

A Cross-Sectional Study of the Impact of Sleep Deprivation on Academic Performance in Medical Students of Dakshina Kannada

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Abstract

Background: First year medical students are burdened with a huge study load in a short span of time. They are under tremendous stress during assessment times and often they go without sufficient sleep during examinations. **Objectives:** To determine the number of hours of sleep of all study participants on the night before Physiology internal assessment and the marks obtained by them and thus try to find a correlation between the duration of sleep and exam performance. **Methods:** Study included 146 first year medical students of a private deemed University. The number of hours of sleep obtained by the study participants on the night before the Physiology internal examination was recorded. Then their marks obtained in it exams were tabulated accordingly. Pearson's correlation was applied to determine if there is a significant correlation between the exam performance and duration of sleep. **Results:** There was a significant positive correlation between duration of sleep and exam marks obtained showing that lesser the duration of sleep, lesser is the performance in the exams. **Conclusion:** This study concludes that adequate sleep is essential for optimum performance during exams and deprivation of sleep is an added stress and is detrimental to student performance. Revising the method of assessing the students must be considered as the study reveals the shortcomings of the current pattern.

Keywords: Academic Performance, Cognition, Sleep

Introduction

Medical profession is a very vast field with ever increasing inflow of knowledge and information. Medical students are crammed with a lot of information which they are expected to know and since this is a field which deals with life and death, no errors are acceptable. The syllabus to be covered is very vast. Narrowing down the scenario, first year medicos who are fresh out of school are burdened with a huge study load in a short span of time. Hence they are under tremendous stress

especially during assessment times and often they go without sufficient sleep just before exams. As exam approaches the students try to cram in the subject as much as possible at the cost of other routine activities, most importantly sleep in particular.

Studies have shown that a body requires six to eight hours of sleep in a 24 hour cycle.[1] Less than 8 hours of sleep and the body's efficiency begins to decline.[2] New memories are formed within the brain when a person engages with information to be learned for example, memorizing a list of

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words.[3] However these memories are initially very vulnerable and in order to make them permanent they must be improved and solidified. This is called memory consolidation and it occurs when connections between brain cells as well as between different brain regions are strengthened. It was believed for many years that it develops merely with passage of time. More recently, however, it has been demonstrated that time spent asleep also plays a key role in preserving memory.[4] Thus sleep plays a major role in learning and memory.[5]

Hence there is a need to study the effect of duration of sleep on exam performance among our student population and thereby spread the awareness and importance of adequate sleep.

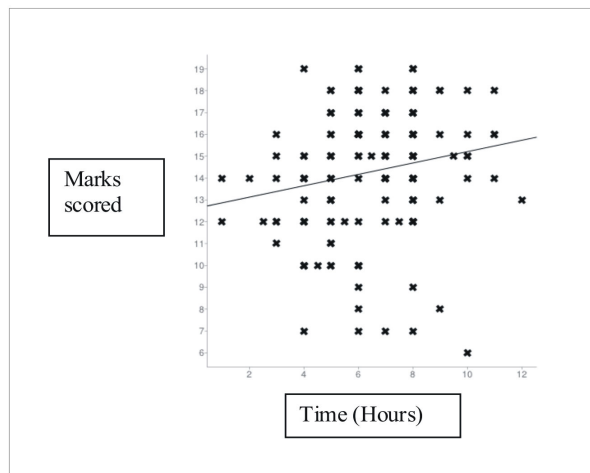
Aim of the study

To determine the number of hours of sleep obtained by 146 medical students on the night before Physiology theory internal assessment examination and the corresponding marks obtained by them and to find a correlation between the two variables.

Material and Methods

This cross sectional study included 146 medical students studying in first year of a private medical college of a deemed University who appeared for Physiology theory first internal assessment examination. Written informed consent was obtained from the study participants. Ethical clearance was also obtained from the Institutional Ethics Committee. Information regarding age, gender and the number of hours of sleep obtained on the night before the theory exam was recorded by self report method. Later, the marks scored by the students in that particular exam were tabulated correspondingly.

Figure 1: Correlation of exam performance with duration of sleep in hours



Pearson's correlation coefficient was applied to determine if there is any significant correlation between the hours of sleep and the marks obtained by the students. Pearson's correlation coefficient was done using statistical software SPSS 21 and MS Excel. All tests are two-tailed and $p < 0.05$ was considered as significant.

Results

The mean age of the study group was 18.5 years (Standard Deviation [SD] = 1.4) ranges from 18 to 20 years. Mean duration of sleep on the night before the exam was 6.4 ± 2 hours. Mean marks scored by the student was 14.28 ± 2.8 out of a maximum of 20 marks. Pearson's correlation coefficient value was (r) 0.19 which was found to be highly significant with a p value of 0.02.

Figure 1 revealed a strong positive correlation between the two parameters signifying that more the duration of sleep obtained by the students, more was the marks scored by them in the assessment.

Discussion

Sleep is essential to existence of life and

normal functioning of daily activities. Sleep deprivation affects mood, leads to low energy levels and hampers the ability to focus, concentrate and learn.[6,7,8] Studies have shown that memory recall and ability to maintain concentration are enhanced when an individual is well rested.

Our study demonstrated that the academic performance had a significant positive correlation with the amount of sleep obtained on the night before the examination. Thus, more the number of hours of sleep the student got on the night before the exam better was the score obtained in the assessment. A recent study observed that following one night of total sleep loss there was increased blood concentration of neuron-specific enolase (NSE) and S100 calcium binding protein B (S-100B). These are brain molecules which are known to be elevated in blood following brain damage.[9] Hence, there arises the hypothesis that sleep deprivation can result in neurodegenerative diseases. Sean Drummond in 2009 observed the effect of total sleep deprivation on cognitive performance tasks such as selective attention, sensory inattention, working memory, verbal encoding and retrieval in young and old adults. He found that older adults (59 to 82 years) showed more resilience than young adults (19 to 38 years) whose performance in all three cognitive tasks was significantly less. Studies done on sleep deprived animal models showed that following five hours of sleep deprivation there was increased levels and activity of PDE₄ and reduced levels of cAMP in mice. cAMP signalling in hippocampus is known to play a crucial role in formation and strengthening of new connections which helps in the process of learning. Further, following inhibition of PDE₄ enzyme there was reduction in the effects of sleep deprivation thus concluding that PDE₄ which rises following sleep deprivation probably blocks the action of cAMP.[10] Prolonged sleep deprivation is said to contribute in the development of

debilitating conditions like diabetes, hypertension and heart disease. There are studies showing an increased association of depression and obesity linked to sleep deprivation.[11]

Thus, sleep is critical for learning, memory and enhanced academic performance in general.[12,13] Limitation of study was that the duration of sleep of only one night was recorded. Also this study was done for internal assessment and more studies need to be done during semester/final examinations.

Conclusion

Sleep is integral to existence of life and adequate sleep is essential for normal physical and mental functioning of a human body. Healthy sleep routine is very essential especially during student life in order to maximize the academic performance. Here, an attempt is being made to determine the impact of quantity of sleep on the exam performance and hence later on, enhance the awareness among students to start a study routine from the very beginning of the course and not to overburden themselves at the very end of a course session at the cost of their normal sleep pattern. Also, the current pattern of assessment of medical students should be examined more thoroughly and appropriate actions for putting in place a more accurate assessment pattern should be considered.

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