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**Original Research Article**

# Role of physical activity on mental health and academic performance among medical students: a cross-sectional study

**Joseph Jose[1]*, Sruthi M. V.[2]**

[1]Department of Community Medicine, [1,2]Amala Institute of Medical Sciences, Thrissur, Kerala, India

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***Correspondence:**
Dr. Joseph Jose,
E-mail: josephjose2210@gmail.com



## ABSTRACT

**Background:** World Health Organization (WHO) defines physical activity as "any bodily movement produced by skeletal muscles that requires energy expenditure. Since medical education is considered stressful due to voluminous academics, it leaves little time for the students to relax and recreate. Hence the present study had been undertaken with an aim to study various trends of physical activity, health status and academic performance among medical students and to find out any association between physical activity and health status, academic performance of medical students.

**Methods:** A cross-sectional study had been undertaken among 2nd and 3rd year MBBS students of our medical college. Physical activity was assessed using GPAQ version 2 questionnaire and mental status of students was measured using hospital anxiety and depression scale. Height, weight, and BMI, of each student along with demographic details were collected. The total percentage of any one of the internal marks of each student was taken for assessing the academic performance.

**Results:** Out of total 150 medical students it was found that 44% of medical students were physically inactive and 40.7% of them were highly active. Majority of female students 70.3% were physically inactive and overweight and obesity were higher among them when compared with male students. But anxiety and depressive symptoms were higher among male students. There was statistically significant difference in association between level of physical activity and mental health. The academic performance also increased with increase in physical activity.

**Conclusions:** Physical activity and mental health are related proportionally and it bears a positive influence on the education of the youth. The regular physical activity improves the mental status and academic performance among students.

**Keywords:** Academic performance, MBBS students, Mental health, Physical activity

## INTRODUCTION

World Health Organization (WHO) defines physical activity as "any bodily movement produced by skeletal muscles that requires energy expenditure." The term "physical activity" should not be confused with "exercise". The exercise is a subcategory of physical activity that is planned, structured, repetitive, and aims to improve or maintain one or more components of physical fitness. Other than exercise, any other physical activity that is done either during leisure time or during transport, or as part of a person's work, has a health benefit.[1] Physical inactivity (lack of physical activity) has been identified as the fourth leading risk factor for global mortality. An estimated 3.2 million deaths globally i.e. 6% of global deaths is due to physical inactivity. Moreover, physical inactivity is estimated to be the main cause for approximately 21-25% of breast and colon

cancers, 27% of diabetes and approximately 30% of ischemic heart disease burden.[2] Regular and adequate levels of physical activity in adults, reduce the risk of hypertension, coronary heart disease, stroke, diabetes, breast and colon cancer, depression, improve bone and functional health, and fundamental to energy balance and weight control.[3] Physical activity is also one of the most effective way to improve mental health. It has positive impact on depression, anxiety, relieves stress, improves memory, and boosts overall mood. Medical education itself is perceived as being stressful as it is characterized by many psychological changes in students. High level of stress may have a negative effect on cognitive functioning and learning of students in the medical school.[4] Psychological stress has long been regarded as having influence on learning and performance.[5] Physical activity is proven to improve mental health among normal individuals and even in people suffering from mental illness.[6] The positive association between physical activity, mental health and treatment of mental health problems, has been demonstrated in various studies.[6,7] Since medical education is considered stressful due to voluminous academics, it leaves little time for the students to relax and recreate. Because of this students face social, emotional and physical problems, which in turn, may affect their learning ability and academic performance.[8] But in reality research had proven that, by reducing the time spent on physical activities to add to academic duration has not produced positive results.[9] Regular physical activity in the form of sports and extracurricular activities for students not only benefit them physically, but also mentally. Individuals who participate in regular physical activity tend to report less symptoms of depression and anxiety and instead report improvements in overall mood and self-esteem. Evidence suggests physical activity enhances memory, cognitive function, and overall satisfaction with life.[10] Another researcher had shown a higher prevalence of overweight and obesity among medical students due to their physical inactivity and unhealthy eating habits.[11] Slade et al have found that changes in recreation before an exam had a positive influence on exam performance.[12] There were few studies among medical students to assess the trends of physical activity and its influence on academic performance and physical and mental health. Hence the present study had been undertaken with an aim to study various trends of physical activity, health status and academic performance among medical students and to find out any association between physical activity and health status, academic performance of medical students.

## METHODS

A cross-sectional study had been undertaken among 2nd & 3rd year MBBS students of our medical college, within May 2018 and October 2018. Calculated sample size was 148 using a formulae $4PQ/d^2$, taking P as 40.3%, prevalence of anxiety and depression among physically inactive medical students from previous study.[13] All students who had given consent from these batches were included except those who were physically challenged were excluded. Data was collected using self-administrated questionnaire. Physical activity was assessed using GPAQ version 2 questionnaire, where 3 domains of activity i.e. activity at work, travel, and recreation was assessed.[14] The level of physical activity referred in the questionnaire was presented as metabolic equivalent (MET).

1 MET =a resting energy expenditure assuming oxygen consumption of 3.5 ml-min/kg weight. Walking = 3.3 METS, moderate physical activity=4.0 METS and vigorous physical activity=8.0 METS. The MET level was assessed using the formula: MET level × minutes of activity/day × days per week. The MET level was multiplied by minutes of physical activity and by days per week. The physical activity was classified based on MET-minutes into three groups as: Inactive/low (<600 met-minutes), active (600-1200 met minutes) and highly active (>1200 met-minutes).

Mental status of students was measured using hospital anxiety and depression scale (HADS) having a 14-item self-report questionnaire with seven questions relating to anxiety and seven questions relating to depression.[15] 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. It contains separate questions for assessing anxiety and depression.

Height, weight, and BMI, of each student along with demographic details were collected. BMI was calculated using the formulae weight divided by height in meter square and WHO Asian classification was used for analysis. The total percentage of any one of the internal marks of each student was taken for assessing the academic performance. The percentage of marks were classified into four category 0-49% as low performance, 50-64% as Average, 65-74% as first class and >75% as Distinction

The data collected was entered into Microsoft excel and analysis was done by SPSS software version 21. The categorical variables were expressed in proportion and continuous variables in mean and standard deviation. The appropriate statistical methods were used for analysis. The level of significance was estimated with 95% confidence interval with $p<0.05$. The Institutional research committee and ethical committee clearance was obtained before starting the study and IEC No: AIMSIEC/14/2018 dated 10.05.2018.

## RESULTS

Out of 150 MBBS students participated in the study majority 76 (50.7%) were males and 74 (49.3%) were females. Majority of the students 77 (51.3%) belong to 7th

semester and 73 (48.7%) belong to 4th semester posting. The mean age was 21.01±0.82 with minimum age 19 and maximum age 24. Out of total 150 students only 1 (0.7%) student does a moderate activity during work and none of them do vigorous activity during travel and 48 (32%) of them does vigorous recreational activity and 73 (48.7%) of them does moderate recreational activity. Physical activity was assessed using GPAQ score. From this it was evident that 66 (44%) were inactive, 61 (40.7%) were highly active and 23 (15.3%) were active. The GPAQ classification was shown in Figure 1.

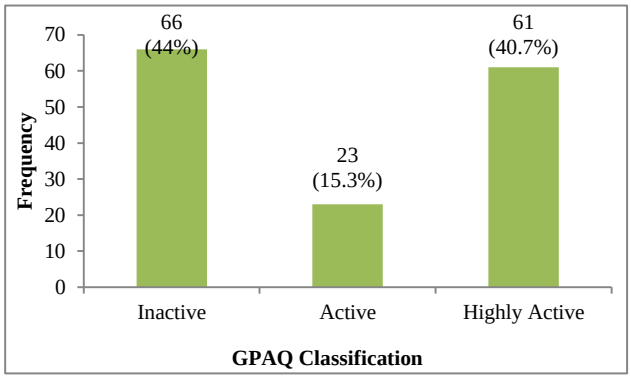


**Figure 1: Distribution of medical students according to their physical activity.**

When anxiety was assessed, it was found that 112 (74.7%) of students had no symptoms, 23 (15.3%) with mild symptoms, 13 (8.7%) with moderate symptoms, and 2 (1.3%) with severe symptoms. When depression was assessed 120 (80%) students had no symptoms, 19(12.7%) with mild symptoms, 8 (5.3%) with moderate symptoms and 3 (2%) with severe symptoms. Both depression and anxiety symptoms were higher among males. Out of total 76 male students 31.5% of them were suffering from anxiety symptoms and 26.3% of them were suffering from depressive symptoms. Among female students (74) only 18.9% of them showed symptoms of anxiety and 13.5% showed symptoms of depression (Table 1).

The mean weight of students was 59.01±10.72 ranging from 39 kg to 96 kg. The mean height of students was 166.77±10.28 ranging from 147 cm to 194 cm. When BMI was assessed it was found that more than half of medical students i.e. 94 (62.7%), were having normal BMI, 25 (16.7%) were overweight, 15 (10%) were obese and only 16 (10.7%) were underweight. Out of total 76 male students there were 10 (3.5%) students with underweight, 48 (64.9%), 10 (13.5%) and 6 (8.1%) of students with normal, overweight and obese category of BMI respectively. Out of total 74 female students, more than half of them 46 (60.5%) were having normal BMI and 6(7.9%) of them belonged to underweight category and 15 (19.7%) were overweight and 9 (11.8%) belonged to obese category. Both overweight and obesity were higher among female students with 19.7% and 11.8% respectively (Table 1).

**Table 1: Distribution of medical students according to their anxiety and depressive symptoms and BMI classification.**

| Parameter | Classification | Males (n=76) | Females (n=74) | Total (n=150) |
|---|---|---|---|---|
| | | N (%) | N (%) | N (%) |
| **Anxiety** | No Symptoms | 52(68.4) | 60(81.1) | 112(74.7) |
| | Mild symptoms | 13(17.1) | 10(13.5) | 23(15.3) |
| | Moderate Symptoms | 9(11.8) | 4(5.4) | 13(8.7) |
| | Severe symptoms | 2(2.6) | 0 | 2(1.3) |
| **Depression** | No symptoms | 56(73.7) | 64(86.5) | 120(80) |
| | Mild Symptoms | 11(14.5) | 8(10.8) | 19(12.7) |
| | Moderate Symptoms | 6(7.9) | 2(2.7) | 8(5.3) |
| | Severe Symptoms | 3(3.9) | 0 | 3(2) |
| **BMI** | Underweight | 10(13.5) | 6(7.9) | 16(10.7) |
| | Normal | 48(64.9) | 46(60.5) | 94(62.7) |
| | Overweight | 10(13.5) | 15(19.7) | 25(16.7) |
| | Obese | 6(8.1) | 9(11.8) | 15(10) |

The academic performance was assessed and it was found that there were 8 (5.3%) students with distinction, 110 (73.3%) with first class, 31 (20.7%) with average performance and only 1 (0.7%) student with poor performance (Figure 2).

When the level of physical activity was compared with gender distribution of medical students it was found that male students were more active than female students and this difference was statistically significant ($p<0.001$). When physical activity was assessed among male students (76) it was found that more than half of them 51 (57.1%) belonged to the highly active group and when it was assessed among female students (74) majority of them 52 (70.3%) belonged to the inactive group. The present study showed a statistically significant difference between anxiety and depressive symptoms among medical students with level of their physical activity. Out of total 13 students with moderate anxiety symptoms, majority of them 11 (84.6%) were inactive and among

112 students without any anxiety symptoms 52(46.4%) were highly active and this difference was statistically significant Table 1 (p=0.005) Out of total 8 students with moderate depressive symptoms more than half 6 (74%) of them were inactive and only 1 (12.5%) of medical students were highly active, and this difference was statistically significant with p value 0.013. When level of physical activity among medical students were compared with BMI it was found that out of 15 obese students, majority 8 (53.3%) of them were inactive and 6 (40%) of them were highly active but this difference was not statistically significant. Out of total 8 students with distinction, it was found that more than half 5 (62.5%) were highly active only 1 (12.5%) of them were inactive and out of 13 students with average performance majority 15 (48.4%) were inactive. But this difference was not statistically significant (Table 2).

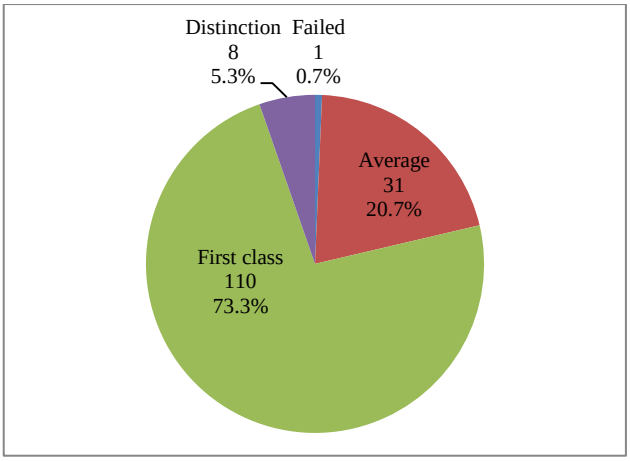


**Figure 2: Distribution of students according to academic performance.**

**Table 2: Association between physical activity among medical students with their gender, anxiety, depressive symptoms, BMI and academic performance.**

| Parameter | Classification | Physical Activity | | | Total | Statistical significance |
|---|---|---|---|---|---|---|
| | | Inactive (n=66) | Active (n=23) | Highly active (n=61) | | |
| | | N (%) | N (%) | N (%) | N (%) | |
| **Gender** | Males | 14 (18.4) | 11 (14.5) | 51 (57.1) | 76 (100) | Chi-square value= 49.4; p<0.001 |
| | Females | 52 (70.3) | 12 (16.2) | 10 (13.5) | 74 (100) | |
| **Anxiety** | No symptoms | 45 (40.2) | 15 (13.4) | 52 (46.4) | 112 (100) | Fischer's exact value=7.92; p=0.005 |
| | Mild symptom | 9 (39.1) | 6 (26.1) | 8 ( (34.8) | 23 (100) | |
| | Moderate sym | 11 (84.6 | 1 (7.7) | 1 (7.7) | 13 (100) | |
| | Severe sym | 1 (50) | 1 (50) | 0 | 2 (100) | |
| **Depression** | No Symptoms | 48 (40) | 16 (13.3) | 56 (46.7) | 120 (100) | Fischer's exact value=6.19; p=0.013 |
| | Mild symptom | 11 (57.9) | 4 (21.1) | 4 (21.1) | 19 (100) | |
| | Moderate sym | 6 (74) | 1 (12.5) | 1 (12.5) | 8 (100) | |
| | Severe sym | 1 (33.3) | 2 (66.7) | 0 | 3 (100) | |
| **BMI** | Under weight | 8 (50) | 1 (6.2) | 7 (43.8) | 16 (100) | Fischer's exact value=0.14; p=0.707 |
| | Normal | 41 (43.6) | 19 (20.2) | 34 (36.2) | 94 (100) | |
| | Over weight | 9 (36) | 2 (8) | 14 (56) | 25 (100) | |
| | Obese | 8 (53.3) | 1 (6.7) | 6 (40) | 15 (100) | |
| **Academic performance** | Failed | 0 | 0 | 1 (100) | 1 (100) | Fischer's exact value=0.303; p=0.58 |
| | Average | 15 (48.4) | 3 (9.7) | 13 (41.9) | 31 (100) | |
| | First class | 50 (45.5) | 18 (16.4) | 42 (38.2) | 110 (100) | |
| | Distinction | 1 (12.5) | 2 (25) | 5 (62.5) | 8 (100) | |

## DISCUSSION

Medical students during their training years are vulnerable to various academic, psychosocial and environmental stressors which can have detrimental effects on their health and academic performance. Stress affects medical students worldwide. Regular physical activity not only reduces the stress level but also has beneficial effect on body as well as mind. The present study shows that 66 (44%) of medical students were physically inactive and 61 (40.7%) of students were doing high level of physical activity. This finding was similar to study done by Viji showing that 44% of medical students were doing physical activity more than 150 min/week.[16] Another study done by Deepthi showed that only 35.9% of medical students were inactive.[13] The present study also shows that more than half of medical female students 52 (70.3%) were physically inactive compared with their male students and this difference was statistically significant. The similar results were obtained from a study done by Deepthi which showed that 41.6% of female students were physically inactive when compared to their male counterpart which comprised of 28.3%.[13] Another study done by Satheesha showed higher percentage of medical students involved in physical activity about 81% of males and 71% of females taking part in physical activity.[17] The present study also shows a

statistically significant difference between level of physical activity and anxiety and depressive symptoms. Similar results were obtained from the previous study done by Deepthi where 40.3% of physically inactive medical students were suffering from both anxiety and depressive symptoms.[13] Another study done among medical students by Veena showed that 18.5% were overweight; 2.64% obese and 14.02% underweight.[11] The present study had similar result with 10.7% of underweight, 16.7% with overweight and 10% with obesity among medical students. Another study conducted by Velou showed that academic performance were higher among physically active medical students.[18] The present study also shows that among students with distinction more than half 5 (62.5%) were highly active. The previous studies had shown that brain function may indirectly benefit from physical activity due to increased energy generation.[19]

## CONCLUSION

Physical activities and mental health are related proportionally and it bears a positive influence on the education of the youth. The study perceives that these activities increase student's focus on studies and help them to succeed academically. The findings of our study suggest that physical activities may bring about positive changes in student's physical health and behavior. Based on the results of the present study, it can be suggested that professional colleges and universities should focus on the facilitation of physical activities for students, through either outdoor or indoor opportunities.

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