

Sleep Quality in Relation to Perceived Stress and Physical Activity in the Students of Private Medical Colleges in Pakistan

Doi: doi.org/10.53685/jshmdc.v3i1.90

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ABSTRACT

Background: Sleep is an essential function of our body. Many surveys have reported prevalence of poor sleep in university students, especially in medical students.

Objective: The objective of the study was to evaluate the effect of physical activity and stress on the sleep quality among medical students in Pakistan.

Materials & Methods: An observational cross-sectional study was conducted on medical students of private medical colleges of Lahore. Convenient sampling technique was used and 210 students were selected. The Pittsburgh Sleep Quality Index (PSQI), Godin Shephard Leisure Time Physical Activity Questionnaire (GSLTPAQ) and Perceived Stress Scale (PSS 10) were used for data collection. We used SPSS 20 to analyze data and applied statistical tests: Chi square test and Logistic Regression. A p-value < 0.05 was taken to establish significance

Results: Among the study participants 91(43.3%) were males and 119 (57.7%) were females. There was a significant effect of stress level on sleep quality (P=0.000*). Frequency of good sleepers was seen to increase by almost three times with increasing physical activity, however, this difference remained non-significant (p=0.07). Logistic regression test showed significant relationship between poor sleep and stress (p=0.008**) while no significant relationship was seen between sleep quality and physical activity.

Conclusion: There was a significant association between poor sleep and high stress levels and an increase in physical activity showed an increase in frequency of good sleep, however this difference was Non-significant. It can be inferred that this positive effect of increasing physical activity on quality of sleep could be indirectly due to its relieving effect on stress.

Key Words: Sleep, physical activity, stress and medical students

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Received 01.02.2022, Revised 27.05.2022,
Accepted 27.05.2022

How to cite this article: Farooqi M, Rehman SJ, Ahsan NZ, Malik MF, Ashraf H, Mirza JM. Sleep Quality in Relation to Perceived Stress and Physical Activity in the Students of Private Medical Colleges in Pakistan. J Shalamar Med Dent Coll. Jan-June 2022, Vol 3 Issue 1: 4-9. doi:10.53685/jshmdc.v3 i1.90

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INTRODUCTION

Sleep is an essential function of the human body. The American Society of the Sleep recommends seven hours of sleep daily for people aged between 18 to 60 years.¹ Sleep deprivation is thought to increase early morbidity and mortality, as well as linked with obesity.² Sleep plays an important role in energy conservation, immunity and cognition.³ Sleep disorders tend to affect memory consolidation,

cardiovascular health and many metabolic functions rather negatively.⁴

College students have relatively poor quality of sleep compared to the general population.⁵ Stress is one of the factors that affect sleep quality. Previous literature on sleep and mental health have demonstrated a reciprocal and rather symbiotic relationship between the two.⁶ Studies done on medical students of Pakistan found a strong association between stress and poor sleep and show that medical students have higher sleeping difficulties than their non-medical counterparts.⁷

Physical activity is another entity that has been associated with improved sleep quality, and physical inactivity has been cited as one of the biggest health concerns of this century.⁸ Therapeutic effects of physical activity on mental health are evident by the fact that exercise and physical exertion are the first-line interventions for anxiety disorders.⁹ College students are a chunk of the population who are prone to developing high stress and poor sleep, but research shows that those who indulge in intense physical activity are unlikely to show bad mental health and high stress.¹⁰ Much work has been done to establish the prevalence of stress in college students, as well as sleeping difficulties.

The objective of the study was to evaluate the effect of physical activity and stress on sleep quality among medical students in Pakistan.

MATERIALS AND METHODS

It was a cross-sectional study that was conducted after approval from the ethics committee of CMH Lahore Medical & Dental College (CASE#.627/ERC/CMH/LMC). A total of 250 subjects, aged between 20 to 80 years, both male and female were included in the study from private medical colleges. Participants were made aware of the study objectives before obtaining their consent and anonymity was ensured by excluding their names or any information that may reveal their identity. Non-probability simple

convenient sampling technique was adopted to select institutions and study participants. Subjects taking any type of sedatives, tranquilizers, anti-depressants or caffeinated energy drinks were excluded from the study. Data was collected, over a period of two months (Feb 2021 to March 2021), on validated questionnaires in order to acquire information regarding (1) subjects' socio-demographic data (such as age and gender) (2) and study variables of the study (i.e. quality of sleep, perceived stress levels and physical activity). The questionnaires were constructed on Google Forms (Google LLC) and the link to these questionnaires was shared with the participants via WhatsApp (Meta Platforms, Inc) and email. Any incomplete forms were excluded.

The Godin-Shephard Leisure Time Physical Activity Questionnaire (GSLTPAQ)¹¹ was used to measure the intensity of physical activity. It showed a reliability of 0.74 for the total LTPA score.

Pittsburgh Sleep Quality Index (PSQI) questionnaire was used to measure the quality of sleep having a reliability index of 0.87 and 98.7% sensitivity for sleep disturbances.¹²

A perceived stress scale (PSS-10) questionnaire was employed to measure the perceived level of stress.¹³ It exhibits adequate reliability of 0.78.

Statistical Analysis

Collected forms were interpreted according to each scale's own grading, and values were fed into an SPSS 20 (SPSS Inc, NY, USA) spreadsheet by the study team and the data was analyzed using SPSS 20. A p-value <0.05 was taken as standard to establish statistical significance. The Frequency distributions and descriptive statistics were obtained. Chi-square and logistic regression tests were used to check for significant associations.

RESULTS

The mean age of the participants was 22.2 ± 1.4 while the age range was 19-26 years. The mean of each study variable was calculated for the total

score obtained using their respective scaling system as per questionnaire guidelines (Table 1). Among the study participants, 91(43.3%) were males and 119 (57.7%) were females stress and 25 of the 40 good sleepers were physically very active.

On the other hand, 49 of the 170 poor sleepers had high stress and 44 of the 170 poor sleepers showed sedentary routine (Table 3). The chi-square test reveals a significant effect of stress level on sleep quality (P=0.000*). On the other hand, the frequency of good sleepers is seen to increase by almost three times with increasing physical activity, however, this difference is non-significant (p=0.07) (Table 3). The logistic regression model was fitted to the data to test the research hypothesis regarding the relationship between poor sleep and stress as well as physical activity. According to the model, the log of the odds of students having poor sleep was positively related to higher stress levels (p < .05), but a non-significant relation is seen with physical activity (p> 0.05) (Table 4). In other words, increasing stress levels directly causes poor sleep, but the hypothesized inverse, or relieving, effect of physical activity may be due to some indirect way.

Table 1: Descriptive Statistics

Variables	mean ± SD
Age (years)	22.2 ± 1.4
Sleep Quality (total score)	4.0 ±1.9
Physical Activity (total score)	16.2±10.1
Stress (total score)	15.9 ±7.3

Table 2: Gender distribution according to Sleep Quality

Gender	Good Sleep (%)	Poor sleep (%)
Male	57.5	40.0
Female	42.5	60.0

Table 3: Comparison of Effect of Physical Activity and Stress on Sleep Quality

Variables	Sleep Quality		χ^2	p-value
	Good Sleep n (%)	Poor Sleep n (%)		
Low Stress	5(26.3)	14(73.7)	10.8	0.00*
Moderate Stress	33(23.6)	107(76.4)		
High Stress	2(3.9)	49(96.1)		
Insufficient Activity	8(15.4)	44(84.6)	0.71	0.07
Moderate Activity	7(18.4)	31(81.6)		
Vigorous Activity	25(20.8)	95(79.2)		

Table 4: Association of Physical Activity and Stress with Sleep Quality

Variables	SEM	p-value	OR	95% CI
Physical Activity	.019	0.0965	0.99	0.962-1.04
Stress	.027	0.008*	1.081	1.020-1013

Logistic Regression test was applied; p<0.05 was considered statistically significant

DISCUSSION

Sleep deprivation is quite prevalent in students all over the world, with studies showing that up to 24% of university students in the United Kingdom¹⁴, while around 49 % in Taiwan reported getting less than 7 hours of sleep.¹⁵ Our study reflects this trend of sleep deprivation with about 36.7% reporting less than 6 hrs of sleep and about 31.9 % reporting 6-7 hrs of sleep. This prevalence of inefficient sleep in the youth exposes them to a large variety of health-related issues 4. The younger generations already face many risks due to devolving technology and fast food diets making the sedentary lifestyles and poor nutrition the new normal. If not addressed early, this may predispose them to lifelong morbid conditions.

College students are quite vulnerable to stressors by virtue of their transitional status i.e. from high school to university, and teenage to maturity.¹⁶ Anxiety is the most reported mental health problem amongst by young people.¹⁷ A

Lund university study reported that students with higher stress also showed poor sleep¹⁸, supported by a bidirectional link observed in previous studies between sleep disturbances and anxiety, indicating that one contributes to the other.⁶ Whereas physical activity is said to improve sleep time and sleep efficiency. Exercise an hour or so before sleeping leads to increased deep sleep and shorter REM sleep.¹⁹ The problem of poor sleep seems multifaceted and cannot be dealt with in an isolated manner. The effect of stress and physical activity on sleep appears intertwined and has to be addressed simultaneously.

The effect of physical activity on relieving harmful effects of stress on mental and physical health are such that increasing physical activity is one of the first recommendations for stress management.^{9,20}

Now it could be that the positive effect of physical activity on sleep, as shown by an almost three times increase in frequency of good sleepers with increasing physical activity, is actually because of its relieving effect on stress, or there could be a direct relation between physical activity and sleep; or it could be that both these paths are involved. Our results showed an indirect effect of physical activity on sleep quality. Stress buffering hypothesis suggests that physical activity lowers adverse effects of stress on health, both physical and mental, which must include sleep distortion as well,^{21,22} as we said before stress and sleep have a significant relationship. So the stress-buffering hypothesis tries to explain how physical activity indirectly affects sleep. Wusnch et al. cites similar findings in their study, reporting that at times of very high-stress students seemed to have lost positive effects of physical activity,²³ thus insinuating that the positive effects of physical activity are due to its effect on stress. The cross-sectional design of this study limits its ability in making inferences. We recruited relatively small sample using the convenient sampling technique, and only included students from Lahore, therefore we cannot generalize these results to the

whole medical student body of Pakistan. Our study was conducted during the COVID-19 lockdown and so its results may have been skewed by its effect on stress levels and physical activity of the individuals. Lastly, the use of self-reported questionnaires in our study may lead to response bias because of misreporting by the subjects.

CONCLUSION

There was a significant association between poor sleep and high stress levels whereas increasing physical activity showed a decline in the frequency of poor sleep, however, this difference was non-significant. It can be inferred that this positive effect of increasing physical activity on quality of sleep could be indirectly due to its relieving effect on stress. This knowledge may be important for health professionals and administrators in developing strategies to increase productivity by controlling stress-related poor outcomes. Controlled experimental studies are needed to further verify the deductions made here.

Conflict of interest:

All authors and co-authors declare that they have no conflict of interests

Contributors:

MF: Study design, Manuscript writing and Analysis corrections

SJR: Data Collection, Literature Review

NZA: Data Collection, Primary draft writing

MFM: Data Collection, Revised the manuscript

HA: Acquisition of Data & Data Analysis

JMM: Data Analysis, Data Interpretation

All authors approved the final version and signed the agreement to be accountable for all aspects of the work.

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