

Prevalence and Associations of Night Eating Syndrome Among Medical Students in Saudi Arabia

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Background: Medical students often experience elevated stress levels and disrupted sleep patterns, increasing the risk of developing Night Eating Syndrome (NES). Depression is prevalent among medical students, further emphasizing the need for investigation. This study aims to explore the occurrence of NES and its associated factors, primarily focusing on depression, among medical students at a university in Jeddah, Saudi Arabia.

Methods: In this cross-sectional study involving medical students, participants completed a self-administered questionnaire covering sociodemographic details, the Night Eating Syndrome Questionnaire (NEQ) with 14 items, and the Patient Health Questionnaire-2 (PHQ-2) for depression screening.

Results: The study involved 300 medical students, reflecting a diverse sample with an average age of 21.4 ± 1.9 years and a well-balanced distribution across academic years. Notably, 41 participants (13.7%) were identified as obese. Depression, as determined by PHQ-2 scores exceeding 3, was prevalent in 159 students (53.0%). A multivariable logistic regression analysis uncovered a significant independent association, revealing that being a second-year medical student was linked to depressive health conditions (odds ratio [OR]: 3.53, 95% confidence interval [CI]: 1.24–10.10, $p = 0.02$). Exploring NES, 22 students (7.3%) scored above the NEQ threshold of 25, indicating its presence. Intriguingly, multivariable logistic regression illustrated that the sole independent factor associated with NES was the presence of depression (OR: 4.4, CI: 1.4–13.2, $p = 0.01$).

Conclusion: The overall prevalence of NES was 7.3%, and it was found to be associated with depression in medical students. Additionally, being a second-year medical student was independently associated with depression. These findings underscore the importance of addressing mental health issues, including NES and depression, in medical students, particularly during the early stages of their training.

Keywords: night eating syndrome, depression, medical students, cross-sectional study, Saudi Arabia

Introduction

Night Eating Syndrome (NES) is characterized by a disruption in the timing of food intake, with recurring episodes of nighttime overeating and a sense of loss of control. It is more prevalent in individuals with obesity, psychiatric disorders, and sleep disturbances.¹ NES often goes unnoticed, and effective treatment strategies are still emerging,² leading to challenges in adhering to diet plans and achieving weight loss.³

The precise prevalence of NES in the general population remains somewhat elusive, with estimates ranging from 1.5% to 4.6%. This prevalence is notably higher in those with obesity (3% to 15%) and individuals with psychiatric conditions, particularly depression (up to 15%).^{4,5} In Saudi Arabia, where the obesity rate stands at 24.7%, addressing conditions linked to obesity and metabolic syndromes, such as NES, becomes increasingly important.⁶

Research has established a connection between NES and mental health problems, particularly depression, across various student populations.^{7–9} However, despite its relevance to public health and its potential impact on individuals'

well-being, NES remains insufficiently investigated, particularly within the distinctive context of medical students. Only one study has investigated NES among Saudi medical students, reporting a prevalence of 10.3%.¹⁰

The demanding nature of medical education is well-documented, placing students under substantial academic pressure and psychological stress. As emerging healthcare professionals, medical students often navigate irregular schedules, sleep disruptions, and high-stakes examinations.¹¹ Such environmental factors may contribute to the development and perpetuation of NES among this population, but the extent of its prevalence and the associated factors remain inadequately understood.⁸

Given the unique challenges of medical education and the increased risk of eating disorders among medical students, it is imperative to examine NES prevalence and its associated factors in this specific population. Insights gained from this study can inform preventive measures and early interventions for NES and related health conditions. This study seeks to investigate the prevalence of NES and depression, along with their associated factors, among Saudi medical students.

Methods

Study Design

A cross-sectional survey was conducted at King Abdulaziz University in Jeddah, Saudi Arabia, from January 15, 2022, to June 30, 2022. The aim of the study was to estimate the prevalence of NES among medical students and explore the factors associated with NES, with a particular focus on its association with depression. The survey, self-administered by participants, was conducted online through Google Forms.

Study Participants

This study includes all medical students enrolled at King Abdulaziz University, spanning from the second to the sixth year of their academic program, with participants from the foundation year cohort excluded due to the non-medical curriculum nature of that year. Additionally, individuals diagnosed with other eating disorders were excluded based on self-reporting. This exclusion was implemented to ensure a more specific focus on night eating syndrome. Including participants with various eating disorders could introduce confounding factors that might complicate the interpretation of the results.

Participants were recruited through class representatives who distributed the survey link via email or WhatsApp messages, ensuring a direct and efficient means of reaching the target population.

Sample Size Calculation

The sample size calculation was based on an assumed total population of approximately 1000 medical students. Using a 10% estimated frequency of night eating syndrome from a prior study¹⁰ and targeting a $\pm 5\%$ margin of error, we set the significance level at 0.05 for a 95% confidence level, corresponding to a Z score of around 1.96. OpenEpi software was employed for this calculation.

Despite the minimum required sample size being 122, we extended invitations to 300 participants, which constitutes one third of the population. This broader approach accommodates potential non-responses and incomplete surveys, thereby enhancing statistical power and generalizability.

Study Instrument

The data collection instrument for this study comprised three distinct sections. The first section gathered demographic details, including age, gender, academic year, weight, and height, providing essential contextual information. The second part utilized the 14-item Night Eating Questionnaire (NEQ), based on the questionnaire proposed by Allison et al,¹² to assess the presence and severity of night eating syndrome symptoms. Finally, the third section incorporated the Patient Health Questionnaire-2 (PHQ-2),¹³ a validated tool assessing psychological well-being and depressive symptoms. The entire survey was conducted exclusively in English. Prior to the main survey, the questionnaire underwent pre-testing on a small sample to ensure clarity and relevance. Feedback from the pre-test phase was used to refine the instrument for the main survey.

Statistical Analysis

Statistical analyses were conducted using Statistical Package for the Social Sciences Version 26. Categorical variables were presented as frequencies and percentages, while continuous variables were described using means and standard deviations. The NEQ global score was computed by reverse coding items 1, 4, and 14 and summing all items except item 13, which did not assess the degree of NES. A total NEQ score of ≥ 25 served as the threshold for identifying NES, while the PHQ global score was obtained by summing up its two items, and a score of ≥ 3 was used as the cut-off point for a positive screening. Associations between categorical variables were examined using the chi-square test, and the independent samples *t*-test was employed for comparing continuous variables. Associations were further explored through multivariable logistic regression analysis. Significance was defined as a *p*-value of < 0.05 .

Results

Demographic Profile

The study involved 300 participants, with an even gender distribution; 150 participants (50%) identified as males, and 150 participants (50%) as females. The average age was 21.4 ± 1.9 years. The distribution across medical years was uniform, with 60 participants (20%) in each academic year from the second to the sixth. Body Mass Index categories revealed that 167 participants (55.7%) had a normal weight, followed by 65 participants (21.7%) who were overweight. The prevalence of underweight individuals was 22 (7.3%), and 26 participants (8.7%) fell into the Class I obese category (Table 1).

Prevalence and Factors Associated with Depression

Overall, 159 (53.0%) students had depression based on PHQ-2 scores higher than 3. Table 2 presents a comparative analysis based on the prevalence of depression. Concerning gender, 82 (54.7%) males and 77 (51.3%) females had scores equal to or above 3, signifying the presence of depression. No statistically significant difference was observed in gender-related depression prevalence ($p = 0.56$). However, a significant association was found between the presence of depression and

Table 1 Demographic Characteristics of Study Participants (N=300)

Variable		Frequency	Percentage	
Gender	Male	150	50.0	
	Female	150	50.0	
Medical Year	Second	60	20.0	
	Third	60	20.0	
	Fourth	60	20.0	
	Fifth	60	20.0	
	Sixth	60	20.0	
BMI	Underweight	22	7.3	
	Normal	167	55.7	
	Overweight	65	21.7	
	Obese	Class I	26	8.7
		Class II	9	3.0
		Class III	6	2.0
Age (years)		21.4 \pm 1.9		

Abbreviations: SD, standard deviation; BMI, body mass index.

Table 2 Comparative Analysis Based on Patient Health Questionnaire-2 Scores

Variable		PHQ Scores				P value	
		<3		≥3			
		n	(%)	n	(%)		
Gender	Male	68	(45.3)	82	(54.7)	0.56	
	Female	73	(48.7)	77	(51.3)		
Medical Year	Second	13	(21.7)	47	(78.3)	<0.01	
	Third	29	(48.3)	31	(51.7)		
	Fourth	29	(48.3)	31	(51.7)		
	Fifth	34	(56.7)	26	(43.3)		
	Sixth	36	(60.0)	24	(40.0)		
BMI	Underweight	14	(63.3)	8	(36.4)	0.31	
	Normal	81	(48.5)	86	(51.5)		
	Overweight	28	(43.1)	37	(56.9)		
	Obese	Class I	13	(50.0)	13		(50.0)
		Class II	3	(33.3)	6		(66.7)
		Class III	1	(16.7)	5		(83.3)
Age (years)		21.8 ± 1.9		21.0 ± 1.9		<0.01	

Note: P-values are in bold if statistically significant.

Abbreviations: n, number of participants; BMI, body mass index; NEQ, Night Eating Syndrome Questionnaire; PHQ, Patient Health Questionnaire-2.

medical year ($p < 0.01$). Specifically, higher proportions of participants in the second year had the highest prevalence (78.3%) of depression compared to those in the higher academic years. Furthermore, no significant differences were observed in the prevalence of depression and body mass index (BMI) categories. Age emerged as a significant factor ($p < 0.01$), with participants experiencing depression in a slightly younger age group (21.0 years vs 21.8 years).

Multivariable logistic regression analysis revealed that being a second-year medical student was independently associated with depressive health conditions (OR: 3.53, 95% CI: 1.24–10.10, $p = 0.02$). Although age was significant in the bivariate analysis, it was not significantly associated with depression (OR: 0.89, 95% CI: 0.74–1.07, $p = 0.22$).

Prevalence and Factors Associated with Night Eating Syndrome

In total, 22 students (7.3%) were found to have NES, as they scored above the NEQ threshold of 25. Table 3 provides a comparative analysis based on the prevalence of NES. Table 3 presents a comparative analysis of participants based on the presence or absence of NES. Across gender, no significant differences were found in NES prevalence, with 139 males (92.7%) and 139 females (92.7%) not exhibiting NES. Similarly, no notable variations were observed among different medical years, BMI categories, or age groups concerning NES prevalence. Importantly, the prevalence of NES significantly differed between participants with depression and those without depression. Specifically, 18 participants (11.3%) in the depression group had NES, while only 4 participants (2.8%) without depression showed NES tendencies ($p = 0.01$).

A multivariable logistic regression analysis was conducted to explore independent factors associated with the presence of NES. The analysis revealed that the sole independent factor linked to NES was the presence of depression (OR: 4.4, CI: 1.4–13.2, $p = 0.01$).

Table 3 Comparative Analysis Based on Night Eating Syndrome Questionnaire Scores

Variable		NEQ Scores				P value	
		<25		≥25			
		n	(%)	n	(%)		
Gender	Male	139	(92.7)	11	(7.3)	1.00	
	Female	139	(92.7)	11	(7.3)		
Medical Year	Second	59	(98.3)	1	(1.7)	0.27	
	Third	54	(90.0)	6	(10.0)		
	Fourth	54	(90.0)	6	(10.0)		
	Fifth	57	(95.0)	3	(5.0)		
	Sixth	54	(90.0)	6	(10.0)		
BMI	Underweight	21	(95.5)	1	(4.5)	0.97	
	Normal	155	(92.8)	12	(7.2)		
	Overweight	60	(92.3)	5	(7.7)		
	Obese	Class I	24	(92.3)	2		(7.7)
		Class II	8	(88.9)	1		(11.1)
		Class III	6	(100.0)	0		(0.0)
Age (years)		21.4 ± 1.9		21.9 ± 1.9		0.24	
PHQ	<3	137	(97.2)	4	(2.8)	0.01	
	≥3	141	(88.7)	18	(11.3)		

Note: P-values are in bold if statistically significant.

Abbreviations: n, number of participants; BMI, body mass index; NEQ, Night Eating Syndrome Questionnaire; PHQ, Patient Health Questionnaire-2.

Discussion

This study aimed to estimate the prevalence of NES and explore its associated risk factors among Saudi medical students. Our findings offer insights into the prevalence of NES, its association with depression, and the complex interplay of factors influencing eating behaviors among medical students.

Our study identified that 7.3% of the participants exhibited symptoms suggestive of NES. Notably, among these individuals, 21.7% were overweight, and 3% were extremely obese. Comparing our results to a 2019 study among medical students in Saudi Arabia, our NES prevalence was lower (10.3%).¹⁰ This disparity may be attributed to differences in the proportion of overweight and obese students in our sample. It underscores the importance of considering sample demographics when examining NES prevalence.

Furthermore, our study found a higher NES prevalence among medical students compared to university students in other countries, such as the United States (4.2%), Egypt (5.8%), and China (1.6%).^{14–16} A higher NES prevalence of 9.5% was observed in university students in Turkey.¹⁷ These varying rates across different studies underscore the need for further research to comprehensively understand the multifaceted factors contributing to NES and to develop effective preventive and management strategies.

Our study identified a significant association between NES and depression among medical students. We found a marked difference in depression scale scores between NES-positive and NES-negative groups, indicating that depression plays a pivotal role in the development of NES. This association was further corroborated through binary logistic regression analysis. These findings emphasize the influential role of psychological factors, particularly depression, in the

prevalence of NES among medical students. Our results align with a substantial body of literature that consistently demonstrates a significant connection between depression and NES, underscoring the multifaceted interplay between mental health and eating behaviors.⁷

Intriguingly, our study did not find statistically significant differences in NES rates concerning gender, age, medical year, or body mass index. However, the relationship between NES and these factors remains a subject of debate in the literature. Previous studies have reported gender differences, with men being more likely to experience NES than females, while others have identified correlations between NES and body mass index among specific age groups.^{16–18} The intricate nature of this relationship suggests that additional research is required to fully elucidate the factors contributing to NES and the variations in its prevalence.

This study exhibits several limitations. Its cross-sectional design restricts the ability to establish causal relationships, and future longitudinal studies may provide more profound insights into the development and progression of NES. The study's limited sample size and scope, focusing on students from a single university in Saudi Arabia, may impact the generalizability of the findings. Future research should consider a broader range of demographic characteristics and a more comprehensive set of mental health measures to enhance our understanding of NES.

Nonetheless, this study makes a substantial contribution to the literature, particularly within the context of Saudi Arabia. It underscores the critical importance of addressing mental health issues, including NES and depression, among medical students, especially during the early stages of their training.

Conclusion

This study estimated the prevalence of NES among medical students to be 7.3%. NES was found to be significantly associated with depression. Furthermore, being a second-year medical student was significantly associated with a positive depression screening result. These findings emphasize the importance of addressing mental health issues, including NES and depression, among medical students, particularly early in their training. By providing targeted support and resources for these students, healthcare professionals and educators can help promote better mental health outcomes and improve the overall well-being of this population. This underscores the need for proactive measures to address the psychological well-being of medical students as a fundamental component of their holistic health.

Abbreviations

BMI, Body Mass Index; CI, Confidence Interval; NES, Night Eating Syndrome; NEQ, Night Eating Syndrome Questionnaire; OR, Odds Ratio; PHQ-2, Patient Health Questionnaire-2.

Data Sharing Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethics Approval and Informed Consent

The study was conducted in strict adherence to the principles outlined in the Declaration of Helsinki, with ethical clearance obtained from the Institutional Review Board at King Abdulaziz University (Reference No. 585-21). The informed consent process included a comprehensive explanation of the voluntary nature of participation, with a particular emphasis on measures taken to ensure the confidentiality of participant information.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no conflicts of interest in this work.

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