

ORIGINAL ARTICLE

ASSOCIATION OF PHYSICAL ACTIVITY AND SLEEP QUALITY WITH ACADEMIC PERFORMANCE AMONG DPT STUDENTS

ABSTRACT

AIM AND OBJECTIVES

It was to determine association of physical activity and sleep quality with academic performance among Doctor of Physical Therapy students.

METHODOLOGY

It was a cross sectional survey done among 230 DPT students of Riphah College of Rehabilitation, Lahore. The study was completed in 4 months. Both male and female having age range between 17 to 22 were included. Those doing their internship or part time job were excluded. Pittsburgh Sleep Quality Index was for assessing sleep quality, while physical activity was measured by Global Physical Activity Questionnaire. Chi square test was used to analyze association, while frequency tables, mean with standard deviation was used for descriptive statistics.

RESULTS

The results showed mean score and standard deviation 338.03+257.642 and 310.68+213.621 for high achievers and low achievers respectively, without any significant difference and correlation (p value 0.431 and 0.039). The results regarding PSQI were 11.185+6.359 and 10.041+6.316 for high achievers and low achievers respectively (p value 0.205 and 0.099).

CONCLUSION

The study concluded that overall there is poor sleep quality and low physical activity irrespective of academic performance or gender. There is no association in sleep quality, physical activity with academic performance in doctor of physical therapy students.

KEYWORDS

Academic performances, Exercise, Physical Activity, Physical Therapy, Sleep Quality, Sleep habit.

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INTRODUCTION

Physical activity and sleep quality are interlinked and can impact on academic performance in many ways. Physical inactivity and deprivation of sleep have impact on low academic performance. Sleep deprivation or sleeplessness is condition in which a person cannot get enough sleep. Physical activity is a movement produced by skeletal muscles and an adult must do 150 minutes low to moderate intensity exercise or 75 minutes moderate to vigorous exercise to stay healthy. Physical inactivity can make a person to have sedentary lifestyle. It is important to increase efficiency of academics in students with increasing their physical activity. Similarly sleep quality is also important this include no waking up for no more than once per night. Sleep quality and duration is also important factor for academic performance¹.

Researches show that medical students have stressed themselves to study and get best results. So, they study day and night for better performance². Less sleep at night causes day time sleepiness. Less sleep can affect student's mood and he feel less enthusiastic, less motivation to do work, more irritable, and can have some symptoms of anxiety. Changes in mood can affect studies as well may damage mental health. Students sacrifice their sleep during exam because to give extra hours to study due to stress of their GPA. Poor sleep may lead to emotional burden, depression or anxiety of clinical level as well as other psychosocial conditions. Actually, altered patterns of sleep are a main reason of many mental health issues. Researches show poor sleep quality is also associated with cognitive impairment and augmented reaction time and abridged cognitive production hence, it is very important to check sleep quality of medical students³.

More literature shows that the physical activity effects cognition and mental abilities in a very positive way. It is predominant that the physical activity level in students is required for finest mental function. Students adopt sedentary lifestyle specifically during exams it mean they perform very little activity. Little activity can cause many problems like obesity and other diseases. Movement is a cure for making change in status of person's physical, mental, and emotional states⁴.

There is quality evidence that the exercise may help in falling asleep more quickly and improve sleep quality. Hence, it is very important to check sleep quality and physical activity of medical students. Physical activity makes student's active and stress free but if they are physical inactive then they face stress, anxiety and sleep difficulty. And they are healthy physically and mentally they can give best academic performance³.

Extremely poor quality of sleep leads to clinical sleep issues such as insomnia or sleeplessness. In which individuals have difficulty in falling asleep or maintaining their sleep. The clinical sleep issues such as insomnia is also characterized with depressed mood irritability and energy issues. It can be short term which may range up to few days or it may be long term which rangers up to months. Search clinical sleep problems comes with underlying causes. These causes may include hyperthyroidism, hard failure chronic stress for chronic pain. Use of excess nicotine caffeine and alcohol are other reasons of sleeplessness^{5,6}.

Non-pharmacological means of treatment also include cognitive behavior therapy. The population which has no active lifestyle, low impact physical activities are recommended to increase activity level. Vigorous activities are not usually the choice of advisors when the purpose of physical activity is to break inactivity. Low impact physical activity has minimum impact on other systems including cardiovascular and musculoskeletal system. Therefore, low impact physical activities should be employed to increase physical activity level^{7,8}.

A cross-sectional survey was carried out in 2014 that included 254 students who performed swimming as physical activity showed higher the level of general physical activity performed, the better the GPA was in boys but in girls, aerobic activity improved grades so the research was gender-dependent and produced different results in males and females⁹. 409 undergraduate students participated in a cross-sectional study in 2016 to assess the association between physical activity and academic performance which showed 193 out of 409 who were found to be physically active achieved higher CGPA showing a positive association between these variables¹⁰.

Another research showed that moderate physical activity has a long term positive impact on academic performance in a sample of 4755 students¹¹. In 2016, 285 Australian students became part of an extensive cross-sectional survey which explained that moderate to vigorous physical activity improved academic performance¹².

A study explained the relation between academic performance and sleep quality that was influenced by stress. The study was a cross-sectional survey that included 144 participants 59% of them were stressed (low performance means low sleep quality and high stress) so poor sleep quality negatively affected their grades¹³.

In addition to sleep quality, sleep duration is also important. A research was conducted by Megan L. Zeek using cross-sectional study including 364 undergraduate students to find an association

between sleep duration and performance. The study revealed that students with optimum sleep (7-8hours) scored a higher GPA¹⁴.

The scope of this study is limited to the sleep quality which can be good or poor. The students with clinical sleep problems were not the focus of this study. The study objective was to evaluate sleep quality and physical activity with academic performance among DPT students of Riphah International University. The result of this study was expected to encourage healthy sleep habits and physical activity specifically for those students who face more problems regarding their grades and are below average.

METHODOLOGY

A cross sectional study was conducted. Data was collected from 330 subjects and the targeted population was the students of Physical Therapy of Riphah College of Rehabilitation Sciences, Lahore. The sample size was calculated through Raosoft Software.

With the sample size of	100	200	300
Margin of error would be	9.75%	6.86%	5.57%
With a confidence level of	90	95	99
Sample size would need to be	264	370	623

However, due to coronavirus situation, the survey was compiled at final sample size of 230. Sampling done was Non-probability convenience sampling. Written informed consent was taken from the students to participate in the study. Male and female students of semester system were included and they were aged between 17 to 22 years. The students working as house officers and professionals were excluded from the study. Data were collected by online questionnaire/ forms that were circulated in students from 2nd to 10th semester. Pittsburgh Sleep Quality Index i.e. PSQI was used for assessing sleep quality, while the physical activity was measured by Global Physical Activity Questionnaire (GPAQ). The academic performance was measured taking their CGPA up to last semester. Data was analyzed using SPSS 20.0 statistical software. The total score was for both sleep quality and physical activity and categorized according to guidelines into categorical variables. The categorical variables were analyzed using chi square statistics to see association. Furthermore, Pearson correlation was to see a correlation in total scores. Descriptive stats used were mean with standard deviation for continuous variables which were total scores of all scales and frequency tables for categorical variables which included demographics and categorical organization of total scores. Pie charts and bar charts were used for graphical representation of results.

RESULTS

The results showed that there were 38 females having good sleep quality and 185 females having poor sleep quality while all 7 males were having poor sleep quality, so gender exhibiting no association with sleep quality (p value 0.232). The results showed that there were 32 females having moderate physical activity and 191 females having low physical activity while except 1 male, remainder 6 males were having low physical activity, so gender exhibiting no association with physical activity levels (p value 0.996).

The results showed that there were 156 females who were high achievers in academic performance and those of 67 females were low achievers while except 1 male, remainder all 6 males were low achievers in academic performance, so gender exhibited significant association with academic performance (p value 0.002). The results showed that among high achievers there were 22 students having good sleep quality and those of 135 females having poor sleep quality, while among low achievers there were 16 students showed good sleep quality while 57 showed poor sleep quality, so academic performance was not associated with sleep quality (p value 0.133).

It was shown that among high achievers there were 24 students having moderate physical activity those of 135 females having moderate physical activity, while among low achievers there were 9 students who showed moderate physical activity while 64 showed low physical activity, so academic performance was not associated with physical activity (p value 0.551). Mean score and Standard Deviation of physical activity was 338.03±257.642 and 310.68±213.621 for high achievers and low achievers respectively, without any significant difference and correlation (p value 0.431 and 0.039).

The mean difference between higher and low academic achievers for physical activity score showed a mean difference of 10.821+6.354, with minimum score to be 0.00 and maximum to be 25, while median percentile found to be 10.50. It showed a non-significant difference (p value 0.248). The results out of total students 230 showed regarding gender distribution that there were 233 females and 7 males. The results showed out of total 230 that there were 14 students belonging to 1st year, 21 to 2nd year, 22 to 3rd year, 55 to 4th year and 118 to final year.

The results showed that out of total 230 students there were 38 students showing good sleep quality and those of 192 having poor sleep quality. The results showed that out of total 230 students there were 33 having moderate physical activity and those of 197 having low physical activity. The results

showed that out of 230 students there were 157 were high achievers in academic performance and those of 73 were low achievers.

Table 1: Academic Performance and Sleep.

Academic Performance	Sleep	P Value	
		Frequency	Percent
High achievers	Good sleep	22	14.0
	Poor sleep	135	86
Low achievers	Good sleep	16	21.9
	Poor sleep	57	78.1

The results showed that among high achievers there were 22 students having good sleep and those of 135 females having poor sleep, while among low achievers there were 16 students showed good sleep while 57 showed poor sleep, so academic performance was not associated with sleep (p value 0.133).

Table 2: Academic Performance and Physical Activity.

Academic Performance	Physical Activity	P Value	
		Frequency	Percent
High achievers	Moderate physical activity	24	15.3
	Low physical activity	133	84.7
Low achievers	Moderate physical activity	9	12.3
	Low physical activity	64	87.7

The results showed that among high achievers there were 24 students having moderate physical activity those of 135 females having moderate physical activity, while among low achievers there were 9 students who showed moderate physical activity while 64 showed low physical activity, so academic performance was not associated with physical activity (p value 0.551).

Table 3: MET and PSQI Scores.

	Academic Performance	Mean	Std. Deviation	P Value	Correlation Coefficient
MET	High achievers	3.3803E2	257.64202	0.431	0.039
	Low achievers	3.1068E2	213.62174		
PSQI Score	High achievers	11.1847	6.35975	0.205	0.099
	Low achievers	10.0411	6.31673		

Table 4: Sleep versus Physical Activity.

Sleep versus Physical Activity					
		Physical Activity		Total	p-value
		Moderate physical activity	Low physical activity		
Sleep	Good sleep	3	35	38	0.214
	Poor sleep	30	162	192	
Total		33	197	230	

The cross tabulation to analyze association of sleep with physical activity showed that among students showing good quality sleep 3 were in moderate physical activity and 35 among low physical activity level spectrum, while students showing poor sleep showed 30 in moderate physical activity and 162 in low physical activity, however, there was no significant association between sleep and physical activity (p value 0.214).

DISCUSSION

The study provided valuable findings regarding association of sleep, physical activity, academic performance, gender and year of education. Sleep and physical activity in reference to gender and academic performance are particularly important. First, it was observed an association between gender versus sleep and physical activity. A chi square test was performed which showed that all males and majority females were having poor quality sleep. There was no association in sleep and gender.

Furthermore, it was observed an association between gender versus physical activity. A chi square test showed that majority males and majority females were having low physical activity levels and insignificant numbers of male and female students were having moderate physical activity, therefore, there was no association in gender and physical activity as indicated by p value (0.996) greater than 0.05.

The findings of current study were compared with previous literature which were conducted with similar objective. In comparison to our study which showed that sleep quality and physical activity are irrespective to academic performance, previous findings suggested that longer sleep duration was statistically significantly associated with decreased risk for overweight and obesity independent of other sleep characteristics (OR = 0.82, 95% CI: 0.73, 0.91). Longer sleep duration was also associated with better diet quality and higher levels of physical activity¹⁵.

A study conducted in 2018 showed that students with good grades had higher levels of physical

activity and concentration in class with p value <0.001 whereas the results of our study showed negative correlation between physical activity and academic performance. Our study proved that students with poor sleep quality and sedentary lifestyle did not have any negative impact on their performance as compared to previous studies that showed students who had poor sleep quality and were sedentary did not get good grades^{16,17}.

In contrary to the findings of our study, a study showed a strong association between gender and physical activity. The study suggested that male gender is associated with higher physical activity because they were exposed to more outdoor activities than females but our study showed opposite results as the female participants in our study were more physically active than males. However, there was not a significant difference^{8,18,19}.

In comparison to our study, an Australian study suggested that females are predisposed to poor sleep quality than men. The study revealed that females even with longer sleep durations had poor sleep quality while men had efficient sleep with shorter durations. The study was statistically significant with p value <0.05 . Whereas the results of our studies did not show any significant difference regarding sleep duration in both genders²⁰⁻²².

Some previous studies showed that poor sleep quality in students is because of insomnia and depression because students are predisposed to stress. The result of the study showed high PA was insignificantly negatively associated with anxiety, depression, psychopathological symptoms and poor sleep. Low PA and high ST were independently and interactively associated with increased risks of mental health problems and poor sleep quality ($p < 0.05$). However, the results of our study when compared to that study is completely different as students who had poor sleep quality because of academic stress still scored better^{23,24}.

Other studies have more detailed statistical calculation. In order to see the depth and action of association between academic score for physical activity and sleep quality multi linear regression models have been used. However, the result of the study showed that there is no association between sleep quality with p value 0.232 and physical activity with p value 0.996 with academic performance whereas previous literature showed significant correlation between these three variables, when compared to our study²⁵⁻²⁷.

Although in our study there was no clear association between physical activity sleep quality and academic performance however based on previous literature and a general notion the physical activity should be encouraged among students.

The physical activity and sleep quality are natural influencers on each other. Good sleep quality is likely to promote physical activity and physical activity likely to induce good quality of sleep. There are many confounding factors which are worth mentioning for a future research. With the rapid change in lifestyle the physical activity seems to decrease for all individuals irrespective of their occupation or professional status. While this study was done, it was the beginning of covid-19, however, at the time of Data collection lockdown was not implemented in Pakistan. Still there was a decrease in physical activity and the academic activities were also being limited. There should also be included scales which measure level of stress and depression among students and any underline medical ailments such as hyperthyroidism or family history of cardiac failure or hypertension. daily consumption of nicotine and caffeine should also be taken in consideration. There should be taken record physical activity or history of participation in physical activity should also be considered.

CONCLUSION

The study concluded that over all there is poor sleep quality and low physical activity irrespective of academic performance or gender. There is no association in sleep quality, physical activity with academic performance in doctor of physical therapy students. Sleep quality and physical activity has poor correlation.

REFERENCES

- [1] Kao HS, Zhu L, Chao AA, Chen HY, Liu IC, Zhang M. [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3928403/Calligraphy and meditation for stress reduction: an experimental comparison](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3928403/Calligraphy%20and%20meditation%20for%20stress%20reduction%3A%20an%20experimental%20comparison).
- [2] Garfield V, Llewellyn CH, Kumari M. The relationship between physical activity, sleep duration and depressive symptoms in older adults: The English Longitudinal Study of Ageing (ELSA). *Preventive medicine reports*. 2016;4:512-6.
- [3] Curcio G, Ferrara M, De Gennaro L. Sleep loss, learning capacity and academic performance. *Sleep medicine reviews*. 2006;10(5):323-37.
- [4] Anwer S, Alghadir A, Manzar MD, Noohu MM, Salahuddin M, Li H. Psychometric Analysis Of The Sleep Hygiene Index And Correlation With Stress And Anxiety Among Saudi University Students. *Nature and Science of Sleep*. 2019;11:325.
- [5] Lesku JA, Aulsebrook AE, Kelly ML, Tisdale RK. Evolution of sleep and adaptive sleeplessness. *Handbook of Behavioral Neuroscience: Elsevier*; 2019. p. 299-316.
- [6] Horne J. *Sleeplessness: assessing sleep need in society today*: Springer; 2016.
- [7] Park H, Suh B. Association between sleep quality and physical activity according to gender and shift work. *Journal of Sleep Research*.

- 2019:e12924.
- [8] Wang F, Boros S. The effect of physical activity on sleep quality: a systematic review. *European Journal of Physiotherapy*. 2019:1-8.
- [9] Ayan C, Carral JC, Montero C. Academic performance of young competitive swimmers is associated with physical activity intensity and its predominant metabolic pathway: a pilot study. *Journal of Physical Activity and Health*. 2014;11(7):1415-9.
- [10] Al-Drees A, Abdulghani H, Irshad M, Baqays AA, Al-Zhrani AA, Alshammari SA, et al. Physical activity and academic achievement among the medical students: A cross-sectional study. *Medical teacher*. 2016;38(sup1):S66-S72.
- [11] Booth J, Leary S, Joinson C, Ness A, Tomporowski P, Boyle J, et al. Associations between objectively measured physical activity and academic attainment in adolescents from a UK cohort. *Br J Sports Med*. 2014;48(3):265-70.
- [12] Maher C, Lewis L, Katzmarzyk PT, Dumuid D, Cassidy L, Olds T. The associations between physical activity, sedentary behaviour and academic performance. *Journal of Science and Medicine in Sport*. 2016;19(12):1004-9.
- [13] Ahrberg K, Dresler M, Niedermaier S, Steiger A, Genzel L. The interaction between sleep quality and academic performance. *Journal of psychiatric research*. 2012;46(12):1618-22.
- [14] Zeek ML, Savoie MJ, Song M, Kennemur LM, Qian J, Jungnickel PW, et al. Sleep duration and academic performance among student pharmacists. *American journal of pharmaceutical education*. 2015;79(5).
- [15] Khan MK, Chu YL, Kirk SF, Veugelers PJ. Are sleep duration and sleep quality associated with diet quality, physical activity, and body weight status? A population-based study of Canadian children. *Canadian Journal of Public Health*. 2015;106(5):e277-e82.
- [16] Pilcher JJ, Morris DM, Bryant SA, Merritt PA, Feigl HB. Decreasing sedentary behavior: Effects on academic performance, meta-cognition, and sleep. *Frontiers in neuroscience*. 2017;11:219.
- [17] Sano A, Phillips AJ, Amy ZY, McHill AW, Taylor S, Jaques N, et al., editors. Recognizing academic performance, sleep quality, stress level, and mental health using personality traits, wearable sensors and mobile phones. 2015 IEEE 12th International Conference on Wearable and Implantable Body Sensor Networks (BSN); 2015: IEEE.
- [18] Wachob D, Lorenzi DG. Brief report: influence of physical activity on sleep quality in children with autism. *Journal of autism and developmental disorders*. 2015;45(8):2641-6.
- [19] Waqas A, Khan S, Sharif W, Khalid U, Ali A. Association of academic stress with sleeping difficulties in medical students of a Pakistani medical school: a cross sectional survey. *PeerJ*. 2015;3:e840.
- [20] Faught EL, Ekwaru JP, Gleddie D, Storey KE, Asbridge M, Veugelers PJ. The combined impact of diet, physical activity, sleep and screen time on academic achievement: a prospective study of elementary school students in Nova Scotia, Canada. *International Journal of Behavioral Nutrition and Physical Activity*. 2017;14(1):29.
- [21] Flueckiger L, Lieb R, Meyer AH, Wittthauer C, Mata J. The importance of physical activity and sleep for affect on stressful days: Two intensive longitudinal studies. *Emotion*. 2016;16(4):488.
- [22] Jiang X, Hardy LL, Baur LA, Ding D, Wang L, Shi H. Sleep duration, schedule and quality among urban Chinese children and adolescents: associations with routine after-school activities. *PloS one*. 2015;10(1):e0115326.
- [23] Wu X, Tao S, Zhang Y, Zhang S, Tao F. Low physical activity and high screen time can increase the risks of mental health problems and poor sleep quality among Chinese college students. *PloS one*. 2015;10(3):e0119607.
- [24] Wunsch K, Kasten N, Fuchs R. The effect of physical activity on sleep quality, well-being, and affect in academic stress periods. *Nature and science of sleep*. 2017;9:117.
- [25] Almojali AI, Almalki SA, Allothman AS, Masuadi EM, Alaqeel MK. The prevalence and association of stress with sleep quality among medical students. *Journal of epidemiology and global health*. 2017;7(3):169-74.
- [26] Choi D. Physical activity level, sleep quality, attention control and self-regulated learning along to smartphone addiction among college students. *Journal of the Korea Academia-Industrial cooperation Society*. 2015;16(1):429-37.
- [27] Fatima Y, Doi S, Mamun A. Sleep quality and obesity in young subjects: a meta-analysis. *Obesity reviews*. 2016;17(11):1154-66.