of medical education is to graduate knowledgeable, skilful and professional physicians, somehow medical training has some unintentional negative effects on medical students mental and emotional

health. Studies state that student's distress contributes to pessimism and subsequently may affect care to patients, relationship with faculty and finally success in their future carrier as physician [24]. Hence the issue of potential mental health problems in medical students is one which needs to be proactively and continually monitored by academic institutions.

Anxiety has been significantly observed more commonly among females (70.2%), as compared to males. The prevalence of depression has been similar among males and females. The present results are in line with previous studies, [13, 24, 25] who have reported more mental health disorders among female medical students. This may be due to increase in negative psychological functioning during adolescence; females seem to report more psychological complaints than males. More anxiety among females can be attributed to the fact that females have a lower threshold for tolerating stress and also in evaluating and

reporting experiences as problematic. The differences may therefore partly result from gender differences in self-reporting styles [26]. Totally, the results highlight the need to provide support for female medical students especially, as they seem to be more vulnerable to psychological problems.

Students engaged in some physical activity have shown significantly lower levels of depression (34.1%) than the students have been inactive (49.4%). Students engaged with some physical activity also have shown lower levels of anxiety and anxiety with depression than the inactive group. There are various studies where both anxiety and depression were significantly associated with low physical activity [27, 28, 29]. There has been a negative correlation between amounts of physical activity and self-reported anxiety and depression scores as reported by Tyson *et al* [23] Hassmen *et al* have suggested that greater amounts of physical activity is associated with a reduction in depression [30]. As cause effect relationship cannot be established in this study, it is difficult to say that higher levels of depression are due to a lack of physical activity. It may be the case as suggested in other studies [31, 32] that the more depressed an individual becomes, the less likely he is to engage in physical activity. There are only few studies which have explored the relationship between mental health status and physical activity among medical students who were not primarily identified as having any mental health problems.

The significant increase in anxiety levels among students appearing for exams in the next two months has been observed than those who don't. This study supports the findings of previous studies; in that majority of the medical students experience some level of anxiety during exams [33, 34] Hashmat *et al* have also reported significant lack of physical activity among exam going students [34]. There has been a negative

correlation observed between the term of studies, anxiety scores and depression scores. This may be due to the behavioural adjustment made by medical students to meet the needs of the course over period of time. This study does not give causal association between physical activity and mental health as it is a cross sectional study. A longitudinal cohort study for five years on fresh students will help in exploring the same.

In summary prevalence of anxiety, depression and co presence of anxiety and depression is high among medical students. Physical activity levels are low among medical students. Anxiety levels are significantly higher among females compared to males. Males are significantly more physically active compared to females. Depression is significantly associated with physical inactivity. Anxiety has been significantly higher among students who are appearing for exams in the next two months. Anxiety and depression scores are decreased as the term of study of students increased.

Finally, our findings contribute to the growing body of literature demonstrating a positive association between low physical activity and depression and anxiety among medical students. Furthermore, qualitative research into the perceptions of the role of physical activity in the lives of students for the maintenance of good mental health may also shed light on this relationship.

Conclusion:

It should be of interest to the students wishing to maintain and promote their mental health while at medical college, and also for universities wishing to safeguard their students emotional well-being through the promotion of physical activity. Fostering good mental wellbeing and preventing mental health problems among medical students plays a crucial role in medical education and health improvement.

Acknowledgements:

We thank all students of SDUMC, Kolar for their

humble and enthusiastic participation in the research.

References:

1. Grunbaum JA, Kann L, Kinchen SA, et al. Youth risk behavior surveillance—United States, 2001. *MMWR Surveill Summ* 2002; 51:1-64.
2. Shaffer D, Fisher P, Dulcan MK, et al. The NIMH Diagnostic Interview Schedule for Children Version 2.3 (DISC 2.3), description, acceptability, prevalence rates, and performance in the MECA Study: Methods for the Epidemiology of Child and Adolescent Mental Disorders Study. *J Am Acad Child Adolesc Psychiatry* 1996; 35(7):865-877.
3. Shaffer D, Gould MS, Fisher P, et al. Psychiatric diagnosis in child and adolescent suicide. *Arch Gen Psychiatry* 1996; 53(4): 339-348.
4. Shatin D, Drinkard CR. Ambulatory use of psychotropics by employer-insured children and adolescents in a national managed care organization. *Ambul Pediatr* 2002; 2:111-119.
5. Merikangas KR, Nakamura EF, Kessler RC. Epidemiology of mental disorders in children and adolescents. *Dialogues Clin Neurosci* 2009; 11(1):7-20.
6. Oberg EB, Frank E. Physicians' health practices strongly influence patient health practices. *J R Coll Physicians* 2009; 39(4): 290-291.
7. Saxena S, Ommeren VM, Tang K, Armstrong T. Mental health benefits of physical activity. *Journal of Mental Health* 2005; 14(5): 445-451.
8. Stathopoulou G, Powers MB, Berry AC, Smits JAJ, Otto MW. Exercise Interventions for Mental Health: A Quantitative and Qualitative Review. *Clinical Psychology: Science and Practice* 2006; 13 (2): 179-193.
9. Craft L. Exercise and clinical depression: examining two psychological mechanisms. *Psychology of Sport and Exercise* 2005; 6 (2):151-171.
10. Faulkner G, Biddle SJH. Exercise and depression: considering variability and contextuality. *Journal of Sport & Exercise Psychology* 2004; 26(1):3-18.
11. Dunn M, Trivedi J, Kampert C, Clark H, Chambliss. Exercise treatment for depression Efficacy and dose response. *American Journal of Preventive Medicine* 2005; 28(1):1-8.
12. Hamer M, Taylor A, Steptoe A. The effect of acute aerobic exercise on stress related blood pressure responses: a systematic review and meta-analysis. *Biological Psychology* 2005; 71(2): 183-190.
13. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: A cross sectional study. *Med Educ* 2005; 39(6): 594 -604.
14. Seyedfatimi N, Tafreshi M, Hagani H. Experienced stressors and coping strategies among Iranian nursing students. *BMC Nursing* 2007; 6:11.
15. Aktenkin M, Karaman T, Yesim YS, Erdem S, Ercengin H, Akaydin M. Anxiety, depression and stressful life events among medical students: a prospective study in Antalya, Turkey. *Med Educ* 2001; 35(1):12-17.
16. Wardle J, Steptoe A, Gulis G, et al. Depression perceived control, and life satisfaction in university students from central-Eastern and western Europe. *International Journal of Behavioural Medicine* 2004; 11 (1): 27-36.
17. Inam SN, Saqib A, Alam E. Prevalence of anxiety and depression among medical students of a private university. *Journal of the Pakistani Medical Association* 2003; 53(2):44-47.
18. Zigmond A, Snaith RP. The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavia* 1983; 67: 361-370.
19. Mykletun A, Stordal E, Dahl A. Hospital Anxiety and Depression (HAD) Scale: factor structure, item analyses and internal consistency in a large population. *British Journal of Psychiatry* 2001; 179: 540-544.
20. Thirlaway K, Benton D. Participation in physical activity and cardiovascular fitness have different effects on mental health and mood. *Journal of Psychosomatic Research* 1992; 36(7): 657-665.
21. Booth ML. Assessment of Physical Activity: An International Perspective. *Research Quarterly for Exercise and Sport* 2000; 71(2):114-120.
22. Craig CL. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc* 2003; 35(8): 1381-1395.
23. Tyson P, Wilson K, Crone D, Brailsford R, Laws K. Physical Activity and Mental Health in a Student Population. *Journal of Mental Health* 2010; 19(6): 492-499.
24. Sreeramareddy CT, Shankar PR, Binu VS, Mukhopadhyay C, Ray B, Menezes RG. Psychological morbidity, sources of stress and coping strategies

- among undergraduate medical students of Nepal. *BMC Medical Education* 2007; 7(26):1-8.
25. Mostafa SR, Bassiouny A, Shafei M, Tarhony AH. Levels and predictors of stress among medical students in Alexandria. *Bull Alex Fa Med* 2006; 42(4):1-8.
 26. Dyrbye LN, Thomas MR, Shanfelt TD. Medical student distress: causes, consequences and proposed solutions. *Mayo Clinic Proc* 2005; 80(12): 1613-1622.
 27. Heyerdahl S, Kvernmo S, Wichstrom L. Self-reported behavioural/ emotional problems in Norwegian adolescents from multiethnic areas. *European Child & Adolescent Psychiatry* 2004; 13(2): 64-72.
 28. Ahmadi J, Samavat F, Sayyad M, Ghanizadeh A. Various types of exercise and scores on the Beck Depression Inventory. *Psychological Reports* 2002; 90(3):821-822.
 29. Toskovic N. Alterations in selected measures of mood with a single bout of dynamic Taekwondo exercise in college-age students. *Perceptual and Motor Skills* 2001; 92(3): 1031-1038.
 30. Hassmen P, Koivula N, Uutela A. Physical exercise and psychological well being: a population study in Finland. *Preventative Medicine* 2000; 30(1): 17-25.
 31. Ussher M, Stanbury L, Cheeseman V, Faulkner G. Physical Activity Preferences and perceived Barriers to Activity Among Persons with Severe Mental Illness in the United Kingdom. *Psychiatric Services* 2007; 58(3): 405-408.
 32. Paluska SA, Schwenk TL. Physical activity and mental health: current concepts. *Sports Medicine* 2000; 29(3): 167-180.
 33. Siapanish R. Stress among Medical students in a Thai Medical School. *Med Teach* 2003; 25(5): 502-506.
 34. HashmatS, Hashmat M, Amanullah F, Aziz S. Factors causing exam anxiety in medical students. *J Pak Med Assoc* 2008; 58(4): 167-170.

*Author for Correspondence: Dr. Deepthi R, No – 620 G, 'Raghava' 35th Cross, Rajajinagar 2nd Block, Bangalore, Karnataka, India -560010. Cell: 0919731885405 Email: drdeepthikiran@gmail.com