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Effect of sleep quality on academic performance of undergraduate University level students

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[1] Conceptualization analysis and interpretation of study,
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A B S T R A C T

Introduction: Memory processing and learning are enhanced by adequate, high-quality sleep of the appropriate duration. It aids memory processing, executive cognitive functioning and concentration. Academic performance of university students suffers as a result of poorer sleep quality.

Objectives: To determine the effect of sleep quality on academic performance of undergraduate university level students.

Methodology: This is analytical cross-sectional study and non-probability purposive sampling technique was used. The study population comprised a total 300 students, out of which 50 students were not completed the questionnaire. A total of 250 students, 113 male and 137 female students were participated in this study. A structured questionnaire was circulated among bachelor-level students of different universities in blinded from August 2018 to December 2018. The questionnaire was based on Pittsburgh Sleep Quality Index along with other relevant data about the students' age, gender, and discipline of study, respective semester and grades (CGPA or percentage total). The data obtained was analyzed using SPSS 21.

Results: Majority of the students had moderately poor sleep quality (Global PSQI score=5). The 17.6% of subjects scored 5 in PSQI and 14.8% of subjects scored 6 in PSQI. However, the students who scored high CGPA (>3.5) had better sleep quality as compared to those who got CGPA <3.5.

Conclusion: Majority of the students having poor sleep quality and their grades might be affected. Furthermore, the students who attaining good CGPA (>3.5) had on an average good sleep quality.

Keywords: *Academic performance, NREM, PSQI, REM, sleep quality, University students*

Introduction

Sleep and wakefulness, the two basic processes of life, are like two different worlds with independent controls and functions. As we age, humans keep on transforming and adapting different phases of sleep.[1] During different times of the day from dawn to dusk, human body switches on between wakefulness and sleep. Deviations from this circadian rhythm come with functional consequences. According to a study about 17 hours of constant wakefulness leads to decrease in average performance of student.[2] Around 50–70 million US adults suffer from sleep disorders worldwide.[3]

Sleep deprivation is generally classified into three categories; total sleep deprivation; the complete lack of sleep for at least one night and often longer, partial sleep

deprivation; restricted sleep for multiple nights and the third category is sleep fragmentation; repeated awakenings from sleep throughout the night.[4] There are certain effects of sleep deprivation on academic performance of university going students in which brain responses decrease in persistent attention demands, reduced performances on constant attention activities and also decreased activation of specific brain areas as compared to well rested state.[5]

Evidence suggest that female students are at high risk of developing sleep disorders besides men.[6] Many college students are at risk for sleep disorders, and those at risk may also be at risk for academic failure.[7] Undergraduate university level students suffer from sleep deprivation due to a lot of factors that result in sleepiness during working hours.[8] It is also understood that many students are themselves unaware of their sleep deprivation or poor sleep quality. They may not seek counseling or advice regarding this important problem.[9]

Multiple studies have been conducted in order to find out the relationship between academic performances of student's and the results suggest that Sleep deprivation and poor sleep quality are common among undergraduate university level students. High levels of stress and the pressure of maintaining grade point averages may be influencing their quality of sleep.[10]The academic performances of different years of students vary as their ability to adapt to their study hours and accurate management of stress establishes.[11]

Excessive daytime sleepiness (EDS) is common among university students and has many adverse consequences, out of which academic performance is the one that is affected the most.[12] There are certain factors important to score high grades in exams i.e., declarative knowledge, procedural knowledge, cognitive processing and memory. Some other factors are vigilance, attention span, ability to concentrate over long periods of time, ability to retain information and memory consolidation.[13] Sleep quality effects all these parameters in some way and hence it remains an important factor affecting academic performance and grades of students. Sleep quality is a potent factor of sleep wake patterns and daytime functioning, performance on university tests and exams is one of these days' time functions. Poor sleep quality has been found to be associated with poor academic achievement and health, as well as increased health care costs and absenteeism from work.[14]

This study was initiated to describe the effects of sleep quality on academic performance of undergraduate university level students. With this study, awareness can be raised about effect of sleep quality on academic performance.

Methodology

This analytical cross-sectional study was conducted from different universities across Rawalpindi and Islamabad, Pakistan. The universities from which data was collected include National University of Science & Technology (NUST), Foundation for Advancement of Science and Technology (FAST), Riphah College of Rehabilitation Sciences (RCRS) Riphah International University, Foundation University Medical College (FUMC), Shaheed Zulfiqar Ali Bhutto Institute of Science & Technology (SZABIST) and SKANS School of Accountancy. Sample size was calculated as 300 by using Rao soft keeping the margin of error 5% and 95% confidence interval and response distribution rate was 50% through Purposive non probability sampling technique out of which 50 students were not completed questionnaire. The total of 250 students 113 male and 137 female students were participated.

The details were recorded through a structured Questionnaire "Pittsburg Sleep Quality Index" The Pittsburgh Sleep Quality Index (PSQI) is an effective instrument used to measure the quality and patterns of sleep in adults. It differentiates "poor" from "good" sleep quality by measuring seven areas (components): subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications and daytime dysfunction over the last month.[15] The PSQI global score has a possible range of 0-21 points, 0 indicating no difficulty and 21 indicating severe difficulties in all areas. This self-reported questionnaire was given to selected students. Consent was taken from all the participants and confidentiality was ensured. Participants with history of any chronic illness and drug abuse were excluded from the study. The survey was conducted from August, 2018 to December, 2018. The descriptive analysis of data was done through SPSS 21.

Results

A total of 250 students from various universities filled out the questionnaire, out of which 106 students belonged to medical & health sciences, 109 students to engineering and 35 students to management sciences. Out of total 250 students who completed the questionnaires, 113(45.2%) were males and 137(54.8%) were females. Effect of sleep quality on scores of students has been shown in graph 1. The graph shows that greater number of females scored higher on PSQI as compared to males. Hence it can be inferred that females have slightly poorer sleep quality as compared to males.

All the respective institutions taken have same CGPA min/max criteria. Academic performance was assessed by asking participants about their cumulative grade point average (CGPA). Participants provided their CGPA for the last semester prior to the study period; the CGPA ranged from 1 to 4 points. Subjective sleep quality was based on the self-rating of students of their sleep quality. Students rated their sleep quality from very good to very bad. Majority of the students (n=126) with 50% had a 'fairly good' subjective sleep quality and 76(30.4%) had 'very good' subjective sleep quality. Only 14 (5.6%) students had 'very bad' subjective sleep quality as shown in Table 1.

According to the results, maximum number of students (95) lied in the CGPA group 3.0-3.4. The subjective sleep quality of this group of students was such that, 25 students had 'very good', 47 had 'fairly good', 17 had 'fairly bad' and only 6 students had 'very bad' subjective sleep quality. Secondly, a total of 60 students had CGPA ranging from 2.5 to 2.9 and their results showed 15 students had 'very good', 32 had 'fairly good', 7 had 'fairly bad' while only 6 had 'very bad' subjective sleep quality. The third largest group according to CGPA was of the 47 students who got CGPA from 3.5 to 3.9, of which, 18 students had 'very good', 24 had 'fairly good', 4 students had 'fairly bad' while only 1 had 'very bad' subjective sleep quality. From these results we can infer that, maximum number of students got CGPA from 2.5 to 3.9 and according to subjective sleep quality, maximum 126 students claimed to have 'fairly good', 76 said to have 'very good' 34 said to have a 'fairly bad' and only 14 claimed to have 'very bad' subjective sleep quality as shown in Figure 2. Pearson correlation was used to determine the effect sleep quality on academic performances. There was a positive correlation between the two variables, between sleep quality and academic performance r = 0.35, P = 0.04. Students who have very good sleep quality were more likely to have higher mean CGPA as compared to those who have fairly bad or very bad sleep quality.

Table 1: Frequency and percentages of Student's grades and sleep quality (n=250)

Student's (CGPA)	Frequency (n)	Percentage (%)
0.1 – 1.4	2	0.8
1.5 –1.9	3	1.2
0.2 – 2.4	21	8.4
2.5 – 2.9	60	24.0
3.0 – 3.4	95	38.0
3.5 – 3.9	47	18.8
4.00	22	8.8
Total	250	100.0
Sleep quality		
Very Good	76	30.4
Fairly Good	126	50.4
Fairly Bad	34	13.6
Very Bad	14	5.6
Total	250	100.0

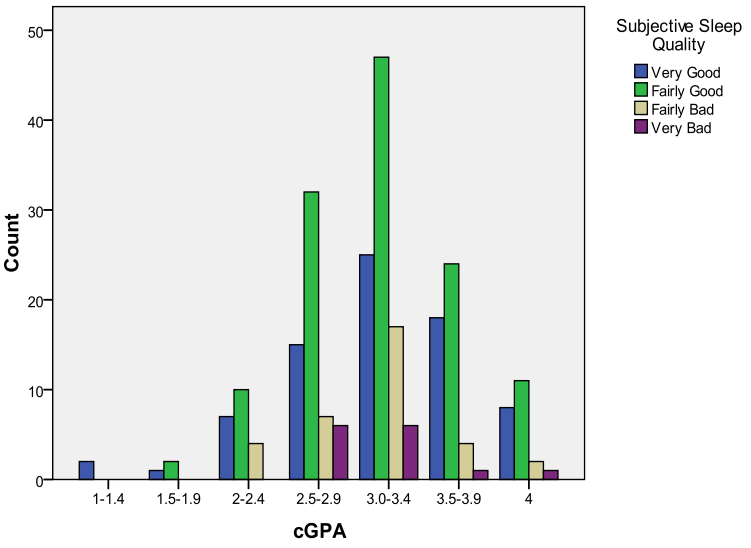

Figure 1: Effect of sleep quality on the grades CGPA of students

Discussion

According to the results of our study, females scored higher on the PSQI hence it can be said that females have a poorer sleep quality as compared to males. Although the difference is not very notable, females have a sleep quality slightly inferior to males. Some studies support this result while some show gender does not play a role in determining sleep quality. A study by Lindberg et al supports the fact that females have poorer sleep quality as females experienced difficulties in maintaining sleep, had episodes of morning tiredness and frequent daytime napping. Cheng et al, also supported the fact that females have a poorer sleep quality.[16] On the other hand, studies by Wolfson and Carskadon, 1998; Tsai and Li, 2004; Kadison, 2005 showed that there was no difference in sleep quality in women and men. However small sample size and methodological differences may be the reason of varied results. Hence the role of gender in this regard remains unclear.[17]

The result of our study showed that the majority of students got CGPA above 3.0 and the PSQI score was ranging from 3 to 10. However, one notable finding was the students who got exceptionally high CGPA (3.5-3.9) had a better sleep quality as compared to those with CGPA less than 3.5. Moreover, the comparison of CGPA with all the components of PSQI showed that students with higher CGPA had fewer difficulties in components of sleep quality as compared to those with lower CGPA. Many studies suggest that sleep has a definite effect on school performance and grades of students. Meijer AM et al in their study concluded that chronic sleep deprivation has a definite effect on cognition that in turn affects the school performance of students. The study suggested that sleep duration and sleep quality had different effects on cognition and academic performance.[18]

A study on the performance of medical students by Ahrberg K et al., suggested that low sleep quality did not necessarily contribute to academic performance. He showed in his results that students who received poor grades did not have a poor sleep quality or a high stress level. He suggested that most medical students preparing for exams suffer high stress levels and poorer sleep quality but their grades do not correlate with the stress level or sleep quality.[19] A study suggests that the insufficient or disturbed sleep manifests itself in the form of daytime sleepiness.[18]

The comparison of CGPA with all the components of PSQI showed that students with higher CGPA had less difficulty in components of sleep quality as compared to those with lower CGPA.[20] In another study the prevalence of poor sleep quality among the population has been reported to be 26–35% using the Pittsburgh Sleep Quality Index (PSQI).[21]

Conclusion

Based on the findings of current study, it is concluded that the CGPA (Cumulative Grade Points Average) falls as the sleep quality deteriorates. Furthermore, the students attaining good CGPA (>3.5) had an average good sleep quality.

Limitations

As academic performance and PSQI questionnaire was filled by students themselves, it is not clear whether the errors from self-reporting were random or systematic.

Recommendations

It is hence recommended that university level students should pay special attention toward their sleep hygiene. Proper hours of sleep along with other components of sleep quality should be taken care of. Sleep quality related to depressive symptoms affecting the grades of students can also be studied. Study can also be done within students of same discipline. Further study can be done on this subject with a larger sample size and using multiple tools for assessing sleep quality.

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