Sleep Deprivation among the University Students and Its Relative Effect on Their Academic Performance

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ABSTRACT

Sleep deprivation is emerging as a great problem globally. Most of the studies related to sleep pattern have shown that sleep deprivation and poor quality of sleep has negative impact on different dimensions of a person's physical, cognitive and affective life. But quality sleep is an illusion in present world. There is no denying of the fact that present world is full of opportunities on the one hand and full of stresses on the other. New avenues bring new hopes, new inspirations and new directions but the urge to be best fitted in the competitive world leads people to misery, anxiety, stresses, and sleepless night. Students are not having an escape from this reality. Furthermore, sleep may be one factor, among others, which can affect academic performances and mental health of students. They have to cope with their workload and stressful environment. Present study is an attempt to know the sleep deprivation pattern of University students and its relative effect on academic performance of those students. Students pursuing master Degree in Arts and Science streams selected as sample students, taking equal number of male and female. For undertaking the present study descriptive survey method was applied and sample was taken randomly. Results have shown that sleep deprivation was associated with academic performance of students. Students who were not deprived of sleep had better academic performance. It is hoped that this study will be an eye opener to make the people understand the necessity of good sleep

Introduction

Like Food, Air and Water sleep is also an important biological necessity [1].Sleep is considered to be important to body restitution, like energy conservation, thermo regulation and tissue recovery [2]. Sleep is defined as naturally recurring state of mind and body characterized by altered consciousness, relatively inhibited sensory activity, inhibition of nearly all voluntary muscles during rapid eye movement (REM) and hence a reduced interactions with the surroundings [3].

Adequate sleep of high quality and optimum duration facilitates memory processing and learning. It helps to maintain concentration, executive cognitive functions, sensorimotor integration and memory processing [4]. During sleep, the brain conducts memory consolidation and integration; adequate and quality sleep eliminates concentration difficulties [5]. In today's context no one can deny that he/she is deprived of sleep. Today, prolonged wakefulness is a widespread phenomenon [6]. However sleep patterns and habits are different for different individuals depending on their age, occupational demands, social engagements, Psychiatric and somatic conditions and also individual psychological characteristics [7]. Individuals differ in terms of the length, timing, and structure of sleep. Therefore, it is logical to hypothesize that interindividual differences are also important in reaction to Sleep Deprivation (SD). Studies have consistently found that some people are more vulnerable to sleep loss than others [8].

Young and old adults are recommended to sleep for seven to nine hours every night [9].The true picture which is shown by the recent literature predominantly is that most of the young adults are sleeping for less than the recommended duration [10]. But the working hours are constantly increasing along with emphasis on active leisure [6].Some professions like health care or transportation need night wakefulness or in other word some professions induce sleep restriction. Furthermore, people, tend to stretch their capacity and compromise their nightly sleep, thus becoming chronically sleep deprived [6]. Sleep quality is often discussed in context with mental health. Evidence supports the hypothesis that poor quality is associated with decreased mental health and wellbeing [11]. The relationship of sleep inadequacy with stress is that of chain reaction. Different studies have established that sleep disturbances are, at times, caused by psychological stressor culminate in sleep inadequacy [6, 11]. Disturbed and inadequate

sleep leads to judgement impairment, agitation, irritability to process information in the short term, and in the long term, in can contribute to cardiometabolic disorders and even increased mortality [12]. Reduced total sleeping hours have even associated with declining academic performance [13].

Although sleep patterns and habits are different for different individuals depending on their age, occupational demands, social engagements, psychiatric and somatic conditions and also individual physiological characteristics suboptimal sleep is becoming a global problem now a days [7,11]. Though Young and old adults are recommended to sleep for seven to nine hours every night [9], but for several reasons, they are not getting the recommended duration of sleep. One amongst the high-risk groups who are affected by poor sleep quality is the students. Literature has established the fact [7, 10, 11]. It adversely impacts their academic performance. Adequate sleep optimally impacts mental functioning and therefore impacts students' performance on examinations and ultimately grades received [6, 14]. Cognitive performance is susceptible to inadequate sleep durations, defined as fewer than seven (07) hours a day for adults [6, 15]. Inadequate sleep decreases general -alertness and impairs attention, resulting in slowed cognitive processing. The most notably impacted structure is the prefrontal cortex, which executes higher brain functions including language, working memory, logical reasoning and creativity [6]. According to the American Academy of Sleep medicine (AASM), the best way to maximise performance on final examinations is to both study and get a good night of sleep[16]. Duration of sleep the night prior to an examination was associated with academic performance as measured by course grade and semester GPA [17]. Students who reported sleeping for longer durations obtained higher scores on examinations [18]. Dr. Epstein, says that sleep deprivation effects not only whether a student can stay awake in class but how they perform as well [16].

Literature has established the fact that students sleep less compared to the general population and University students are particularly susceptible to these increasing demands on sleep [19,20]. Falling asleep and maintaining sleep are common complaints among university students [21,22].

Schleider and Güntert [23] showed that 54.1.5% of German University students reported sleep deprivation and poor sleep quality as a cause for their learning and working problems. Study has shown that between 14.1% and 33.3% of participants suffered from at least one insomnia symptom [24]. Students with poor academic performance spend more hours at night reading and often deprive themselves of sleep in a bid to improve their grades. This creates a vicious cycle that is associated with an adverse effect on sleep quality and mental health. Medeiros et al's[25] research among medical students found that students who reported sleeping for longer durations obtained higher scores on examinations, and Veldi et al's [26] study also found sleep behaviours to be associated with academic progression. The study of Maheshwari and Shaukat [27] provides robust evidence regarding the association of sleep disturbances with declining pattern in mean GPA scores. Research has established that 90% of university students have roommates, and among them, 41% wake up at night due to the noise of others. Bed- and risetimes on weekdays and weekends often differ in the range of more than one (01) to two (02) hours. These challenges and special circumstances faced by university students are associated with sleep disturbances [28]. About 60% suffer from a poor sleep quality according to the PSQI [29]. Gaultney [30] revealed that 27% of all university students are at a risk of at least one sleep disorder. Furthermore, findings of many studies reported that a minimum 7.7% of students suffer from insomnia and 24.3% from nightmares [31, 32]. Literature review shows that university students are night owls. Sleep deprivation has become a problem for the students' community in general and students of higher education in particular. Therefore, it was felt imperative to see if there was any relationship between the sleep deprivation and academic performance of the students of Gauhati University, Assam, India.

Need and Justification of the Study

Different aspects and problems on academic performances in relation to sleep deprivation have been discussed in the earlier studies. But there is still a scope to address the gap in this particular area. Sleep deprivation is a global problem and as

such it has influenced everyone around the globe physically or mentally. Rapid urbanization and modern living have given stimulus to this problem. Above all in the area of the present study that is, in the state of Assam, India there is an extreme dearth of such study, more particularly relationship between sleep deprivation and academic performance with respect to streams. To address this gap there is an urgent need of conduct the current study. Furthermore, awareness about sleep deprivation and its relative effect can be of great help for the students for their physical, mental and emotional health. Considering all the facts the present study has tried to see the relationship between sleep deprivation and academic performance taking into consideration the gender and stream of the students.

Objectives

1) To know the pattern of sleep deprivation in University students.
2) To see if there is any relationship between sleep deprivation and academic performance of University students.
3) To know if there is any relationship between sleep deprivation and academic performance of University students due to gender.
4) To know if there is any relationship between sleep deprivation and academic performance of University students due to stream.

Hypotheses

Ho_1: Academic performance of University students is independent of sleep deprivation.
Ho_2: Relationship between sleep deprivation and academic performance is independent of gender.
Ho_3: Relationship between sleep deprivation and academic performance is independent of stream.

Design of the Study

The present study used descriptive kind of cross-sectional design to obtain the data and see the relationship between the variables. This type of design is very helpful in the field of education. In the present study, respondents consisted of the students perusing post-graduation in Gauhati University in the state of Assam, India. Here an attempt was made to examine the relationship of

independent variable sleep deprivation and the dependent variable academic performance. Data relating to sleep deprivation were collected using Pittsburg Sleep Quality Index (PSQI) and the GPA of the students, representing the Academic performance of the students were collected from the office of the Controller of Examinations of Gauhati University.   The following subsections were included in the design of the study.
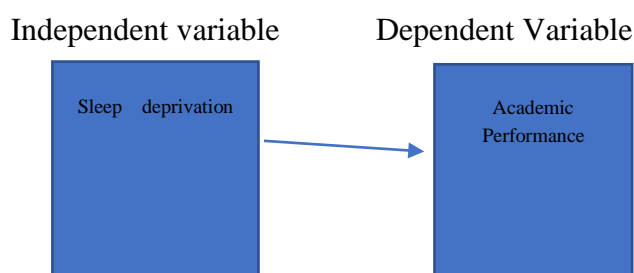
Variables

Independent variable   Dependent Variable

Figure 1. Independent and Dependent variable and their relationship

Method of the study
The descriptive survey method has been used in the present study. A descriptive study describes and interprets what exist. It deals with conditions or relationships that is existing, opinions that are held by people, the conditions and processes that are going on, important effects, or trends that are developing. In the present study an attempt is made to study the Sleep Deprivation pattern of University students and to establish a relationship between independent variable sleep deprivation and dependent variable academic performance taking into consideration the gender and stream of students.

Population
All the M.A. 3rd semester students from the subject Education ,of Arts stream and all the 3rd semester students from the subject physics, of Science stream of Gauhati University has been considered as the population of the study.

Sample
Sample size was two hundred (200) University students. One hundred (100) from Arts and one hundred (100) from science stream were taken for the study.

Table 1. Distribution of Sample

Sample			
	Male	**Female**	**Total**
Arts	50	50	100
Science	50	50	100
Total	100	100	200

Table 1 has shown the sample distribution on the basis of gender and stream.

Sampling technique
Simple Random Sampling Technique was used for selecting the sample. Random Number Table was used for selecting the sample.

Tools for Collection of Data
1)   Pittsburg Sleep Quality Index (PSQI).
2)   Grade Point average (GPA).

 Inclusion Criteria
1) University students studying at Master Degree level.
2) Normal Healthy students.

Exclusion Criteria
1) Students having sleep disorder like insomnia, sleep walking.
2) Students taking sleeping pills or any other medicine.
3) Students with part time job having night shift.

Procedure
It was a cross sectional study conducted with the students of Gauhati University, Assam, India. The study duration was from June 2019 till March 2020. Students from both genders and two streams namely Arts and Science were included. There were 150 incomplete responses which were excluded. Remaining two (200) hundred students of the aforesaid University, meeting the inclusion criteria were taken for the study. Before conducting the study, a written consent was taken from the students. Those students who have not met with the inclusion criteria were excluded. The students were then explained with the purpose of the study and they were assured that their responses would be kept confidential. Their GPA

was collected from the Office of Examination Controller, Gauhati University. It was considered as the Academic performance of the students. Then the Pittsburg Sleep Quality Index (PSQI) was given to be filled up by the students. The score of the PSQI ranges from minimum 0 to maximum 21. It has seven components and the combined score of all seven components is termed as "global score of PSQI"

Statistical Techniques used for data analysis
1) Percentage analysis
2) Chi square (χ^2) test

Results and Analysis

The data were collected from the students and analyzed systematically.

Table 2. Component wise Concentration of Students in PSQI

Components of PSQI	Count of students	%
Subjective sleep Quality		
Very good	41	20.5
Fairly good	61	30.5
Fairly bad	59	29.5
Very bad	39	19.5
Sleep latency		
≤15min	32	16
16to 30 min	49	24.5
31-60min	46	23
>60min	73	36.5
Sleep duration		
>7hrs	51	25.5
6-7hrs	71	35.5
5-6hrs	46	23
<5hrs	32	16
Habitual sleep efficiency		
>85%	29	14.5
75-84%	56	28
65-74%	64	32
<65%	51	25.5

Sleep disturbances		
Not during the past month	44	22
Less than once a week	62	31
Once or twice a week	53	26.5
Three or more times a week	41	20.5
Use of sleep medication		
Not during the past month	200	100%
Less than once a week	0	
Once or twice a week	0	
Three or more times a week	0	
Daytime dysfunction		
1-2 days	112	56
3-4 days	47	23.5
5-6 days	25	12.5
Everyday	16	8

A good number of students (19.5%) were concentrated in the very bad category of the component subjective sleep quality, fairly good number of students (36.5) were in the >60 min category of the component sleep latency, 16% were having sleep duration of <5 hours. In the <65% category of habitual sleep efficiency, 25.5% of students' concentration was observed. In the component sleep disturbances, a good number of students (20.5) were having sleep disturbances; in the category three or more times a week, no one were taking sleep medication for the past one month, 8% of students were having daytime dysfunction every day.

Table 3. Cross Tabulation of Academic Performance of Sleep Deprived and Not Deprived Group

Group	Academic Performance							
	Good		Average		Poor		Total	
	cn	%	cn		cn	%	cnt	%
	t		t	%	t			
Deprived	25	25.5	33	33.7	40	40.8	98	100
Not Deprived	51	50	38	37.3	13	12.7	102	100
Total	76	38	71	35.5	53	26.5	200	100

Table 3 has shown that out of the total sample 98 i.e. less than half (49%) of the students were sleep deprived. Descriptive statistic has shown the sleep deprivation and relative grade of the students. Half (50%) of the not deprived students were having GPA in good category. Table indicates academic performance of not deprived group was better than that of the sleep deprived group. Further χ^2 was used to test the null hypothesis Ho_1.

Table 4. Relation of Sleep Deprivation and Academic Performance of University Students

Variable	N	df	χ^2 value	Significant value	Level of significance
Sleep deprivation	200	2	22.931	0.000	0.05
Academic Performance	200				

Table 4 has presented the χ^2 value showing the relationship between Sleep deprivation and academic performance, for 2 degrees of freedom. It is indicated in the aforementioned table that the significant value is lesser than 0.05 (0.000<0.05), which leads to the rejection of null hypothesis Ho_1. Therefore, there is enough evidence to say that in the present study sleep deprivation was related to academic performance of Gauhati university students of Assam, India.

Table 5. Cross Tabulation of Academic Performance of Deprived and Not Deprived Students with Respect to Gender

Group	Academic Performance							
	Good		Average		Poor		Total	
	cn	%	cn		cn	%	cn	%

	t		t	%	t		t	
Deprived Male	12	25.5	16	34.0	19	40.4	47	100
Not Deprived Male	25	47.2	21	39.6	7	13.2	53	100
Deprived Female	13	25.5	17	33.3	21	41.2	51	100
Not Deprived Female	26	53.1	17	34.7	6	12.2	49	100
Total	76	38	71	35.5	53	26.5	200	100

Table 5 has depicted the academic performance of deprived and not deprived group on the basis of gender. Here it is seen that in academic performance of not deprived groups of both male and female category have outshone the male and female of deprived groups. The not deprived females were ahead of the not deprived males in the good category of academic performance. In the total sample (200), females in the current study were more sleep deprived (25.5%) than that of their male counterpart (23.5%).

Table 6. Relation of Sleep Deprivation and Academic Performance of University Students with Respect to Gender

Gender	N	df	χ^2 value	Significant value	Level of significance
Male	200	6	23.36	0'001	0.05
Female					

Table 6 has presented that the significant value was lesser than 0.05 level of significance. It has indicated that the difference between the academic performance of male and female, based on sleep deprivation, was not superficial but significant. Hence the null hypothesis Ho_2 was rejected.

Table 7. Cross Tabulation of Academic Performance of Deprived and Not Deprived Students with Respect to Stream

Group	Academic Performance							
	Good		Average		Poor		Total	
	cnt	%	cnt	%	cnt	%	cnt	%
Deprived Arts	11	25	15	34.1	18	40.9	44	100
Not Deprived Arts	26	46.4	22	39.3	8	14.3	56	100
Deprived Science	14	25.9	18	33.3	22	40.7	54	100
Not Deprived Science	25	54.3	16	34.8	5	10.9	46	100
Total	76	38	71	35.5	53	26.5	200	100

Table 7 has shown that students who were not deprived of sleep belonging to both the streams (Arts and Science) were ahead of the deprived group of both the streams, in their academic performance. In the good category of academic performance, the concentration of not deprived arts group was more than that of not deprived science group. In the total sample it was seen that University students of science stream were more sleep derived (27%) than that of the students of Arts stream (22%).

Table 8. Relation of Sleep Deprivation and Academic Performance of University Students with Respect to Stream

Variable	N	df	χ^2 value	Significant value	Level of significance
Arts	200	6	23.613	0'001	0.05
Science					

e					

Table 8 has revealed that that the significant value is lesser than the 0.05 level of significance, which leads to the rejection of null hypothesis Ho_3. It has indicated that the difference between the academic performance of students of science stream and arts stream, based on sleep deprivation, was not superficial but significant. Descriptive statistic has shown that in the good category of academic performance, the concentration of not deprived arts group was more than that of not deprived science group

Discussion

Sleep deprivation is pronounced among the students. In the present study it was found that university students with sleep deprivation had lower GPA. Relationship existed between sleep deprivation and academic performance. The findings of the study have consensus with Maheshwari and Shaukat's study [27]. Lemma S. et al [33] also found that students with better sleep quality score achieved better on their academic performance. Similarly, Indian medical students whose sleep duration was shorter reported lower GPAs and poor memory and concentration [1]. Some students may "pull an all-nighter" (24 hours or more of sleep deprivation) before examinations in the hope of improved grades [34]. Being an evening person, sleeping "badly" , getting less sleep, and having inconsistent bedtimes predict a lowered GPA. Sleep habits, particularly wake up times accounted for the largest amount of variance in grade point averages, of all the variables considered [35]. These behaviours may be modifiable (given sufficient motivation), and education about sleep hygiene may be useful, perhaps a part of an intervention package for students who are struggling academically [36]. Adequate, uninterrupted sleep may optimize learning and cognitive functioning. Sleep appears to play an important although not well understood, role in memory consolidation [37]. Results of the study done by Smith [38] strongly suggests that REM sleep is involved with the efficient memory processing of cognitive procedural material but not declarative material.

Identification and treatment of students with sleep disorders may produce benefits such as improved academic performance and better quality of life [36]. Diagnosis and treatment of sleep disorders could lead to increased or more consolidated sleep in young adults, and may improve cognition and mood, when 15 college students were asked to sleep as much as possible at night during the sleep-extension phase of one study. It has been found in the same study that sleep extension has decreased daytime sleepiness, also has improved the reaction time, mood and fatigue [39].

In the present study gender produced significant differences in sleep deprivation. Female students are at more risk than their male counterparts in sleep deprivation. This difference has been associated with academic performances of the sample students. The result of the present study has conformity with that of Manber and Amritage [40] which stated that there are dissimilarities between genders in sleep structure. The study of Toscano-Hermoso et al [41] also reported that women have fewer sleeping hours than that of men. These can be seen in cognitive performances [42]. When considering the relationship between sleep quality and academic performance it is observed that students having poor sleep quality obtain lower academic scores [41].

Women of all ages report more sleeping problems than men [43]. Females were more sleep deprived than their male counterpart. Gender differences during SD could be due to either physiological or social factors .There are differences in the brain structure and functioning of men and women [44,45] .Current literature, however , provides only minimal incidence of differential effects during SD, and does not resolve the issue of sexual dimorphism in coping with SD [6].

Regarding the relationship between academic performance and sleep deprivation with reference to stream in the present study significant differences was observed between the science and arts students. Difference of stream existed in academic performance of deprived and not deprived group. Students of science stream was more deprived than that of Arts group and it was also found that differences in academic performances existed between the students of these two streams. However, after repeated search no such related literature has been found in this aspect. Therefore, ample scope is there to explore the relationship between academic performance and sleep deprivation with reference to stream so

as to arrive at a conclusion. Insomnia and sleep deprivation may have notable effect on academic success in higher education [46]. Sleeping habits of a regular sleep schedule coined with adequate sleep duration each night is beneficial to students and their academic achievement [47]. Study of Okano et al [48] also provides evidence for a strong relation between sleep and academic performance. Therefore all concerned should be aware of sleep deprivation, its bad effects and consequent effect on academic performance.

Limitations of the Study

The present study has provided strong evidence regarding the relationship between sleep deprivation of the students and their academic performance based on gender and stream. However, this study is not free from limitations. It has not taken into account some of the important contributors of academic performance like study habit, stress, anxiety, motivation, difficulty of examination etc. Again, the sample size of the study was also not very large. It was conducted with two (200) hundred students, from a single university only. Furthermore, only two streams namely arts and science were included and hence cannot be generalised to the entire population of University students. Moreover, it is a cross-sectional study and therefore it shows only association and in no matter, it has proved causality of two variables.

Conclusions

Sleep disturbances are common among the college students and this very fact worsens their academic performance. Sleep deprivation has led the students to daytime sleepiness, poor appetite, poor concentration and poor memorization and increase stress and anxiety. These factors affect the academic performance of the students negatively. There is an urgent need that the students, academicians, parents, teachers and government should comprehend the negative effect of sleep deprivation on academics of the students. Adequate measures must be taken to improve the sleep quality of the students in order to get better academic performance as well as good physical and mental health of the students.

Appendix-I

Gnd	Slp Dpr	Stream									
		Arts					Science				
		Good	Average	Poor	tt	tt	Good	Average	poor	tt	tt
M	sd	5	7	9	21	50	7	9	10	26	50
	snd	12	13	4	29		13	8	3	24	
F	sd	6	8	9	23	50	7	9	12	28	50
	snd	14	9	4	27		12	8	2	22	
Total						100					100
Total		200									

Abbreviations
Gnd =Gender
M=Male
F=Female
Slp =Sleep
Dpr=Deprivation
Sd=Sleep Deprived
Snd=Sleep not Deprived
Cnt= Count
df=degrees of freedom
tt= total

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