

Incidence of sleep deprivation and its relation with academic performance of undergraduate students of Karachi

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Abstract :

BACKGROUND A good healthy sleep is essential especially for a student. Poor sleep among students is associated with lower grades, lack of motivation and associated with emotional and behavioral disturbance

OBJECTIVE Our primary objective is to find out the incidence of sleep deprivation, its quality and relation with academic performance of undergraduate.

METHODS A cross-sectional survey was conducted. Sleep deprivation was measured by using Groninger sleep quality scale and self-made questions. Data analysis was done by using SPSS 16.0.

RESULT Day sleepiness was found to be present in majority of students which is

independent factor. 412 students were found to have poor sleep quality. 44 students were found to have difficulty falling asleep. Majority of students had cGPA in between 2.5 and 3.0. Many students were found to be sleep deprived. Comparison analysis revealed the inverse relation between sleep duration and academic. The link between students GPA and number of hours sleep before exam was found.

CONCLUSION This study showed that decrease in sleep quantity affects academic performance of students. Day sleepiness and poor quality sleep are not associated with academic performance. There is a firm relationship between grades of students with their amount of sleep before exams.

KEYWORDS :

Sleep; Sleep deprivation; students, medical; Sleep; REM

Introduction:

Sleep is defined as unconsciousness from which the person can be aroused by sensory or other stimuli. A normal healthy sleep is essential for proper brain functioning. It is more like a break for a worker after working whole day. A healthy sleep ensures improved memory and concentration, good mood and less stress. Past researches have proved the strong relation between sleep duration and academic performance of students.

There are two aspects of sleep pattern, sleep quality and its quantity (duration) and both are very important for a good healthy sleep. A sleep with good duration but totally interrupted is never a healthy sleep. Sleepless nights are common among undergraduate students. Some students sacrifice their sleep willingly for studies adopting different methods and techniques to avoid sleep while some are unable to sleep due to studies stress. Those who cannot sleep are suffering from sleep deprivation.

There are also two stages of sleep. Rapid eye movement (REM) and non-rapid eye movement (NREM) sleep. REM sleep is associated with dreaming while NREM sleep is non-dreaming and has further sub stages. Both stages are necessary for brain learning and memory¹.

In 1996, a study was held by Pilcher and Huffcutt in which they completed a meta-analysis on current studies dealing with

sleep deprivation and its effects upon various daily functions. They defined sleep deprivation to be operative with less than five hours of sleep from the preceding night. They also analyzed that sleep deprivation affects cerebral and motor functioning and emotional stability as well. They also defined different sorts of sleep deprivation such as partial sleep deprivation which means less than 5 hours of sleep in a single night, short term total sleep deprivation meaning period of no sleep lasting less than or equal to 45 hours and long-term sleep deprivation meaning period of no sleep longer than 45 hours².

Daytime sleepiness is another problem in students with poor sleep quality. Day time sleepiness as a consequence of poor sleep quality can seriously impair students' cognitive functioning and behavioral performance¹.

A sufficient amount of sleep is required for one's mental and physical status, for cognitive restitution, processing, learning and memory consolidation³⁻⁵. Many researches showed that sleep deprivation as well as poor sleep quality are particularly noticeable in college student populations⁶⁻⁹ and they are at a greater menace of developing sleeping syndromes which can unfavorably affect their academic enactment¹⁰⁻¹¹.

Many researches have been performed in the past on sleep habits, sleep deprivation and sleep disorders in Pakistan but none of them focused on undergraduate students relating their sleep pattern with academic performance especially GPA system. Our primary objective was to find out the incidence of sleep deprivation, its quality

and relation with academic performance of undergraduate. Other secondary objective includes relation of day time sleepiness with the students GPA. The students were questioned relating to sleep quality, sleep duration and day sleepiness and were also asked their personal opinion about possible effects of sleep duration on their academic performance. We have assumed that there is negative effect of sleep deprivation on academic performance of students and also sleep quality is positively associated with academic performance which is our null hypothesis.

METHODS:

Selection and description of participants:

A cross-sectional survey was conducted over a two months period in 2014 using a questionnaire consisting of standardized as well as self-made questions. A total of 460 students were randomly approached including male and female from second year to final year. The students were from Dow University of Health Sciences(DUHS) and NED University.

INCLUSION CRITERIA

Students from second year to final year are included in this research as they have experience and have spent one or more year in the respective colleges.

EXCLUSION CRITERIA

Only first year students were not included since first year students did not have their GPA results and their experience was also less.

Technical information:

The questionnaire consisted of mixed questions some of which were self-made and some were picked from the standard scales after an extensive review of literature for about 1 year. Consent was taken from each student in the beginning of questionnaire paper. A pilot study was also conducted on 20 peoples and after taking feedback from them further amendment on the questionnaire was made and then data collection was continued. The paper consisted of demographic details and 26 other questions. General information regarding name, age, gender, study year, college and faculty were asked in demographic detail. Name was optional.

The first question was totally based on Epworth Sleepiness Scale which we modified according to the normal daily activities of Karachi students. We picked three original questions from the scale and added further 3 new questions. In this way we also modified the scoring system as the original scale had 8 questions in it rather than 6. A score of 5 or less was considered the student is getting enough sleep, 6-7 was considered average sleep while 8 and above was considered very sleepy.

Questions 2 to 17 were from Groningen Sleep Quality Scale¹⁸. No alterations were made in this scale. This scale measures the sleep quality regardless of duration in the present time. Other questions were mainly of general belief of the participants including their duration of sleep before exams and their opinion if sleep deprivation affected their academic performance. We also asked the cGPA of the students to evaluate their academic performance.

Statistics:

With 95% confidence interval and taking 5% sampling error, the sample size calculated is 400. Source is open Epi (version 3), open source calculator and SS prop. Sleep deprivation was measured by using Groningen sleep quality scale, Epworth Sleepiness scale and self-made questions. Data analysis was done by using SPSS 16.0.

RESULTS:

Out of 460 students 439 completed the questionnaire, therefore the response rate was 95.43%. 165 (37.58) were male while 274 (62.41) were female students. Demographic details include gender, age, university, study year and students opinion about their sleep (Table 1).

Sleep quality and quantity were evaluated by Groninger sleep quality scale and our self-created questions respectively. Q12 to Q17 were from Groninger Sleep Quality Questionnaire¹⁸ to find a sleep quality score. The scoring procedure was followed as per scale; first question was not scored as per requirement. A score of 0 intended that the student had the best quality of sleep. The questions which were self-created assessed the sleep deprivation of students with open-ended numerical responses. In the end the students were asked about their GPAs so that we can correlate them with number of hours of sleep before exam. Table-2 shows Groningen Sleep Quality assessment results. Summarized results are shown in Table-3. 412 students (93.6%) were found to have poor sleep quality. Only 27 students (6.1%) had good sleep quality. This showed poor sleep quality among undergraduates but it negatively affects academic performance.

Descriptive analysis was done to find out link between students GPA and number of hours sleep before exam (Table 4). This revealed that they are associated with each other and those students who had adequate amount of sleep tends to score good GPAs in exams.

Day sleepiness was found to be present in 433 students (98.4%) (Table 5) which shows poor sleep quality and quantity and may have adverse effects on their performance but our study does not support any relation of day sleepiness with academic performance.

86 students (19.6%) believed that they get the required amount of sleep always while 174 students (39.6%) and 123 students (28%) get required sleep most of the time and some of the time respectively. Only 56 students (12.8%) said that they never get required amount sleep. 44 students (10.0%) were found to have difficulty falling asleep. 340 students (77.4%) were found to sleep more during weekends as compared to other days. 223 (50.8%) students believed that sleep disturbance have affected their academic performance. 137 students (31.2%) had cGPA in between 2.5 and 3.0 and 100 students (22.8) had cGPA in between 3.1 - 3.5 while remaining had different ranges with the lowest (1.6%) having less than 2.0 (Table-1). 141 students (32.1%) were found to be sleep deprived (Table-5).

No conclusive relation between sleep quality with academic performance is found. Similarly day sleepiness was also an independent factor.

Table 1. Demographic details and other variables of Study Population (439)	
Variables	n (%)
Sex	
Male	165 (37.6)
Female	274 (62.4)
Academic year	
2nd year	178 (40.5)
3rd year	181 (41.2)
4th year	35 (8.0)
5th year	45 (10.25)
University	
Dow University of Health Sciences (DUHS)	291 (66.3)
NED University	148 (33.7)
Age group	
18-20	266 (60.59)
21-23	153 (35.09)
24-26	20 (4.55)
Academic CGPA	
4	20 (4.6)
3.5-3.99	87 (19.8)
3.01-3.49	100 (22.8)
2.5-2.99	137 (31.2)
2.01-2.49	88 (20)
Less than 2	7 (1.6)
Do you think you get enough sleep	
Yes	298 (67.88)
No	141 (32.12)
Do you feel that sleep disturbance have affected your GPA	
Yes	223 (50.8)
No	216 (49.2)

Table 2. Analysis of Groninger Sleep Quality Scale	
Variables	n (%)
I had a sleep last night.	
Yes	370 (84.3)
No	69 (15.7)
I feel that I sleep poorly last night.	
Yes	181 (41.2)
No	258 (58.7)
It took me more than half an hour to fall asleep last night.	
Yes	235 (53.5)
No	204 (46.5)

I woke up several times last night.	
Yes	143 (32.6)
No	296 (67.4)
I felt tired after waking up this morning.	
Yes	190 (43.3)
No	249 (56.7)
I feel that I didn't get enough sleep last night.	
Yes	224 (51)
No	215 (49)
I got up in the middle of last night.	
Yes	188 (42.8)
No	251 (57.2)
I felt rested after waking up this morning.	
Yes	258 (58.8)
No	181 (41.2)
I feel that I only have couple of hours sleep last night.	
Yes	197 (44.9)
No	242 (55.1)
I feel that I slept well last night.	
Yes	273 (62.2)
No	166 (37.8)
I didn't sleep a wink last night.	
Yes	100 (22.8)
No	339 (77.2)
I didn't have trouble falling asleep last night.	
Yes	266 (60.6)
No	173 (39.4)
After I woke up last night, I feel trouble falling asleep again.	
Yes	153 (34.9)
No	286 (65.1)
I tossed and turned all night last night.	
Yes	115 (34.9)
No	324 (73.8)
I think I didn't get 5 hours sleep last night.	
Yes	165 (37.6)
No	274 (62.4)
Did you have nightmares during sleep last night	
Yes	144 (32.8)
No	295 (67.2)

Table 3. Summarize Groningen Sleep Quality Scale results

	Frequency	Percent	Valid Percent	Cumulative Percent
	n	%	%	%
Normal Sleep before night	27	6.1	6.2	6.2
poor sleep the night before	412	93.6	93.8	100
Total	439	99.8	100	

Table 4. Relationship between sleep before exams and GPA of study population (439)

		What was your cGPA?					
		4	3.5 - 3.9	3.0 - 3.5	2.5 - 3.0	2.0 - 2.5	less than 2.0
Number of hours sleep before exam	0-2 hours	0	7	2	4	5	0
	2-4 hours	2	17	25	34	20	2
	4-6 hours	8	23	40	55	31	2
	6-8 hours	7	28	27	33	22	1
	8-10 hours	3	12	6	11	10	2
TOTAL		20	87	100	137	88	7

Table 5. Day sleepiness results

	Frequency	Percent	Valid Percent	Cumulative Percent
	n	%	%	%
Enough sleep	1	0.2	0.2	0.2
Average	6	1.4	1.4	1.6
Very sleepy	433	98.4	98.4	100
Total	440	100	100	

Discussion:

Current study reveals an association between sleep/wake habits and academic performance. The study partially proves our hypothesis that there is an inverse relation between sleep deprivation and academic performance but no association of sleep quality and day sleepiness with academic performance was found.

Almost all students were found to have day sleepiness which means that they do not get enough sleep during the night. Groningen scale showed that almost all students were experiencing poor quality sleep at the time of survey which was independent of academic performance. However sleep quantity was an important factor related with academic performance which showed less sleep was associated with poor academic performance. Although there were few students with less sleep and good academic performance so there may be other factors and behaviours relating to academic performance. Bulk of the students had decreased amount of sleep in exam days and its reason was found to be

studying late and also to a study carried out in University of Colorado School of medicine which suggested that sleep disturbances negatively affect student performances at different ages and educational levels¹². A parallel study done in China proved that a large number of college students had sleeping difficulties¹³. Our study contraindicate to the study of Kust University of Pakistan which showed no firm relationship between sleep at night before paper¹⁵

Time required to fall asleep was also an important question. More than half of the students said they required about 20 minutes to fall asleep after going to bed. There were only about 10 % students for whom it took more than 1 hour to fall asleep. This increased time may be associated with depression, anxiety or other psychogenic factors from increased study load. About 60% students believed that sleep disturbance has affected their studies while about 50% believed it has affected their cGPA. These two questions look almost same but there is a difference in them as you can see the response that for

some students sleep disturbance may have affected their studies but it is not affecting their final result. Also about 77% of students sleep more during the weekends.

This study supports the study conducted by Pilcher and Huffcutt but it contradicts the study of Giuseppe Curcio, Michele Ferrara & Luigi De Gennaro. However despite too much efforts this study had its limitations. We cannot guarantee the results of modified Epworth scale as we knew little about the scoring system of original scale so changing the score after altering questions was not authentic. Groningen scale assesses sleep quality only in present time not on the long term. For better results we should have assessed the students at different time intervals which was very difficult for us or used a scale for assessing sleep quality on long term which we unable to find. Further we did not asked the students about physical activities and eating habits which are also useful factors contributing in academic performance as well as sleeping habits. Our study strongly supports results of Lowry (2010) which specified a significant positive correlation between amount of sleep per night with GPA, and a significant negative correlation between average number of days per week that students attained fewer than five hours of sleep and GPA. Normal amount of sleep per night before exam was found to be significantly correlated with GPA, $r(101) = 0.20$, $p = 0.048$. The students who slept for more hours on an average night before exams tended to obtain slightly better grades¹⁴. Another cross-sectional study was conducted at College of Medicine, King Saud University which showed that decreased nocturnal sleep time, late bedtimes during weekdays and weekends, catch-up sleep on

weekends and increased daytime sleepiness are negatively associated with academic performance in medical students¹⁶. Additional study in which study of the link between sleep disorders and academic achievement showed a significant relationship with day time sleepiness with academic grades¹⁷ contraindicates our study.

Conclusion:

This study showed that decrease in sleep quantity (deprivation) affects academic performance of students. Day sleepiness is not associated with academic performance. Although students are having very poor sleep quality but it shows no association with academic results. There is a firm relationship between grades of students with their amount of sleep before exams. There may be other factors that are related to it but due to study limitations we are unable to do that. It is highly recommended to do research on such factors that may be a cause of sleep deprivation.

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