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Research paper

Predictors of Daytime Sleepiness Among University Students

Role of Sleep Hygiene, Sleep Duration, and Residential Status

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ABSTRACT

Objective: To examine how sleep hygiene (SHI), demographic factors (age, gender), and sleep duration influence daytime sleepiness (ESS), and whether residential status (hosteler vs. day scholar) moderates these relationships.
Method: A cross-sectional, survey-based study was conducted among 240 college students aged 18–25 years from Moradabad, Uttar Pradesh. Participants were screened based on inclusion and exclusion criteria. Students with self-reported disturbed sleep patterns over the past two weeks were recruited. After obtaining written informed consent, a brief assessment was conducted. Outcome measures included the Epworth Sleepiness Scale (ESS) to evaluate daytime sleepiness and the Sleep Hygiene Index (SHI) to assess sleep-related behaviors. Data analysis was performed to examine the influence of sleep hygiene, demographics, and sleep duration on daytime sleepiness, and to explore the moderating effect of residential status (hosteler vs. day scholar).
Results: A total of 240 college students participated in the study. The mean age was 20.60 years (SD = 3.19), with some likely data entry errors noted. Participants reported an average sleep duration of 6.89 hours (SD = 1.82). The mean ESS score was 7.64 (SD = 4.31), indicating mild daytime sleepiness. The average SHI score was 20.25 (SD = 8.11), reflecting moderate variability and deficiencies in sleep hygiene. Overall, the data highlight suboptimal sleep habits and mild daytime sleepiness among the students.
Conclusion: The study concludes that poor sleep hygiene and shorter sleep duration are significant predictors of daytime sleepiness among university students. Additionally, residential status influences sleep behavior, with hostellers showing higher levels of sleep disruption. These findings underscore the need for targeted interventions to promote healthy sleep habits in this population.

1. Introduction

Sleep is a healthy spa that revitalizes the body and its processes; it is a rejuvenating, restorative therapy. “Rock Britto [1] sleep disorder is an under-recognized public health challenge that affects millions of people and is strongly associated with morbidity and mortality. Poor sleep conditions are currently considered key indicators and risk factors for mental illness and other pathological conditions. Although the precise function of sleeping has not been fully elucidated, there is strong evidence that sleep is associated with a higher incidence of cognitive decline and an increased risk of developing Alzheimer's disease [2]. One of the best examples of these rhythms is found in sleep, which alternates between the nonrapid eye movement (NREM) and rapid eye movement phases of the sleep cycle. Along with sleep duration, the timing of late sleep appears to increase the risk of metabolic and cardiovascular issues, most likely due to circadian misalignment caused by exposure to late-night light. In fact, according to certain research, almost any light at night increases the relative chance of developing a metabolic or cardiovascular disease [2].

Roughly, one-third of adults in developed countries exhibit difficulty with sleep initiation or maintenance at least once a week, and about 6–15% meet the criteria for insomnia disorders [2]. A sleep disorder is a clinical diagnosis made by medical professionals using a variety of tools, including rating scales, sleep diary reports, clinical observations, and patient symptoms. The International Classification of Sleep Disorders (ICSD), the American Academy of Sleep Medicine (AASM), the American Psychiatric Association (APA), and the World Health Organization (WHO) all agree that insomnia is a subjective complaint of insufficient sleep quantity or quality, linked to early awakening, difficulty falling asleep, or difficulty maintaining sleep, as well as clinically significant impairment of day functioning. 2 Insomnia, combined with depression and anxiety, can adversely affect long-term Quality of life (QOL). It inhibits immune activities by changing cytokine expression, influencing disease incidence and mortality. Insomnia is also associated with decreased natural killer cell numbers and activity due to aberrant cortisol production [3]. They also demonstrated a loss of cardiac autonomic dynamics during sleep after stroke in addition to diurnal variation of clock gene expression and sleep–wake rhythm biomarkers [4]. A Version 3 of the International Classification of Sleep Disorders lists over 50. The sleep-breathing condition known as obstructive sleep apnea is characterized by Intermittent partial or total upper airway blockage during sleep might result in abnormal breathing decreases (hypopnea) or airflow cessation (apnea) [5].

QOL has been measured using a variety of tools in sleep problem research, including, as well as sleep-specific tools like the Insomnia Severity Index (ISI) to gauge the probability of clinical 2 insomnia and the Epworth Sleepiness Scale (ESS) to gauge reported sleepiness in various everyday living scenarios [5]. Snoring is one of the most prevalent symptoms that occur during sleep. Excessive daytime weariness or sleepiness is a common symptom of OSA during the day. While fatigue is defined as feeling worn out, lacking energy, and lacking motivation, excessive daytime drowsiness is defined as feeling extremely lethargic or sleepy at times. Another symptom is feeling exhausted even after obtaining the suggested 7 to 9 hours of sleep. Factors that can be changed, but age, race, and male sex are risk variables that cannot be changed. Risk factors that can be changed include smoking, endocrine abnormalities (hypothyroidism, polycystic ovarian syndrome), drugs that relax muscles and constrict the airway (such as opiates, benzodiazepines, and alcohol), obesity, and nasal congestion or impediment. Although women have a risk comparable to men after menopause, men are more likely than women to develop OSA [6]. It has been discovered that people who get enough good sleep at the right times have better general health and a higher standard of living. In contrast, those who sleep poorly or excessively have a lower standard of living. High quality of life (QOL) was first thought to be associated with a lack of stress, but it has since developed into a multifaceted notion that highlights the subjectivity of experience, function, and welfare and incorporates the social, psychological, and physical facets of existence.

The anatomic nervous system releases the hormone cortisol in response to stress, which often helps in controlling cycles of sleep. However, insomnia and other sleep disorders are brought on by high levels of cortisol. Particularly over time, inadequate, excessive, or otherwise compromised sleep is worrisome since it can have detrimental effects on one's physical, mental, and social well-being. People who get a good night's sleep feel refreshed and cognitively alert. The amount of sleep has an impact on QOL and is a good indicator of well-being. The time that people sleep, however, is frequently disregarded. Individuals must modify their sleep schedules to accommodate social norms, which frequently conflict with their inclinations. This discrepancy between our innate biological and social rhythms causes social jet lag, which has been linked to quality of life in the past [7]. Therefore, sleep issues and disruptions offer a chance for either prevention or therapy to lessen the population's burden of poor brain health. Changes in brain electrical activity during sleep are a behavioral state that can cause altered consciousness, decreased sensory response, and a decline in muscular tone [8].

Sleep quantity, or duration, is easily quantified and is frequently expressed in hours or minutes using objective measurements like polysomnography or actigraphy, as well as self-report. However, there doesn't seem to be a universally accepted standard for sleep quality. Researchers have examined the relationship between self-reported sleep and objective sleep restful sleep [9]. Another element that may have an impact on quality of life is social relationships. The foundation of family function and social support is what social relationships are about. Developing positive social relationships is crucial to preserving both mental and physical well-being. Loneliness, sadness, and social disengagement are all consequences of poor social relationships [10]. Sleep, a basic essential for human growth and development, is one of the most important processes for optimizing physical, emotional, and cognitive functioning and maintaining good quality of life. Sleep is the best form of rest, and refreshment and good quality sleep is necessary for a healthy and good life [11].

Most the body's physiological recoveries, including musculoskeletal recoveries, immunological processes, memory consolidation, and learning facilitation, take place during the sleep phase. Sleep is therefore a dynamic process connected to understanding awake, and how these two behavioral states interact is essential to comprehending all sleep-related processes, including circadian oscillation [12]. Obstructive sleep apnea (OSA) has become more common in modern culture; 49.7% of men and 23.4% of women have been diagnosed with moderate to severe OSA1. The following etiologies contribute to OSA: aging, anatomic blockage, and deteriorated nerve innervations in muscles connected to the respiratory system. Higher mortality, comorbidities with stroke, cerebral vascular events, hypertension, diabetes mellitus, coronary artery disease, carotid stenosis, and depression are all consequences of untreated OSA. It also has an impact on other areas, like the health of roommates [13].

Sleep hygiene, which is crucial for enhancing the quality of sleep, involves actions that promote sleep (like consistent exercise) and refrain from disrupting it (like smoking, drinking alcohol in the evening, or using caffeine in the evening, dozing during the day). Prior research has demonstrated links between adults' poor sleep hygiene habits and poor sleep quality. Sleep deprivation has a significant impact on QOL, which is based on social, physical, and psychological health. There are contradictory findings about shift work and health issues [14]. The Epworth SLEEP SCALE (ESS) is a self-reported, eight-item measure of daytime drowsiness. Respondents use a 4-point Likert-type scale (0 being never and 3 being high probability) to indicate how frequently they display sleep patterns in 8 distinct scenarios. The responses' overall score falls between 0 and 24. Excessive daytime sleepiness is indicated by an ESS score of 9 [15]. A desire to sleep is the definition of sleepiness, which can also be characterized in behavioral, physiological, and subjective ways. It has been determined to be a significant contributor to accidents. Regarding the current study, it is noteworthy that the cumulative sleep study's evaluation of the initial limited sleep with 5-hour TIME IN BED (TIB) revealed a definite rise in subjective drowsiness in comparison to 8-hour TIB, along with a slight rise during the next 6 days of restriction. The outcomes were comparable for 4 and 6 hours over two weeks, and for 5 hours but not 7 hours in a related trial [16].

2. Materials and Methods

2.1 Material required

Sleep Hygiene Index (SHI)
Epworth Sleepiness Scale (ESS)

Sampling: Sample size- 240

2.2 Inclusion criteria

➢ College students aged between 18 and 25 years

➢ Both male and females are included in the study

➢ Participants must be able to report on their typical sleep patterns, including sleep duration, sleep quality, bedtime, wake-up time, and frequency of disruptions.

➢ Participants must have the ability to complete surveys, questionnaires assessing sleep quality

➢ Participants must be proficient in the language in which the study is conducted (e.g., English) to understand the assessments and surveys.

2.3 Exclusion criteria

➢ Pre-existing Medical or Psychiatric Conditions

➢ Use of Medications Impacting Sleep

➢ Participants with cognitive impairments that affect their ability to understand or complete the study's assessments (e.g., severe intellectual disabilities) may be excluded to ensure reliable data collection.

➢ Lack of Proficiency in the Study Language

3. Results

A total of 240 participants were included in the study. The descriptive analysis revealed that the mean age of participants was 20.60 years (SD = 3.19), with a range from 0 to 40 years. The average sleep duration reported was 6.88 hours (SD = 1.82), with values ranging from 0 to 19hours. The mean Epworth Sleepiness Scale (ESS) score was 7.64 (SD = 4.31), indicating a tendency toward mild to moderate daytime sleepiness. The average Sleep Hygiene Index (SHI) score was 20.25 (SD = 8.11), suggesting moderate variability and potential inadequacies in sleep hygiene practices among the participants.

Regarding participant characteristics, the academic background showed that 67.5% (n = 162) were from medical disciplines such as physiotherapy and nursing, while 32.5% (n = 78) belonged to non-medical fields. In terms of residential status, 24.2% (n = 58) were hostellers and 75.8% (n = 182) were day scholars. Tests of normality using both the Kolmogorov-Smirnov and Shapiro-Wilk methods indicated that the main variables—sleeping hours, ESS scores, and SHI scores—were not normally distributed across the total sample ($p < 0.05$ for all).

Furthermore, subgroup analysis based on academic background (medical vs. non-medical) also showed a non-normal distribution for all three variables ($p < 0.05$ in each group). These results justify the application of non-parametric statistical methods for subsequent data analysis.

4. Discussion

Poor sleep hygiene—such as irregular sleep schedules, screen use before bed, eating in bed, or studying late—has been consistently linked to increased daytime sleepiness. For example, a rural South Indian study found that behaviors like watching television in bed and eating before sleeping were significantly associated with excessive daytime sleepiness. Similarly, university students who used electronic devices late at night reported disrupted circadian rhythms and reduced daytime alertness. These findings align with our results that higher SHI scores were correlated with greater ESS scores, emphasizing the critical impact of sleep hygiene practices on daytime functioning [37]. Average sleep duration in our sample (~6.9 hours/night) falls below the 79 hours recommended for adults [38]. Similar trends have been observed globally: two-thirds of university students in the UAE slept less than seven hours, accompanied by higher ESS scores [39]. Shorter sleep duration is associated with increased daytime sleepiness and impaired cognitive performance [40]. Thus, our finding that reduced sleep duration predicts higher daytime sleepiness is consistent with established sleep science. Residential status—whether a student is a hosteller or day scholar—can influence sleep behavior. A South Indian rural study showed hostel accommodation was linked to poorer sleep quality compared to living at home [41]. Another investigation noted that hostellers exhibited suboptimal sleep hygiene (e.g., irregular schedules, environment disturbances) compared to students living with family. Differences in travel time, social environment, and campus life. may contribute to this effect. Our moderated analyses reflect these findings, indicating that hostellers may experience greater daytime sleepiness due to less structured living conditions. Younger students and those in non-medical streams have been observed to report more daytime sleepiness [41]. However, in our sample, the effect of academic background was nuanced. Medical students might benefit from structured routines but face higher academic stress affecting sleep quality, consistent with findings that rigorous curricula and stress contribute to poor sleep hygiene and increased ESS scores.

Our findings are supported by the two-process model of sleep regulation, where a delay in circadian timing (especially among young adults) and inadequate sleep drive can lead to sleep deprivation and daytime sleepiness. Environmental factors in residential settings—such as noise and light—further disrupt sleep, underscoring the need for sleep-friendly living spaces.

5. Conclusion

The findings of this study highlight a notable prevalence of inadequate sleep duration, daytime sleepiness, and poor sleep hygiene practices among college students aged 18–25 years. The average Epworth Sleepiness Scale (ESS) and Sleep Hygiene Index (SHI) scores suggest that a significant proportion of students experience mild to moderate sleep disturbances and engage in suboptimal sleep behaviours. Differences in academic background and residential status did not yield normally distributed data, as confirmed by normality tests, indicating the need for non-parametric analyses in further group comparisons. Overall, these results underscore the importance of promoting sleep education and interventions targeting sleep hygiene, especially in academic settings, to improve students' health, well-being, and academic performance.

Figures and Tables

Table 1 Descriptive Statistics of Age, Sleep Duration, Daytime Sleepiness (ESS), and Sleep Hygiene (SHI) Scores Among Participants (N = 240)

	N	Minimum	Maximum	Mean	Std. Deviation
Age	240	0.00	40.00	20.6042	3.19741
Sleeping_hrs	240	0.00	19.00	6.8875	1.81804
ESS_Score	240	0.00	22.00	7.6417	4.31073
SHI_Score	240	0.00	52.00	20.2458	8.11076
Valid N (listwise)	240				

Graph 1: Mean Scores of Age, Sleep Duration, Daytime Sleepiness, and Sleep Hygiene among Participants (N = 240)

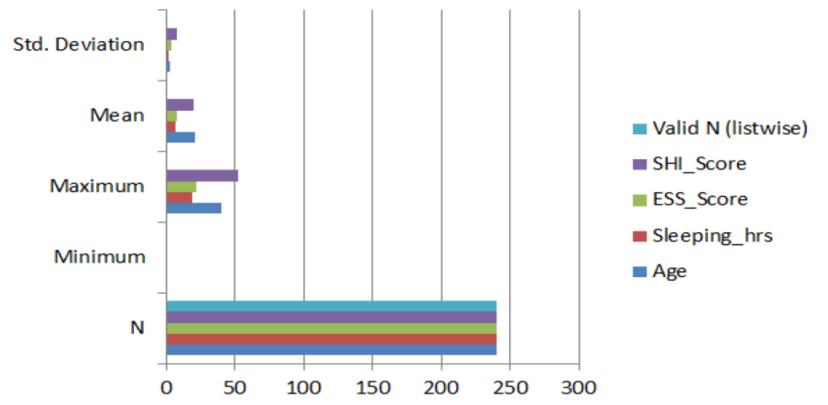

Table 2: Distribution of Participants According to Academic Background (Medical vs. Non-Medical, N = 240)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Medical	162	67.5	67.5	67.5
	Non medical	78	32.5	32.5	100.0
	Total	240	100.0	100.0	

Graph 2: Mean Scores of Age, Sleep Duration, Daytime Sleepiness, and Sleep Hygiene among Participants (N = 240)

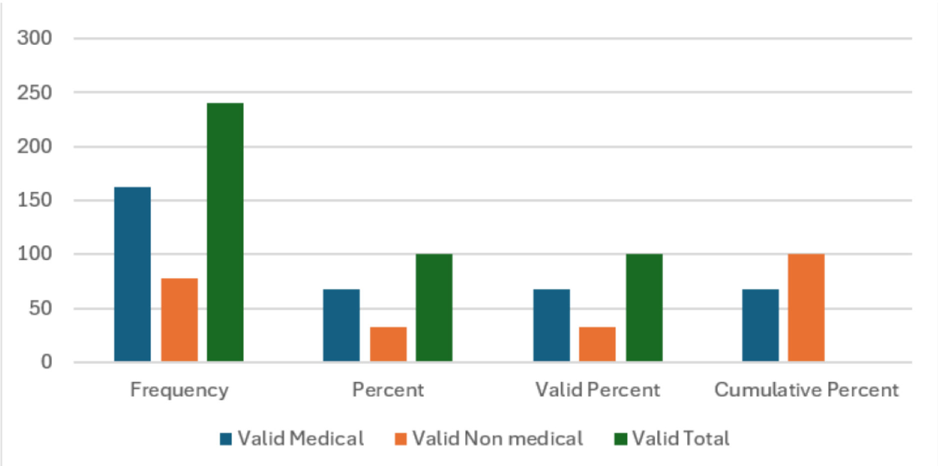

Table 3: Distribution of Participants According to Residential Status (Hostellers vs. Day Scholars, N = 240)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hostlers	58	24.2	24.2	24.2
	Dayscholars	182	75.8	75.8	100.0
	Total	240	100.0	100.0	

Table 4: Tests of Normality for Sleep Duration, Daytime Sleepiness (ESS), and Sleep Hygiene Index (SHI) Scores (N = 240)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Sleeping_hrs	.174	240	.000	.859	240	.000
ESS_Score	.109	240	.000	.964	240	.000
SHI_Score	.065	240	.016	.963	240	.000

Table 5: Tests of Normality for Sleep Parameters by Academic Group (Medical vs. Non-Medical Students)

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Group		Statistic	df	Sig.	Statistic	df	Sig.
Sleeping_hrs	Medical	.184	162	.000	.829	162	.000
	Non medical	.173	78	.000	.909	78	.000
ESS_Score	Medical	.130	162	.000	.960	162	.000
	Non medical	.202	78	.000	.925	78	.000
SHI_Score	Medical	.067	162	.070	.963	162	.000
	Non medical	.094	78	.088	.953	78	.006

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Ethical consideration

Approval for the study has been taken by the institutional review board and participant consent have also been taken before the data collection was carried out.

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