



EFFECT OF SLEEP DEPRIVATION ON ATTENTION AND STRESS IN FUTURE HEALTHCARE PROFESSIONALS

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Abstract

Background: Sleep plays a crucial role in maintaining cognitive function, emotional regulation, and physiological balance. Among future healthcare professionals, whose demanding schedules often compromise sleep quality and duration, understanding the effects of sleep deprivation is critical.

Objective: To evaluate the impact of sleep deprivation on attention and stress levels in future healthcare professionals.

Methods: This cross-sectional observational study was conducted from January to December 2024 at Dr. B.S. Kushwah Institute of Medical Sciences, Kanpur. A total of 85 participants were divided into sleep-deprived (n = 45) and non-deprived (n = 40) groups based on reported sleep duration. Attention was assessed using standardized cognitive tests, and stress levels were measured through validated psychological scales. Statistical analysis was performed to determine differences across groups.

Results: There were no statistically significant differences in gender (p = 0.81) or age (p = 0.35) distribution between the sleep-deprived and non-deprived groups. The sleep-deprived group demonstrated significantly lower attention scores (65.4 ± 10.2 vs. 78.6 ± 8.9 ; p = 0.001) and higher stress levels (7.8 ± 1.5 vs. 5.3 ± 1.1 ; p = 0.005) compared to the non-deprived group. Additionally, high stress (60% vs. 25%; p = 0.002) and attention impairment (55% vs. 15%; p = 0.001) were more prevalent among sleep-deprived participants. A clear trend was noted between increased sleep duration and improved cognitive performance and reduced stress.

Conclusion: Sleep deprivation significantly impairs attention and elevates stress among future healthcare professionals. These findings emphasize the need to promote adequate sleep hygiene in medical students to support their cognitive functioning and mental well-being.

Keywords: Sleep deprivation, Attention, Stress, Medical students, Cognitive performance, Sleep duration

Introduction: Sleep is a vital process of human life. Though seemingly a passive process, on-hand medical literature suggests a high brain activity during sleep in all probability.¹ It helps to consolidate

existing memories and to make new links which inherently enhance the performance of an individual on a variety of tasks. Humans can survive several days of continuous sleeplessness, but it will be at the expense of deterioration in wellbeing and functioning.²

encompassing several fundamental functions for the human organism, such as regulating brain activities related to emotions and facilitating the processing and consolidation of memories.³ In addition, proper sleep regulation is crucial for the balance of physiological systems, such as the cardiovascular, immune, and endocrine systems.⁴ In addition, the ideal duration of sleep varies between 7 and 9 hours, alternating between two distinct neurophysiological states: rapid eye movement (REM) sleep and non-rapid eye movement (NREM) sleep.⁵

Sleep deprivation can be described as changes in the pressure to sleep, related to the homeostatic process, and in the pressure to stay awake, associated with the circadian cycle.⁶

Sleep disturbance is thought to affect not only emotional processing, but also stress management and cognitive flexibility, which are expressed as irritability, instability of mood and impaired concentration. Imaging studies have associated poor sleep with functional changes in the amygdala, prefrontal cortex, and hippocampus—regions important for emotion regulation and memory formation.⁷ Bad sleep has an equally dramatic impact on the body. Disturbances in sleep have been associated with enhanced sympathetic nervous system activity, hypercortisolism and impaired glucose metabolism.⁸

Material and Methods:

Study was conducted in department of Physiology in associated with the department of psychiatric, during a period from January- December 2024 at Dr. B.S. Kushwah Institute of Medical Sciences, Lakhanpur Kanpur.

The study was approved by the scientific review board and institutional ethics committee.

Study design: Cross-sectional, observational study

Sample size: 85 sample

Result:

Table 1: Gender Distribution by Sleep Deprivation Status

Gender	Sleep-Deprived (n = 45)	Non-Deprived (n = 40)	Total (n = 85)	p value
Male	25	22	47	0.81
Female	20	18	38	0.94
Total	45	40	85	

There was no statistically significant difference in gender distribution between the sleep-deprived and non-deprived groups ($p = 0.81$). This suggests gender is unlikely to have influenced the results related to attention and stress.

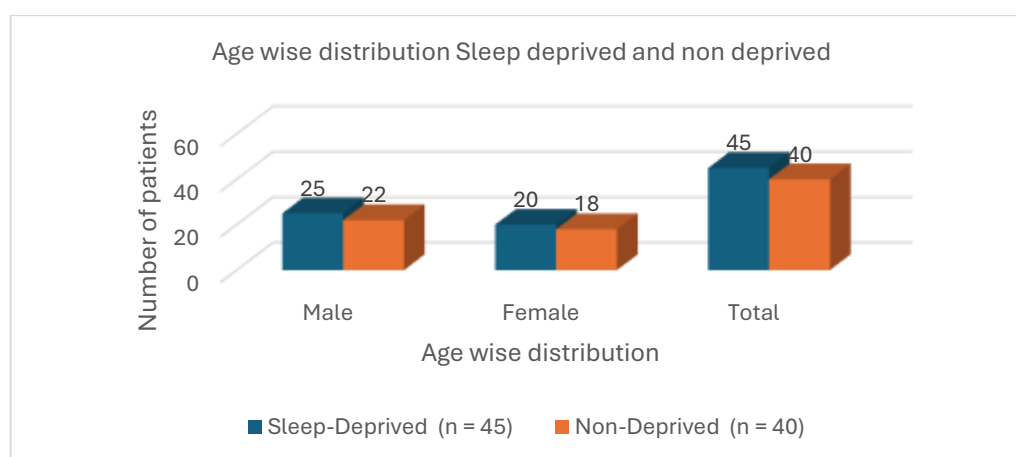
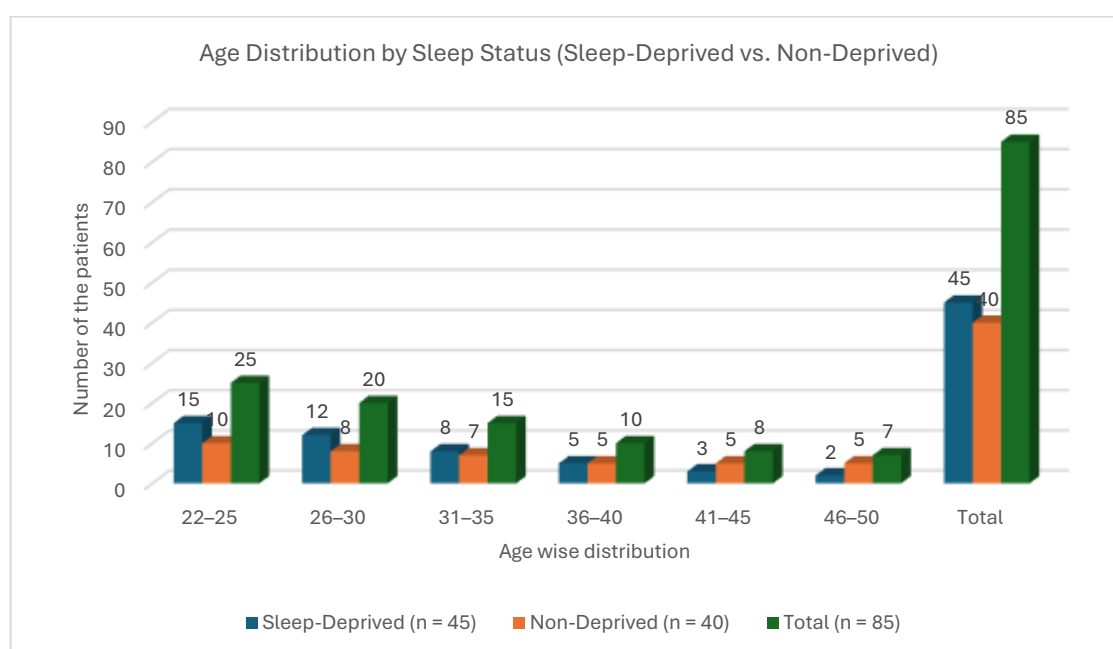


Figure 1: graphical represents age wise distribution Sleep deprived and non-deprived of patients

Table 2: Age Distribution by Sleep Status (Sleep-Deprived vs. Non-Deprived)

Age Group (Years)	Sleep-Deprived (n = 45)	Non-Deprived (n = 40)	Total (n = 85)	p-value
21–25	15	10	25	0.35
26–30	12	8	20	
31–35	8	7	15	
36–40	5	5	10	
41–45	3	5	8	
46–50	2	5	7	
Total	45	40	85	

The age distribution between the sleep-deprived and non-deprived groups showed no statistically significant difference ($p = 0.35$). This suggests that age was evenly distributed across both groups and is unlikely to act as a confounding variable in the analysis of attention and stress outcomes.

**Figure 2: graphical represents age distribution by Sleep Status (Sleep-Deprived vs. Non-Deprived)****Table 3: represents Sleep Deprivation on Attention and Stress Levels**

Parameter	Sleep-Deprived Group (n = 45)	Non-Deprived Group (n = 40)	p-value
Attention Score (Mean $\pm$ SD)	65.4 $\pm$ 10.2	78.6 $\pm$ 8.9	0.001**
Stress Level (Mean $\pm$ SD)	7.8 $\pm$ 1.5	5.3 $\pm$ 1.1	0.005*
Percentage with High Stress (%)	60%	25%	0.002*
Attention Impairment (%)	55%	15%	0.001**

Table shows that sleep deprivation significantly affects both attention and stress levels. The sleep-deprived group had a lower mean attention score (65.4) compared to the non-deprived group (78.6), with a p-value of 0.001, indicating a highly significant decline in attention. Stress levels were also higher in the sleep-deprived group (7.8 vs. 5.3, $p = 0.005$). Additionally, a greater percentage of sleep-

deprived individuals reported high stress (60% vs. 25%, $p = 0.002$) and attention impairment (55% vs. 15%, $p < 0.001$). These results suggest that lack of sleep is closely linked to reduced attention and increased stress.

Table 4: table represents relationship Between Sleep Duration, Attention Score, and Stress Level.

Sleep Duration (Hours)	Number of participants	Mean Attention Score $\pm$ SD	Mean Stress Level $\pm$ SD
< 5 hours	20	60.2 $\pm$ 9.8	8.1 $\pm$ 1.3
5–6 hours	25	67.3 $\pm$ 8.7	7.2 $\pm$ 1.1
> 6 hours	40	78.6 $\pm$ 8.9	5.3 $\pm$ 1.1

The data show a clear trend linking sleep duration with both attention and stress levels. Participants who slept less than 5 hours had the lowest attention scores (60.2 $\pm$ 9.8) and the highest stress levels (8.1 $\pm$ 1.3). Those sleeping 5–6 hours showed moderate improvement in attention (67.3 $\pm$ 8.7) and slightly lower stress (7.2 $\pm$ 1.1). Participants who slept more than 6 hours had the highest attention scores (78.6 $\pm$ 8.9) and the lowest stress levels (5.3 $\pm$ 1.1).

These findings suggest that longer sleep duration is associated with better cognitive performance and lower stress, highlighting the importance of adequate sleep for mental well-being and attention regulation.

Discussion: This study found that sleep deprivation significantly impairs attention and increases stress levels among future healthcare professionals. Sleep-deprived participants showed lower attention scores and higher stress compared to non-deprived individuals.⁹ Additionally, a greater percentage of sleep-deprived individuals reported high stress and attention impairment. A clear trend was observed where longer sleep duration was associated with better attention and lower stress, highlighting the cognitive and emotional benefits of adequate sleep. Age and gender were evenly distributed, ruling them out as confounding factors.

Conclusion: Sleep deprivation negatively affects attention and stress in future healthcare professionals. Those with shorter sleep duration performed worse cognitively and reported higher stress. Promoting healthy sleep habits in medical students is essential for improving their mental performance and well-being.

Conflict of Interest: The authors declare no conflict of interest related to this study.

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