

Original Research Article

Assessment of perceived stress and daytime somnolence in health science students in North India

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ABSTRACT

Background: Recent studies have increasingly underscored the high prevalence of stress and sleep disturbances among medical students that adversely impacts their general well-being and academic performance. The present research was conducted with the aim to assess the perceived stress and daytime sleepiness levels in medical and paramedical students. Additionally, relationship between the two was also examined.

Methods: This cross-sectional study was conducted in 200 undergraduate students in the age group of 18-25 years, pursuing medical and paramedical courses at a government medical college in Karnal district, Haryana, north India. Perceived stress scale (PSS)-10 was used to evaluate the perceived stress level and Epworth sleepiness scale (ESS) to assess daytime somnolence. Association between study variables was determined using Pearson's correlation analysis.

Results: Study sample encompassed 51% (n=102) females, 49% (n=98) males and had mean age of 20.46 (SD=1.47) years. 84% (n=168) of students reported moderate stress while 12% (n=24) demonstrated high stress levels. Around four out of five (n=159) experienced excessive level of daytime sleepiness. Pearson's correlation analysis demonstrated a significant, positive ($r=0.15$, $p=0.03$) association between perceived stress and daytime somnolence.

Conclusions: Our findings were concerning as the prevalence of moderate to severe stress and excessive daytime sleepiness was found to be alarmingly high, regardless of gender. Also, daytime sleepiness showed positive relationship with perceived stress. There is an urgent need to identify and address these issues well in time.

Keywords: Daytime somnolence, Excessive daytime sleepiness, Medical students, Perceived stress

INTRODUCTION

Medical students often face intense stress and numerous challenges throughout their training. The demanding academic workload and pressure to perform at a consistently high level can lead to physical and emotional exhaustion. Many students struggle with maintaining a work-life balance, often sacrificing personal time, sleep, and social connections in pursuit of academic excellence. Additionally, the competitive environment, fear of failure, and exposure to emotionally taxing clinical situations can

further contribute to anxiety, burnout, and feelings of inadequacy. These stressors not only impact their mental and physical health but can also affect academic performance and overall quality of life.¹ The prevalence of stress among medical students is alarmingly high and has been widely documented in recent studies. Research consistently shows that a significant proportion of medical students experience moderate to severe levels of stress during their training. Factors contributing to this include the rigorous academic demands, high expectations, frequent examinations, and the emotional burden of clinical responsibilities.^{2,3}

Excessive daytime sleepiness (daytime somnolence) refers to uncontrollable dozing off and drowsiness during the daytime, leading to the inability to remain alert and cautious in performing important daily activities. Excessive daytime sleepiness can have diverse and serious consequences. Daytime sleepiness can directly affect the behaviour of the individuals and has been linked to poor health and compromised professional performance.^{4,5} Sleepy adolescents tend to have noticeably lower academic performance, are late to school more often, and have reduced graduation rates compared to their peers.⁶

Sleep deprivation is probably the most common cause of excessive daytime sleepiness.⁷ Medical students often experience a high prevalence of sleep disturbances due to the demanding nature of their training. Many medical students report difficulty falling asleep, frequent awakenings during the night, and poor sleep quality overall.⁸ These disturbances not only impact their physical and mental health but also impair cognitive function, concentration, and academic performance. Over a period of time, chronic sleep deprivation can increase the risk of burnout, anxiety, and depression, making it a critical issue that needs attention within medical education.^{9,10} Keeping in view the aforementioned information, the present research was carried out with the purpose to estimate the prevalence of high stress and excessive daytime sleepiness in medical and paramedical undergraduate students. Additionally, the relationship between perceived stress and daytime sleepiness was also investigated.

METHODS

Study design and setting

This study having cross-sectional design was conducted in the Department of Physiology, Kalpana Chawla Government Medical College (KCGMC), Karnal district, Haryana, north India over a period of three months from July to September 2024. Before commencement of the study, due clearance was given by the institutional ethics committee of KCGMC, Karnal vide letter number KCGMC/IEC/2024/188.

Participants

Study sample comprised of undergraduate students of either gender in the age group of 18 to 25 years enrolled in medical or paramedical courses at Kalpana Chawla Government Medical College, Karnal. Those students suffering from any psychiatric or systemic illness, showed unwillingness were excluded. Participants were explained about the purpose of the study and nature of assessments following which informed written consent was obtained. Participants were made to relax in a quiet room for 5-10 minutes. General information such as age, gender, course etc. was collected from each participant. To evaluate participants regarding their perceived stress

levels and daytime somnolence, responses were recorded using two questionnaires: perceived stress scale (PSS)-10 and Epworth sleepiness scale (ESS). Duly filled questionnaires were collected and scrutinized for any missing responses. Questionnaires from a total of 200 participants (sample size =200) were found to be complete in all respect and subjected to statistical analysis.

Instruments

Perceived stress scale (PSS)-10 questionnaire

The perceived stress scale (PSS) is the most widely used psychological instrument for measuring the perception of stress. It measures the degree to which situations in one's life are appraised as stressful. It consists of 10 items designed to know how unpredictable, uncontrollable, and overloaded respondents find their lives. The scale also includes a number of direct queries about current levels of experienced stress. The questions in the PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way.

The responses are recorded using a five-point Likert scale (never, almost never, sometimes, fairly often, and very often). Scoring was given to each question as 0-4, where (never was given 0, almost never- 1, sometimes- 2, fairly often- 3, and very often- 4) for questions 1, 2, 3, 6, 9, and 10. Reverse scoring was given to the rest four questions 4, 5, 7, and 8. (Never was given 4, almost never- 3, sometimes- 2, fairly often- 1, and very often- 0). The scores were added up, and the total score was categorized as 0 to 13: low stress, 14 to 26: moderate stress and 27-40: high-perceived stress. The scores on the PSS-10 can range from 0 to 40, higher scores indicating higher perceived stress.¹¹

Epworth sleepiness scale

Daytime sleepiness was assessed using the Epworth sleepiness scale (ESS). The Epworth sleepiness scale (ESS), developed at Epworth Hospital in Melbourne, Australia, is an 8-item self-administered questionnaire. Its psychometric properties have been widely investigated. The questionnaire asks the subject to rate his or her probability of falling asleep on a scale of 0-3 for eight different situations that most people engage in during their daily lives, though not necessarily every day.

The scores for the eight questions are added together to obtain a single number. Sleepiness is assessed using a 4-point Likert scale referring to an individuals' likelihood of dozing off in that situation 0 = would never doze off 1 = slight chance of dozing 2 = moderate chance of dozing 3 = high chance of dozing. Epworth Sleepiness score 0-10 = normal range of sleepiness in healthy adults, 11-14 = mild sleepiness, 15-17 = moderate sleepiness and 18-24 = marked sleepiness. Higher ESS scores indicate greater daytime sleepiness, or a higher sleep propensity, in daily

life. A score of >6 points indicate daytime sleepiness and >10 points indicate excessive daytime sleepiness. The maximum score possible is 24, with higher scores reflecting higher levels of sleepiness.¹²

RESULTS

Our study population of 200 students had mean age of 20.46 (SD=1.47) years. Predominantly, 52% (n=104) of students were in the age group of 18-20 years; however, 48% (n=96) students were in 21-24 years age group. Out of the total 200 participants, majority were females 51% (n=102) and remaining 49% (n=98) were males. MBBS (bachelor of medicine, bachelor surgery) students [88.0% (n=176)] constituted the major bulk of the participants followed by paramedical stream BPT (bachelor of physiotherapy) course students; 10.05% (n=21) and only 1.5% (n=3) students of B.Sc. MLT (bachelor of science in medical laboratory technology) course.

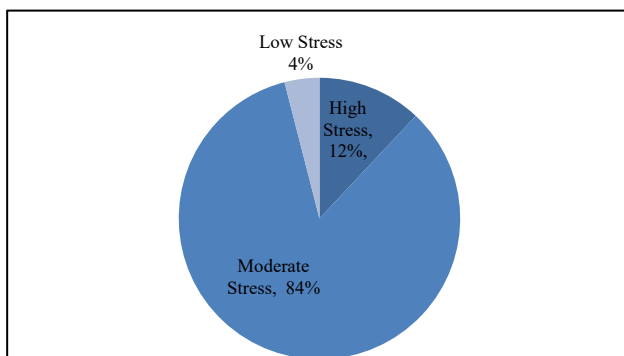


Figure 1: Distribution of study participants (n=200) based on perceived stress level.

The mean PSS score for study population was found to be 22.60 ± 4.05 . 84% (n=168) of the students demonstrated moderate level of stress followed by 12% (n=24) reporting high stress level (Figure 1), which depicts a grim scenario. Analysis of frequency distribution of

participants in perceived stress categories in relation to gender, course and age group using chi-squared test of independence showed no statistically significant difference.

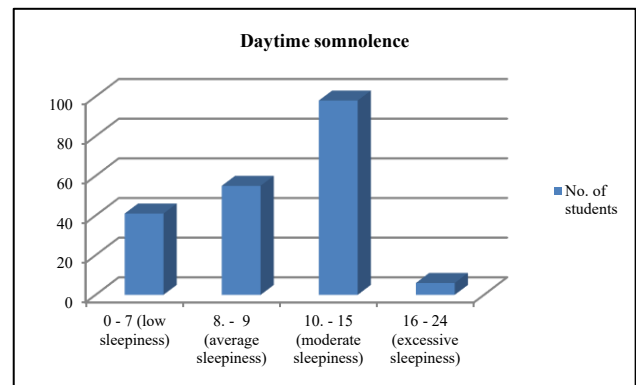


Figure 2: Distribution of study participants (n=200) based on levels of daytime somnolence.

In our study, 49% (n=98) of students reported moderate sleepiness, whereas 27.5% (n=55) reported average sleepiness (Figure 2). However, 3% (n=6) of students reported excessive sleepiness and 41 students (20.5%) experienced low levels of sleepiness. The mean score for daytime sleepiness assessed using Epworth sleepiness scale (ESS) scale was found to be 9.78 ± 3.07 .

Table 1 shows the distribution of students according to their levels of daytime sleepiness (assessed by ESS) in relation to age, gender and educational stream. Around four out of five (n=159) students reported excessive daytime sleepiness. Those who reported excessive daytime sleepiness had more than twice the greater odds of being enrolled in MBBS program than paramedical course. However, there was no gender predisposition pertaining to the sleepiness levels. Also, the trends shown in the age group of 18-24 years was similar and statistically insignificant.

Table 1: Daytime sleepiness levels of participants (n=200).

		Daytime sleepiness level (%)		Odd's ratio (OR) (95% Confidence limits)
		Normal sleepiness	Excessive sleepiness	
Course	MBBS	32 (18.2)	144 (81.8)	2.68*
	Paramedical (BSc MLT, BPT)	9 (37.5)	15 (62.5)	(1.04, 6.69)
Age group (years)	18-20	20 (19.2)	84 (80.8)	1.17
	21-24	21 (21.9)	75 (78.1)	(0.58, 2.35)
Gender	Male	19 (19.4)	79 (80.6)	1.14
	Female	22 (21.6)	80 (78.4)	(0.57, 2.29)

*Statistically significant at $p < 0.05$ (determined using Mid-P exact test).

Pearson's analysis of the correlation between perceived stress (PSS scores) and daytime somnolence (ESS scores) demonstrated a positive, significant ($r=0.15$, $p=0.03$)

linear relationship. Thus, students perceiving more stress were likely to experience greater degree of daytime sleepiness.

DISCUSSION

In recent years, the literature has increasingly highlighted the prevalence of stress and sleep disturbances during medical training that significantly negatively impacts the general well-being and academic performance of the students. In our study conducted among 200 medical and paramedical students, it was found that 84% of students had a moderate amount of perceived stress; however, 12% students reported high level of stress (Figure 1). Similar results have also been reported by Gupta et al in their study in Haryana with 72.7% of students perceiving different levels of stress.¹³ Francis et al reported 69% of MBBS students in a private college in North Kerala were under stress, with a perceived stress score of 33.54 ± 8.71 .¹⁴ Similar findings have also been reported by Anuradha et al from Chennai and Basu et al where the total participants reported to be under stress were 54.2% and 63.48% respectively.^{15,16} Global studies on medical student population have also reported similar prevalence of perceived stress. Nsengimana et al reported that 80% of the medical students in Rwanda experienced mild to severe stress during their university years.¹⁷ Alotaibi et al in his study reported stress perception in 63% of the medical students.¹⁸ Kowalczyk et al reported that 58.17% of the medical staff was under moderate stress.¹⁹

Present study revealed an alarming figure with respect to the prevalence of excessive daytime sleepiness in students. The mean score for daytime sleepiness assessed using Epworth sleepiness scale (ESS) scale in our study was 9.78 ± 3.07 . Further analysis revealed that four out of five students reported excessive daytime sleepiness, with odds being greater in those enrolled in MBBS programme than in a paramedical course. 52% of students reported experiencing moderate to severe level of daytime sleepiness. Giri et al in their study on 150 medical undergraduates, interns, and postgraduate university students in India found that, 17.3% experienced high levels of daytime sleepiness, while 13.3% experienced borderline levels of daytime sleepiness based on the Epworth Sleepiness Scale.²⁰ Kowalczyk et al observed that 36.64% of the medical staff experienced excessive daytime sleepiness (mean ESS score 9.3 ± 5.7).¹⁹

In addition, our study demonstrated a significant, positive ($r=0.15$, $p=0.03$) correlation between perceived stress and daytime sleepiness, the probable reason for it may be due to poor quality of sleep. There are studies which corroborate our findings. Kashani et al revealed that stress levels correlated with daytime consequences of disturbed sleep.²¹ Also, Isac and Abraham found a positive association between daytime sleepiness and stress levels in nursing students.²² Yogeshwar et al in their study among undergraduate physiotherapy students reported a strong association between stress and quality of sleep.²³ Rebello et al also demonstrated a positive correlation between the PSS-14 scores and various academic stressors and the global PSQI score.²⁴ The possible mechanisms by which stress has been found to have a

negative impact on the amount and quality of sleep can be due to varied reasons like hypothalamic-pituitary-adrenal (HPA) axis activation, disruption of circadian rhythm, psychosocial factors, and imbalance of the neurotransmitter involved in sleep regulation.²⁵ It is important to note that the relationship between stress and sleep is bidirectional. While stress can disrupt sleep, inadequate, or poor-quality sleep can also contribute to increased stress levels, creating a vicious cycle of stress and sleep disturbances. Both sleep quality and daytime sleepiness can significantly predict psychological and physiological stress responses.

CONCLUSION

Present study revealed an alarmingly high prevalence of moderate to high perceived stress and excessive daytime sleepiness in medical and paramedical students, irrespective of the gender. A significant, positive association was found between perceived stress and daytime sleepiness. Our findings warrant appropriate measures be taken to address these health issues as they could adversely affect the overall health and academic performance of the students.

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Ethical approval: The study was approved by the Institutional Ethics Committee of KCGMC, Karnal (KCGMC/IEC/2024/188)

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