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Original Research Article

A study on night eating syndrome and its association with depression among medical students in Tumakuru: a cross-sectional study

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ABSTRACT

Background: Night eating syndrome (NES) is an eating disorder characterized by excessive evening or nocturnal food intake and is often associated with psychological disturbances, particularly depression. Medical students are especially vulnerable due to academic stress, irregular sleep patterns, and lifestyle disruptions. Evidence on the burden of NES and its association with depression among Indian medical students remains limited.
Methods: A cross-sectional study was conducted among 324 medical students of a medical college in Tumakuru from April to June 2025 using universal sampling. Data were collected through a semi-structured questionnaire. Depression was assessed using the patient health questionnaire-9 (PHQ-9), and NES was evaluated using the revised night eating diagnostic questionnaire (NEDQ). Data were analyzed using IBM statistical package for the social sciences (SPSS) version 21.0. Descriptive statistics were applied, and associations were tested using the Chi-square test. A $p<0.05$ was considered statistically significant.
Results: The prevalence of NES among study participants was 87.3%, with the majority having mild NES (70.7%). Depression was present in 66.4% of participants. A statistically significant association was observed between NES and female gender ($p=0.04$) and eating pattern after 7 PM ($p<0.001$). Although a higher proportion of students with NES had depression (65.1%), the association between NES and depression was not statistically significant ($p=0.18$).
Conclusion: NES and depression are highly prevalent among medical students and are strongly interrelated. Early screening, mental health support, sleep hygiene education, and lifestyle interventions should be integrated into medical student wellness programs to prevent long-term psychological and behavioral consequences.

Keywords: Depression, Medical students, Night eating diagnostic questionnaire, Night eating syndrome

INTRODUCTION

Night eating syndrome (NES) is an eating disorder characterized by excessive food intake during evening or nighttime, often associated with nocturnal awakenings and altered circadian rhythm of eating behavior.[1] Depression is a common mental disorder characterized by persistent sadness, loss of interest, and reduced functioning, affecting approximately 300 million people worldwide. It significantly contributes to the global burden of disease and is highly prevalent among young adults and students.[2] The prevalence of NES varies widely across populations. Studies among students' report prevalence ranging from 10% to 49%, indicating considerable variability depending on lifestyle and environmental factors.[3] In India, studies have reported prevalence ranging from 11.8% to 37.3% among college students.[4]

Medical students were particularly vulnerable to both NES and depression due to academic stress, irregular sleep cycles, and unhealthy eating habits.[5] Evidence suggests that NES is strongly associated with psychological disturbances such as depression, anxiety, and stress, often mediated through circadian rhythm disruption and neurohormonal imbalance.[6]

Despite increasing recognition, there is limited data on the burden of NES and its association with depression among Indian medical students. Hence, this study was undertaken to assess the prevalence of NES and its association with depression in this population.

Aim

The aim of the study was to assess the prevalence of night eating syndrome and its association with depression among medical students.

Objectives

The objectives were to estimate the prevalence of night eating syndrome among medical students, to estimate the prevalence of depression among medical students and to assess the association between NES and depression among the study participants.

METHODS

This was a cross-sectional study conducted among students of a Medical college in Tumakuru, spanning from April 2025 to June 2025. The study enrolled 450 participants selected through universal sampling. Inclusion criteria covered all students willing to participate, while those not providing consent were excluded. Out of 450 students, 324 gave consent to participate in the study.

Data collection involved obtaining written informed consent, followed by interviewing participants using a semi-structured questionnaire to gather socio-demographic factors. The level of depression was assessed using the patient health questionnaire (PHQ-9) scale, and NES was assessed using the night eating diagnostic questionnaire (NEDQ) revised (9/2014). For statistical analysis, data collected in Google Forms were transferred from a Microsoft Excel sheet to IBM licensed statistical package for the social sciences (SPSS) statistics version 21.0.

Descriptive statistics were utilized to determine frequencies and percentages, while mean, standard deviation, and standard error were calculated for normally distributed continuous variables, and median and inter quartile range for skewed continuous variables. The Chi-square test was employed to find associations between qualitative variables, and parametric tests assessed the difference in significance and strength of association between continuous variables. A $p<0.05$ was established as the threshold for statistical significance.

Data collection tool

NES scoring included non-NE=normal (does not meet any criteria category below), N=mild night eater has 1 criteria from I (but does not meet criteria NE or NES), NE=moderate night eater has 1 criteria from I plus >3 of 5 qualifiers from criteria III (but does not meet criteria NE or NES) and NES=full syndrome night eater has >1 from I plus >3 of 5 qualifiers from criteria III plus IV and V.

PHQ-9 scoring included a score of 0 to 4 suggests minimal or no depressive symptoms, score between 5 and 9, it indicates mild depression, score of 10 to 14 suggests moderate depression, score of 15 to 19 indicates moderately severe depression and a score between 20 and 27 signifies severe depression.

Statistical analysis

The data was collected in the Google forms and extracted into Microsoft excel sheet. After data editing and data cleaning it will be transferred to IBM licensed SPSS statistics version 21.0 Descriptive statistics was used to determine the frequency and percentages. Mean, standard deviation and standard error will be calculated for normally distributed continuous variables and median and inter quartile range was calculated for skewed continuous variables. Chi square was used to find the any association between the qualitative variables. Parametric tests were used to assess the difference in significance and strength of association between the continuous variables. A $p<0.05$ will be considered as a statistically significant.

RESULTS

In this study, majority of students were females 233 (71.9%), belonging to the age group of 20 to 22 years 203 (62.7%), studying in 1st year of MBBS 116 (35.8%) and 235 (72.5%) were in upper socio-economic status (modified B. G. Prasad classification). Most students went to bed after 12 am 168 (51.9%), and woke up around 7 am 126 (38.9%). About 198 (61.1%) students were consuming moderate (50.0-75.0%) amount of food after 7 pm (Table 1).

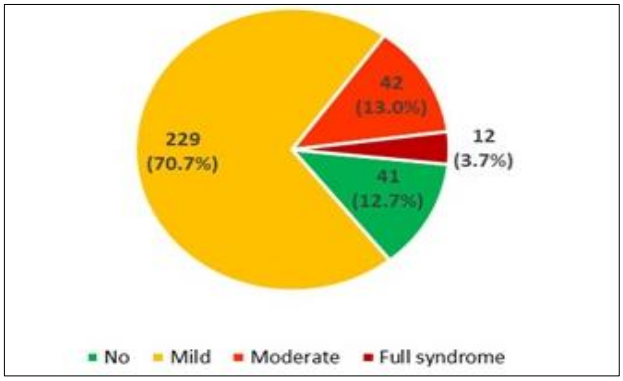

Figure 1: Distribution of NES among medical students (n=324).

Among the 324 students, 283 (87.3%) met the criteria for having NES. Based on the scoring and severity 229 (70.7%) of the students had Mild NES, followed by 42 (13.0%) moderate NES, and 12 (3.7%) with severe NES. (Figure 1). A total of 215 (66.4%) of participants had some

degree of depression. About 127 (39.2%) students had mild depression, followed by 53 (16.4%) moderate, 22 (6.8%) moderately severe, and 13 (4.0%) had severe depression (Figure 2).

NES is found to be more common among female study participants 198 (70.0%) which is statistically significant with p=0.04. The NES was found more among the age group of 20-22 years 176 (62.2%) and 1st year MBBS students 95 (33.6%). Students belonging to upper class (according to modified B. G. Prasad classification) had more NES 206 (72.8%).

Regarding with sleeping time and wake up time most of the students who sleeps late hours have NES 114 (50.9%) and students who wakes up around 7 am have NES compared to others 109 (38.5%). Students eating moderately after 7pm had higher NES 183(64.7%) (p<0.001) and about 184 (65.1%) of the students who has NES are reported with depression (Table 2).

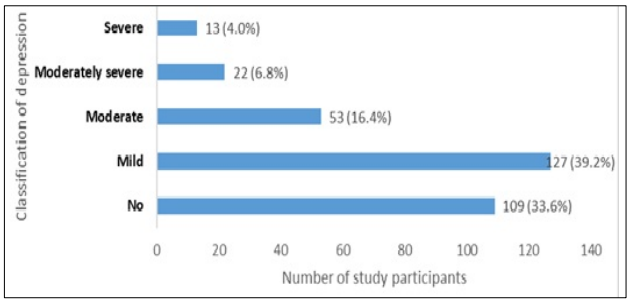

Figure 2: Distribution of study participants based on levels of depression (PHQ-9, n=324).

Table 1: Demographic profile of study participants (n=324).

Variables	Category	N	%
Gender	Male	91	28.1
	Female	233	71.9
Age group (years)	≤19	106	32.7
	20–22	203	62.7
	≥23	15	4.6
Year of study	Ist MBBS	116	35.8
	IInd MBBS	90	27.8
	IIIrd MBBS	103	31.8
	IV MBBS	15	4.6
Socio-economic status (modified B. G. Prasad classification)	Upper	235	72.5
	Upper middle	38	11.7
	Middle	20	6.2
	Lower middle	16	4.9
	Lower	15	4.6
Wake time (am)	6	56	17.3
	7	126	38.9
	8	98	30.2
	After 8	44	13.6
Bedtime	Before 10 pm	09	2.8
	10–11 pm	37	11.4
	11 pm –12 am	110	34.0
	>12 am	168	51.9
Eating quantity after 7 pm (%)	0-25 (almost nothing)	14	4.3
	25-50 (a very little)	72	22.2
	50-75 (moderate)	198	61.1
	75-100 (a significant portion)	40	12.3

Table 2: Distribution of study participants based on factors effecting NES (n=324).

Variables	Night eating syndrome		Total (n=324), N (%)	Chi² (p value)
	Present (n=283), N (%)	Absent (n=41), N (%)		
Gender				
Female	198 (70.0)	35 (85.4)	233 (71.9)	4.2 (0.04)
Male	85 (30.0)	06 (14.6)	91 (28.1)	
Age group (years)				
≤19	93 (32.9)	13 (31.7)	106 (32.7)	0.28 (0.87)
20–22	176 (62.2)	27 (65.9)	203 (62.7)	

Continued.

Variables	Night eating syndrome		Total (n=324), N (%)	Chi² (p value)
	Present (n=283), N (%)	Absent (n=41), N (%)		
≥23	14 (4.9)	01 (2.4)	15 (4.6)	
Year of study				
Ist MBBS	95 (33.6)	21 (51.2)	116 (35.8)	6.41 (0.08)
IInd MBBS	82 (29.0)	08 (19.5)	90 (27.8)	
IIIrd MBBS	94 (33.2)	09 (22.0)	103 (31.8)	
Final year	12 (4.2)	03 (7.3)	15 (4.6)	
Socio-economic status (modified B. G. Prasad classification)				
Upper	206 (72.8)	29 (70.7)	235 (72.5)	4.45 (0.31)
Upper middle	33 (11.7)	05 (12.2)	38 (11.7)	
Middle	17 (6.0)	03 (7.3)	20 (6.2)	
Lower middle	12 (4.2)	04 (9.8)	16 (4.9)	
Lower	15 (5.3)	00 (0.0)	15 (4.6)	
Wake time (am)				
6	51 (18.0)	05 (12.2)	56 (17.3)	1.08 (0.78)
7	109 (38.5)	17 (41.5)	126 (38.9)	
8	84 (29.7)	14 (34.1)	98 (30.2)	
After 8	39 (13.8)	05 (12.2)	44 (13.6)	
Bedtime				
Before 10 pm	06 (2.1)	03 (7.3)	09 (2.8)	4.96 (0.15)
10–11 pm	33 (11.7)	04 (9.8)	37 (11.4)	
11 pm –12 am	100 (35.3)	10 (24.4)	110 (34.0)	
>12 am	114 (50.9)	24 (58.5)	168 (51.9)	
Eating quantity after 7 pm				
0-25% (almost nothing)	06 (2.1)	08 (19.5)	14 (4.3)	23.29 (<0.001)
25-50% (a very little)	59 (20.8)	13 (31.7)	72 (22.2)	
50-75% (moderate)	183 (64.7)	15 (36.6)	198 (61.1)	
75-100% (a significant portion)	35 (12.4)	05 (12.2)	40 (12.3)	
Depression				
Present	184 (65.1)	31 (75.6)	215 (66.4)	1.8 (0.18)
Absent	99 (34.9)	10 (4.4)	109 (33.6)	

DISCUSSION

The present study assessed the prevalence of NES and its association with depression among medical students. The proportion of NES was 87.3%, which is consistent with several international studies reporting high NES rates among young adults experiencing academic pressure.[7] NES was more common in females than males, echoing previous findings that suggest females tend to exhibit higher emotional and nocturnal eating behaviour.[8]

This reveals a substantial burden of subclinical NES, where early forms (mild/moderate) occur more frequently than severe NES, 33.6% of the students had minimal/no depression. This aligns with literature reporting that 20–45% of medical students' experience depression because of chronic academic pressure and reduced sleep.[9]

A higher proportion of students with NES had depression (65.1%); however, the association was not statistically significant (p=0.18). This suggests that NES may not be directly influenced by depression alone. Depression is a multifactorial condition influenced by biological, psychological, and social factors, and its relationship with eating behavior may vary across populations. The findings indicate that lifestyle factors such as late-night eating may play a more important role than psychological factors alone.

The prevalence of depression in this study was 87.3%, comparable to multiple studies reporting depression rates of 35–50% among South Asian medical students.[9] Irregular schedules, academic burden, and inadequate sleep contribute greatly to this constellation of problems.[10]

Sociodemographic variables such as year of study, age group, bedtime, and wake timing were not significantly associated with NES. These findings suggest that NES in medical students is not dependent on age or academic year but more closely related to psychological factors and lifestyle behaviour. Literature also confirms that NES tends to be independent of demographic variables but strongly linked to stress, anxiety, and sleep disruption.[11,12]

The study highlights the need to integrate mental health screening, sleep hygiene education, and nutritional

counselling into medical student wellness programs. Early identification of subclinical NES may help prevent progression to more severe forms of disordered eating and chronic depression.

Limitations

Cross-sectional design prevents establishing causal relationship between NES and depression. Self-reported data may introduce recall and reporting bias.

CONCLUSION

The present study demonstrates that NES is a significant behavioural concern among medical students, with nearly one-third of the participants meeting diagnostic criteria. A substantial proportion of students also exhibited depressive symptoms, and NES showed a strong and statistically significant association with depression. Female gender and late eating pattern were additional factors contributing to higher NES prevalence.

These findings highlight the growing need for early identification of maladaptive eating behaviours and underlying psychological distress among medical students. Integrating mental health screening, sleep hygiene education, and lifestyle-based interventions into student wellness programs may help reduce the burden of NES and its related consequences. Addressing these issues at an early stage is essential for improving academic performance, emotional well-being, and long-term health outcomes in future healthcare professionals.

Recommendations

Future studies should use longitudinal design and multivariate analysis to establish causality. Implement screening, lifestyle modification, and mental health interventions among students.

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