Original Research Article

The Impact of Physical Activity on Health Care Student Academic Performance in Riyadh, Saudi Arabia

Muath Ibrahim Alsabih1*, Hussein Saad Amin2,3, Ali Saeed Alrawdhan1, Fahad Yousef Alturki1, Abdulrahman Mansour Alakeel1, Yasser Abdulaziz Alrumih1, Ahmed Saleh Allohidan1, Ammar Abdullah Naji1, Naif Abdulrahman Alarjani1

1Medical Interns, College of Medicine, King Saud University
2Assistant Professor and Consultant in Family Medicine, Department of Family and Community medicine, College of Medicine, King Saud University
3KSU Chair for Medical Education Research and Development, King Saud University
*Corresponding author email: muathalsabih@gmail.com

Abstract

Background: It is assumed that the students of health care colleges have a greater knowledge about healthy lifestyle and dietary habits when compared to other students. The main goal of this study was to determine the prevalence and effect of exercise on the academic performance of the health care students.

Materials and methods: This cross-sectional study was conducted on 376 male healthcare students at King Saud University in Riyadh from Colleges of Medicine, Dentistry and Pharmacy in the period from December 2014 until March 2015. The study population was selected by multistage random sampling. A self-administered questionnaire was used for data collection. A pilot study was conducted to test its feasibility. A statistical package for the social sciences (SPSS) version 21.0 was used for data analysis.

Results: 56.6% of the subjects were found to be physically active. Those who did not perform exercise, lack of time (55.8%) and lack of interest (36.2%) appeared to be the two most common
causes for not exercising. The effect of physical activity on academic performance was found to be statistically significant in only two domains which were being less likely to be being late to the classes (P.026) and relatively better concentration during lectures (P.001).

**Conclusion:** The study included that a significant positive effect of exercise was found on two domains of academic performance, namely better concentration in classes and punctuality in attending lectures, but with no significant effect on GPA of students.

**Key words**
Physical activity, Academic performance, Healthcare students, Punctuality, Concentration.

**Introduction**
Healthcare education can be stressful, preventing the students from practicing their hobbies, like physical activity (PA), which is defined by World Health Organization as any bodily movement produced by skeletal muscles that require energy expenditure [1]. An adequate PA defined as 150 minutes per week of moderately intense PA such as a brisk walk and resistance exercise [2]. A study showed that students who spend more time engaged in PA are predisposed to a below average academic record [3]. Several authors [4-7] have observed a positive relationship between PA and students’ academic results. We studied the relationship of PA and Academic performance of medical students in Riyadh, Saudi Arabia.

**Materials and methods**
A cross-sectional study was performed on medical, pharmacy and dental colleges at King Saud University in Riyadh during the period from December 2014 to March 2015.

Prevalence of students doing exercise was assumed to be 50%. The sample size of 385 subjects was calculated by using the following equation: \( N = Z^2 \alpha P (1-P)/d^2 \) where \( Z_\alpha = 1.96 \), \( D=0.05 \) and \( P=.5 \)

Since the study subjects were planned to be from three different colleges, a multistage random sampling was the sampling technique for this study. The students in each college were distributed by academic year and listed in groups. We distributed 25 questionnaires randomly to each group of medical students in each academic year.

A questionnaire was designed to fit the study objectives. It was divided into three sections. The first section described the subject’s personal data that included the subject’s age, residence, college, academic year, smoking habits, social status, past medical history and the way they arrived at the college. The second section included the type of exercise, the frequency and gym participation. The third section focused on the subject’s academic performance, considering their concentration in the lectures, grade point average (GPA), average sleep hours, class attendance, daily mood, study method, the general effect of exercise on study and the effect of exercise on orientation in classes. For instance, the questionnaire including participation in housework, waking time in usual study days, the status and way of study such as studying while watching TV or listening to music.

From an ethical point of view, Institutional Review Board (IRB) of College of Medicine approved the research proposal. A pilot study was conducted among 30 volunteers of medical students to assess the validity and feasibility of the questionnaire. The pilot study was very helpful in improving the questionnaire. Ambiguous and unclear statements were rectified as needed.

Statistical Package for the Social Sciences (SPSS) version 21.0 was used to analyze the data. To compare between physical activity &
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academic performance, the tests that were selected in this comparison are independent frequency tables to estimate the frequency different dependent and independent variables. To test the association between variables, the independent T test was used for continuous data and chi-square test for categorical data. Statistical significance was set at $P < .05$.

**Results**

**Description of enrolled students**

The medical students who responded and participated in this study were 376 with a mean age of 21.7 years. The majority were from colleges of medicine (53.7%), followed by dentistry (27.4%) and pharmacy (18.9%). The great majority of students were single (97.2%). 11.7% were current smokers and there were no demographic differences of statistical significance between students who exercise and others who did not ($P = .557$). The data showed variable duration of smoking ranging from 1-10 years. Nearly three quarters reported waking up at 6-7 am. The mean of sleeping hours was 6.7 hours with no significant association between sleeping time and exercise ($P = .134$) (Table - 1).

The majority of students (92.8%) use cars to come to colleges and only a few of them used to come walking (6.1%) or by biking (1.1%) with no significant difference between both groups ($P = .758$).

**Table - 1:** Factors related to exercising among students.

<table>
<thead>
<tr>
<th>Factors related to exercising</th>
<th>Exercising</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td><strong>Academic year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First</td>
<td>34</td>
<td>16.0</td>
</tr>
<tr>
<td>Second</td>
<td>59</td>
<td>27.7</td>
</tr>
<tr>
<td>Third</td>
<td>40</td>
<td>18.8</td>
</tr>
<tr>
<td>Fourth</td>
<td>43</td>
<td>20.2</td>
</tr>
<tr>
<td>Fifth</td>
<td>37</td>
<td>17.4</td>
</tr>
<tr>
<td><strong>College</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine</td>
<td>117</td>
<td>54.9</td>
</tr>
<tr>
<td>Dentistry</td>
<td>57</td>
<td>26.8</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>39</td>
<td>18.3</td>
</tr>
<tr>
<td><strong>Smoking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>25</td>
<td>11.7</td>
</tr>
<tr>
<td>No</td>
<td>188</td>
<td>88.3</td>
</tr>
<tr>
<td><strong>Health problems</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>32</td>
<td>15.0</td>
</tr>
<tr>
<td>No</td>
<td>181</td>
<td>85.0</td>
</tr>
<tr>
<td><strong>Transport to college</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>197</td>
<td>92.5</td>
</tr>
<tr>
<td>Bicycling</td>
<td>13</td>
<td>6.1</td>
</tr>
<tr>
<td>Walking</td>
<td>3</td>
<td>1.4</td>
</tr>
</tbody>
</table>

The study showed that 12.8% of students were currently suffering from chronic health problems. The most frequent were asthma (64.6%) followed by skin allergy (12.5%) and cardiac problems (10.4%) (Table - 2).
Table - 2: Health problems among medical students.

<table>
<thead>
<tr>
<th>Health problems (n=48)</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>31</td>
<td>64.6</td>
</tr>
<tr>
<td>Skin allergy</td>
<td>6</td>
<td>12.5</td>
</tr>
<tr>
<td>Cardiac problems</td>
<td>5</td>
<td>10.4</td>
</tr>
<tr>
<td>Allergic rhinitis</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>Musculoskeletal problems</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Hyperopia</td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Irritable Bowel Syndrome</td>
<td>1</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Table - 3: Prevalence and pattern of physical exercises reported by students.

<table>
<thead>
<tr>
<th>Exercises</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doing physical exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>213</td>
<td>56.6</td>
</tr>
<tr>
<td>No</td>
<td>163</td>
<td>43.4</td>
</tr>
<tr>
<td>Intensity of exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vigorous Exercise</td>
<td>52</td>
<td>24.4</td>
</tr>
<tr>
<td>Moderate Exercise</td>
<td>75</td>
<td>35.2</td>
</tr>
<tr>
<td>Light Exercise</td>
<td>86</td>
<td>40.4</td>
</tr>
<tr>
<td>Timing of exercising</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning</td>
<td>10</td>
<td>4.7</td>
</tr>
<tr>
<td>Afternoon</td>
<td>30</td>
<td>14.1</td>
</tr>
<tr>
<td>At evening</td>
<td>168</td>
<td>78.9</td>
</tr>
<tr>
<td>Any time of the day</td>
<td>5</td>
<td>2.3</td>
</tr>
<tr>
<td>Duration of exercising (minutes per day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 30 minutes</td>
<td>53</td>
<td>24.9</td>
</tr>
<tr>
<td>31 - 60 minutes</td>
<td>82</td>
<td>38.5</td>
</tr>
<tr>
<td>&gt; 60 minutes</td>
<td>78</td>
<td>36.6</td>
</tr>
<tr>
<td>Frequency of exercising (days per week)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every day</td>
<td>23</td>
<td>10.8</td>
</tr>
<tr>
<td>3 – 6 days</td>
<td>138</td>
<td>64.8</td>
</tr>
<tr>
<td>Less than 3 days</td>
<td>52</td>
<td>24.4</td>
</tr>
<tr>
<td>Participation in house chores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>102</td>
<td>47.9</td>
</tr>
<tr>
<td>No</td>
<td>111</td>
<td>52.1</td>
</tr>
</tbody>
</table>

Physical exercise was reported by (56.6%) of the students. The most frequent reported type of exercise was brisk walking (50.7%), followed by running (43.2%), weight lifting (40.8%), football (36.2%), and swimming (30%). The common frequent reason of not exercising was lack of time (55.8%), followed by lack of interest (36.2%) and medical problems (3.1%). Exercise intensity was vigorous among 24.4% of students and moderate among 35.2%, where more of students experience light exercise 40.4%. Most of the students were exercising 3-6 days weekly (64.8%), everyday (10.8%) and Less than 3 days weekly (24.4%). Students who exercise on average for 30 min per day came to be (24.9%), those more than 30 min and less than one hour per day were 38.5% and more than one hour per day were 36.6%. In addition, less than half of students (47.9%) were participating in the house chores (Table - 3, 4).

Table - 4: Type of exercise among medical students.

<table>
<thead>
<tr>
<th>Type of exercise among medical students</th>
<th>No of students</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>108</td>
<td>50.7</td>
</tr>
<tr>
<td>Running</td>
<td>92</td>
<td>43.2</td>
</tr>
<tr>
<td>Weight lifting</td>
<td>87</td>
<td>40.8</td>
</tr>
<tr>
<td>Football</td>
<td>77</td>
<td>36.2</td>
</tr>
<tr>
<td>Swimming</td>
<td>64</td>
<td>30</td>
</tr>
<tr>
<td>Bicycling</td>
<td>32</td>
<td>15</td>
</tr>
<tr>
<td>Jogging/brisk walking</td>
<td>30</td>
<td>14</td>
</tr>
<tr>
<td>Tennis</td>
<td>13</td>
<td>6.1</td>
</tr>
</tbody>
</table>

Half of the students, who exercise, do workouts in the gym (50.7%). The most frequent reported type of exercise in the gym was weight lifting, followed by treadmill and biking together, then swimming (Table - 5).

More than half of students spend 2 hours in the gym (53.7%), students who spend one hour in the gym were (38%) and the least of students spend more than 2 hours in the gym were (8.3%).

Factors related to exercising

Rates and pattern of physical activity

Around one third of students perceived themselves to have mood disturbance including stressed mood (14.6%), depression (12.8%) and anxiety (4.3%). No significant association was found between perception of mental disturbance and exercise (P.194) (Table - 6).
The students who were exercising reported that, they concentrate in class most of the time (55.4%), while those who did not do exercise, came to be (47.2%). There is a significant association between exercise and concentration in class \((P < .001)\). The students who were doing exercise and were frequently coming late to the class were (27.2%) whereas those who did not exercise were (38.0%), revealing a significant association between exercise and coming late to class \((P = .026)\). There was no significant association between exercise and missing classes \((P = .145)\). The exercise showed no significant effect on improvement of students' GPA \((P = .541)\) (Table - 6).

**Table - 5:** Workout in gym of students who report exercising.

<table>
<thead>
<tr>
<th>Workout</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workout in gym</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>108</td>
<td>50.7</td>
</tr>
<tr>
<td>No</td>
<td>105</td>
<td>49.3</td>
</tr>
<tr>
<td>Pattern of workout *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardio</td>
<td>91</td>
<td>84.3</td>
</tr>
<tr>
<td>weight lifting</td>
<td>66</td>
<td>61.1</td>
</tr>
<tr>
<td>Treadmill</td>
<td>57</td>
<td>52.8</td>
</tr>
<tr>
<td>Biking</td>
<td>57</td>
<td>52.8</td>
</tr>
<tr>
<td>Swimming</td>
<td>55</td>
<td>50.9</td>
</tr>
<tr>
<td>Elliptical</td>
<td>42</td>
<td>38.9</td>
</tr>
<tr>
<td>Aerobics</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td>Hours spent in gym (hours Per day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 hour</td>
<td>41</td>
<td>38.0</td>
</tr>
<tr>
<td>2 hours</td>
<td>58</td>
<td>53.7</td>
</tr>
<tr>
<td>3 hours</td>
<td>8</td>
<td>7.4</td>
</tr>
<tr>
<td>&gt; 3 hours</td>
<td>1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

*Categories are not mutually exclusive

**Discussion**

One of the main goal of the current study was to investigate the effect of exercise among health care students. More specifically, it aimed to investigate the effect of exercise on academic performance. We had assumed that health care students would have a higher prevalence of exercise than general population considering their knowledge and awareness regarding the benefits of physical activities.

WHO in its prevalence of insufficient physical activity among adults' data by country report in 2010 [8], stated that the global prevalence of physical activity among adults over 18 is 77%, while Saudi Arabia was occupying the third most inactive population with prevalence of inactivity of 53.2%. A study by Al-hazaa [9] reported that physical inactivity ranged from 43.4% to 99.5% in Saudi Arabia depending on the age group and estimated that physical activity prevalence was 28.4% in people between the ages 15-29. In the current study we found that, the prevalence of physical activity among health care students was 56.6%, which is higher than the above-mentioned studies related to the general population. The difference could be attributed to the increased awareness and knowledge of the importance of the physical activity among the health care students. Still, it is lower than the global prevalence and the possible explanation could be the limited number of facilities available for practicing physical activity at the university as well as city of Riyadh.

The Bureau of Labor Statistics (BLS) of the United States (US) Department of Labor [10] reported that, the most common reported types of exercise among population between 15-24 years were basketball, American football and soccer while weight lifting and walking were not that common. In comparison to this research, we found that walking was the most common type of exercise among the students, followed by running and then weight lifting. This may be due to the environmental and cultural differences and variability of interests.

Regular exercise releases chemicals, which are the key for memory, concentration and mental sharpness [11]. This fact might be applied on our sample, as we found a significant difference between physically active and inactive students in concentration during classes. This study also showed that a significant higher percentage of
students, who reported exercising, were less frequently late for their classes. As being late to classes could be considered as lack of punctuality, we could conclude that the exercise is a positive factor in time management.

A study on health sciences graduate students reported, "there was no significant correlation between GPA and level of physical activity" [12], which is consistent with the observation in the current study. This was contradictory to the findings of Soo Shin who showed that students who spend more time engaged in physical inactivity are predisposed to a below average academic record [3].

**Table - 6:** Factors reflected academic performance and their relation to exercise.

<table>
<thead>
<tr>
<th>Factors related to exercising</th>
<th>Exercising</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Late to class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>58</td>
<td>62</td>
</tr>
<tr>
<td>No</td>
<td>155</td>
<td>101</td>
</tr>
<tr>
<td>Absence from class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>50</td>
<td>47</td>
</tr>
<tr>
<td>No</td>
<td>163</td>
<td>116</td>
</tr>
<tr>
<td>Concentration on lectures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All the time</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>Sometime</td>
<td>76</td>
<td>83</td>
</tr>
<tr>
<td>Most of the time</td>
<td>118</td>
<td>77</td>
</tr>
<tr>
<td>GPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5 – 5</td>
<td>32</td>
<td>16</td>
</tr>
<tr>
<td>4 - 4.49</td>
<td>181</td>
<td>147</td>
</tr>
<tr>
<td>3.5 - 3.99</td>
<td>37</td>
<td>31</td>
</tr>
<tr>
<td>≤ 3.49</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Mood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not disturbed</td>
<td>155</td>
<td>102</td>
</tr>
<tr>
<td>Depressed</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>Anxious</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Stressed</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>x ± s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>21.63±1.48</td>
<td>21.79±1.65</td>
</tr>
<tr>
<td>Sleeping hours</td>
<td>6.60±1.25</td>
<td>6.82±1.49</td>
</tr>
</tbody>
</table>

WHO has reported that regular physical activity may reduce anxiety and depression [2]. However, our findings did not support this concept as no significant association was found in the current study between physical activity and reduction of stress and anxiety. However, these variables are more subjective than objective. Finally, the present study is not without limitations. Firstly, the sample distribution showed that there were less number of pharmacy students than medical and dental students as academic years for Pharmacy College are four years whereas medicine and dentistry colleges' academic years are of five years duration. Secondly, female students were not included due to the impression that males in this country are
more likely to be engaged in exercise than the females due to cultural and environmental factors. Thirdly, academic performance was evaluated subjectively, which may have caused instrumental bias.

**Conclusion**

This study showed that more than half of the healthcare students of KSU colleges perform physical activity. There was a significant positive effect of exercise on some domains of academic performance, especially concentration in classes and punctuality but with no significant effect on GPA.

Health care students might face stress and lack of time for the exercise. However, they should be encouraged to consider the great benefits related to its effect on academic performance. Therefor students should try to find a time for their physical activities.

**Acknowledgement**

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