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Association Of Night Eating Syndrome With Sleep Quality, Dietary Habits, And Circadian Rhythm Aged Among Adults Of 18-25 Years Mumbai, India.

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Introduction

Young adults aged 18-25 years experience significant life transitions that often lead to weight gain. Researchers such as Anderson, Shapiro, & Lundgren (2003), Burke et al. (2004), and Graham et al. (2002) have observed that factors like independent living, higher education or employment, and changes in relationship status contribute to this vulnerability. Among these transitions, dietary patterns play a crucial role. Studies by Huffman et al. (2007), Niemeier et al. (2006), and Sheehan et al. (2003) have identified common dietary changes in this age group, including breakfast skipping and increased eating outside the home due to social activities (Caperchione et al., 2008; Wallace et al., 2000).

Night Eating Syndrome (NES), initially identified by Stunkard, Grace, and Wolff in 1955, presents a distinctive amalgamation of eating, sleep, and mood disorders characterized by morning anorexia, evening hyperphagia, and insomnia. Diagnostic criteria for NES have evolved over time, leading to underrecognition among medical professionals. Significant strides were made in 2010 with consensus-driven diagnostic criteria by Allison et al., now included in the DSM-5 under Feeding or Eating Disorders Not Elsewhere Classified (OSFED). NES affects both genders and approximately 1% to 2% of the general population, with a higher prevalence in overweight or obese populations and those with diabetes mellitus or psychiatric disorders. NES prevalence ranges from 15% to 44% in patients with Binge Eating Disorder (BED) and 9% to 47% in those with Bulimia Nervosa (BN), with notable differences in nocturnal energy intake and circadian patterns of food intake between NES and BED.

Chronotype refers to an individual's preferred sleep/wake cycle timing, categorized as early or late. The circadian rhythm, controlled by an internal clock, regulates daily variations in behavior and sleep timing. Early chronotypes have earlier sleep times and peak alertness compared to late chronotypes. Light exposure plays a crucial role in regulating circadian rhythms, with morning light advancing the biological clock and evening light delaying it. Sharkey et al. (2011) and Appleman et al. (2013) found that light interventions influence circadian phase shifts, suggesting that individual sleep preferences may affect the efficacy of such interventions.Sleep quality significantly impacts health, including metabolic processes and psychological well-being. Disturbances in sleep, as seen in individuals with NES, can affect appetite regulation, nutrition, and energy balance. Inadequate sleep can lead to increased hunger and altered food intake patterns, contributing to nighttime eating. Research indicates that poor sleep quality affects appetite hormones, leading to increased appetite during evening hours (Peuhkuri et al., 2012; Miller et al., 2019; Orhan et al., 2009).

Nutrition plays a crucial role in preventing diseases like cancer, obesity, diabetes, and cardiovascular conditions. A balanced diet rich in vegetables, fruits, and fibers and low in processed foods, sugary beverages, alcohol, and red/processed meats is recommended. In Belgium, adolescents aged 14-17 exhibit poor dietary habits, while those aged 18-39 show mixed patterns. Socio-economic factors significantly influence dietary habits, with higher SES linked to better nutrition and lower SES to unhealthy food consumption. Circadian rhythms, governed by cellular clocks, regulate metabolism, gene expression, and behavior. Light is the primary regulator of the central circadian clock, while food intake timing and composition influence peripheral clocks.Consuming food at inappropriate times can disrupt circadian rhythms, leading to weight gain and metabolic health issues. Obese individuals tend to eat closer to the onset of melatonin secretion, a circadian phase marker, compared to lean individuals. The timing and composition of food intake are significant cues for the circadian system, with disruptions linked to adverse health outcomes (Boyland et al., 2017; Braude et al., 2014).The rationale for this study is to explore the association of night eating syndrome with circadian rhythms, dietary habits, and sleep quality, especially in the Indian context where data are limited. Research into the relationship between chronotype and NES is needed to understand how these factors interplay, contributing to evaluating the association between chronotype, dietary intake, and night eating

Methods:

A cross-sectional study involving 200 young adults from colleges was conducted from January 2024 to March 2024, utilizing snowball sampling. Demographic information, anthropometric measurements, and validated tools including the Night Eating Diagnostic Questionnaire (NEDQ), Pittsburgh Sleep Quality Index Questionnaire (PSQI), Morningness-Eveningness Questionnaire (MEQ), and Semi quantitative Food Frequency Questionnaire were used.Inclusion criteria Young adults with 18-25 years of age, residing in Mumbai.& Exclusion Criteria:Severely hospitalized or young adults with chronic disease, working in call centre or working in airlines those who have night shift

Results:

The study population was 51.5% females & 48.5% males. The study sample size was 200 students from various colleges.The detailed demographic descriptive statistics have been explained in the table below:

Table 1 :Demographic Characteristics of Participants.

Demographic Variable	**N(%)**
Age(years)	
18-21years	93(46.5%)
22-25years	107(53.5%)
BMI (kg/m2) (According to WHO Asian BMI Cut off) (Girdhar, Sangeeta & Sharma, Sarit & Chaudhary, Anurag & Bansal, Priya & Satija, Mahesh. (2016). An Epidemiological Study of Overweight and Obesity Among Women in an Urban Area of North India. Indian Journal of Community Medicine. 41. 154-7. 10.4103/0970-0218.173492.)	
<18.5 Under weight	-
18.5 – 22.9	57(28.5%)
23.0 – 24.9	54(27%)
25.0 -29.9 (obese class I)	69(34.5%)
>30.0(Obese class II)	20(10%)
Level of Education	
12th Std	104(52%)
Graduate	69(34.5)
Post Graduate	20(10%)
Diploma	7(3.5%)

In this study of 200 Participants , the prevalent age of the participants was between 18-25 years the mean age of female was 21.69 years and male was 21.38 years.. With.Nearly 34.5% of participants belonged to obese class I category , followed by 28.5% normal weight , 27% had overweight & 10% were class II obese.Regarding education levels, a significant proportion had completed Junior College education (52%), followed by Graduates (34.5%), Post Graduates (10%), and those with Diploma qualifications (3.5%). According to a study done by (Gallant et al 2012), there was an association between night eaters and BMI..

Anthorpometric measurement: The baseline anthropometric measurements have been recorded and discussed below:

Table 2: Anthropometric measurement among study participants classified on gender:

Anthropometric Measurement	Group	N	Mean(Std Deviation)
Weight in (kg)	Female	103	67.79(12.992)
	Male	97	66.79(11.169)
Height in (cm)	Female	103	163.15(8.424)
	Male	97	162.11(8.608)
Body Mass Index (kg/m2)	Female	103	25.387(3.900)
	Male	97	25.355(3.270)

Data presented as Mean(SD)

According to the anthropometric data provided there are slight differences in anthropometric measurements between females and males in the studied population. While females generally had slightly higher mean values for weight, height, and BMI compared to males, the differences were not substantial. Among females (n=103), the mean weight was 67.79 kg with a standard deviation of 12.992 kg, while among males (n=97), the mean weight was slightly lower at 66.79 kg with a standard deviation of 11.169 kg. In terms of height, females had a mean height of 163.15 cm with a standard deviation of 8.424 cm, whereas males had a mean height of 162.11 cm with a standard deviation of 8.608 cm.Regarding BMI, females had a mean BMI of 25.387 kg/m^2(overweight) with a standard deviation of 3.900 kg/m^2, and males had a similar mean BMI of 25.355 kg/m^2(overweight) with a standard deviation of 3.270 kg/m^2.

Sleeping patterns & meal patterns : The participants responded for questions related to daily schedules. The mean values according to gender have been tabulated as follows:

Table 3:Daily schedules of participants for sleep pattern and meal pattern.

Time schedule for participants	Group	Mean(Std Deviation)
Time of going to bed in the evening (PM)	Female(n=103)	11:28(2.828)
	Male(n=97)	11:42(2.893)
Time of getting out of bed in the morning(AM)	Female(n=103)	6:32(3.153)
	Male(n=97)	6:46(3.120)
Time taken to fall asleep (minutes)	Female	15.33(2.870)
	Male	15.43(3.039)
Hours of actual sleep at night in the past month(hours)	Female(n=103)	6.7(2.649)
	Male	6.9(2.371)
Time of Lunch(PM)	Female	2:06(2.071)
	Male	2:26(2.261)
Time of Breakfast(AM)	Female	8:22(4.019)
	Male	8:17(3.967)
Time of Dinner(PM)	Female	8:44(2.368)
	Male	8:52(2.530)

Data Presented as Mean (SD)

The analysis of anthropometric measurements revealed that there were slight differences in weight and height between the two groups. Both groups exhibited similar body mass index (BMI) values, indicating that there was no significant difference in BMI between them. Similarly, when examining age, it was found that the mean age of the two groups was very close, with no statistically significant difference observed. In terms of sleep patterns, no significant differences were identified between the groups regarding bedtime, wake-up time, or the time taken to fall asleep. Additionally, both groups reported similar durations of sleep and exhibited similar bedtime habits over the past month. The lack of significant disparities in these sleep-related variables suggests that sleep patterns were consistent across both groups. Meal times also showed no significant differences between the groups, including breakfast, lunch, dinner. This consistency in meal timings indicates that dietary habits were similar between the two groups. Overall, the statistical analysis suggests that there are no significant differences between the two groups in terms of anthropometric measurements, age, sleep patterns, or meal times.

4.2Night Eating Syndrome:

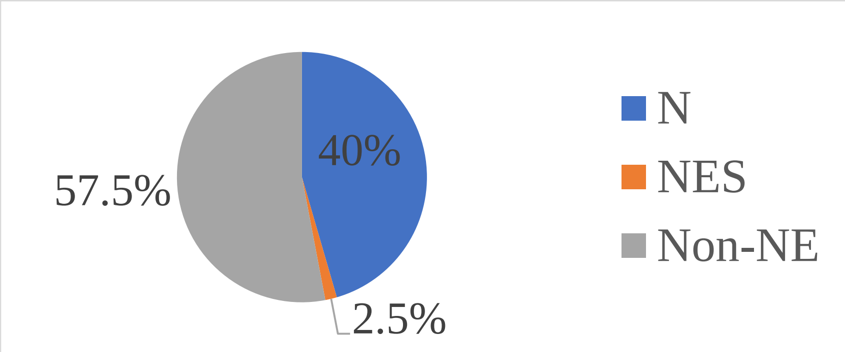

Fig4.2: Distribution of Participants on the basis of Night Eating.
Distribution of participants based on Night Eating Syndrome Criteria
NEQValues (Night Eating Questionnaire):There are three categories in NEQ:
0(Non-NE :does not meet any criteria), 1(Mild night eater), and 3(NES:full Syndrome Night Eater).

Table4:Association of NEQ with Gender & Age among study participants.

	NEQ			X^2 Value	*p* Value
Gender	Non-NE	N(Mild Night Eater)	Full Night Eating Syndrome		
Male (n=97)	55(56.7%)	37(38.1%)	5(5.2%)	5.492	0.64
Female(n=103)	60(58.3%)	43(41.7%)	0((0.0%)		

*Significance is at the level of $p<0.05$

According to the table, the NEQ (Night Eating Questionnaire) scores were examined in relation to gender. Among males (n=97), 56.7% it was inferred negative for night eating syndrome, 38.1% of participants had mild night eating syndrome, and 5.2% were categorized as participants with full night eating syndrome. Similarly, among females (n=103), 58.3% it was inferred negative for night eating syndrome, 41.7% of participants had mild night eating syndrome. The correlation analysis also showed no significant association between NEQ scores and gender among females. The correlation analysis yielded a χ^2 Value of 5.492, with a p-= 0.64, indicating a non-significant association between NEQ scores and gender among males.& females According to Nolan et al. 2019 4.6% had mild night eating syndrome ,2.4% had moderate night eating syndrome & 0.9% had full night eating syndrome.

Table 4.7:Association of PSQI with Gender among study participants

	PSQI SCORE		χ^2 Value	*p*Value
	<5	>=5		
Male (n=97)	9(9.3%)	88(90.7%)	1.492	0.
Female(n=103)	6(5.8%)	97(94.1%)		
Age	22.56	21.54	-0.001	0.986

Significance is at the evel of $p<0.05$

According to the table, the association of PSQI (Pittsburgh Sleep Quality Index) scores with gender and age was investigated. Among males (n=97), 4.5% had good sleep quality,44.5% might have tendency of night eating syndrome. The correlation analysis resulted in a χ^2 Value of 1.492, with a p-value of 0.474, indicating a non-significant association between PSQI scores and gender among males. Similarly, among females (n=103), 3% had PSQI scores <5(good sleep quaity) and 48.5% had scores ≥5 might have tendency of night eating syndrome in females . The correlation analysis also showed no significant association between PSQI scores and gender among females.

Table 5:Association of MEQ with Gender &Age among study participants.

	MEQ SCORE			χ^2 Value	*p*Value
Gender	Evening Type	Intermediate Type	Morning type		
Male (n=97)	10(10.3%)	77(79.4%)	10(10.3%)	4.508	0.105
Female(n=103)	3(2.9%)	89(86.4%)	11((10.7%)		

*significance is at the level p<0.05

According to the table, the association of MEQ (Morningness-Eveningness Questionnaire) scores with gender and age. Among males 10.3% (n=10) had Evening Type so they might have tendency of night eating syndrome ,(n=77) 79.4% had intermediated type , & (n=10) 10.3% had Morning Type .The correlation analysis resulted in a χ^2 Value of 4.508, with a p-value of 0.105, indicating a non-significant association between MEQ scores and gender among males. Similarly, among females 2.9%(n=3) had Evening type so they might have tendency of night eating syndrome , (n=89),53.6% had intermediate type & (n=11)) 10.7% had morning type.

Table: Association of MEQ with Age and BMI among study participants.

	MEQ SCORE				
	Evening type	Intermediate type	Morning type	F value	*p* value
Charatceristics of study participants	Mean (SD) (n=200)	Mean (SD) (n=200)	Mean (SD) (n=200)		
Age(years)	22.08(1.935)	21.46(2.271)	21.86(1.769)	0.717	0.489
BMI(kg/m2)	24.84(3.656)	25.37(3.642)	25.68(3.340)	0.217	0.805

Data presented as Mean (SD)

*Significance is at the level of p<0.05

According to the table in the MEQ categories, the mean ages were 22.08 years (SD=1.935) for Evening type those participants who fall into that category might have tendency of night eating syndrome, 21.46 years (SD=2.271) for Intermediate type, and 21.86 years (SD=1.769) for Morning type. The corresponding p-value of 0.489, indicating no significant difference in age among the MEQ categories. Regarding BMI, the mean BMI values were 24.84 kg/m² (SD=3.656) for Evening type those participants fall into this category might have tendency of night eating syndrome, 25.37 kg/m² (SD=3.642) for Intermediate type, and 25.68 kg/m² (SD=3.340) for Morning type. The p-value of 0.805, indicating no significant difference in BMI among the MEQ categories. In summary, the analysis found no significant associations between MEQ scores and either age or BMI in this study sample.

<u>Night Eating &Dietary Habits</u>

Table 6: Association of Night Eating Syndrome and Dietary habits among study participants :

Food Groups	**Food Items**	**Frequency of consumption**	**Amount of consumption**	**χ2 Value**	**df**	***p* value**
Cereals	Wheat flour	Daily	45g	3.414	6	0.755
	Bajra flour	Rarely	45g	4.395	4	0.355
	Jowar flour	Rarely	45g	2.008	4	0.734
	Ragi flour	Rarely	45g	2.297	4	0.681
	Rice flour	Rarely	45g	2.550	4	0.645
	Daliya	Once week	45g	5.634	6	0.465
	Oats	Rarely	45g	4.402	10	0.927
	Rice	Rarely	45g	2.883	8	0.941
	Brown Rice	Rarely	45g	0.102	2	0.950
	Rice Flakes	Twice week	45g	3.333	8	0.912
	Puffed Rice	Once week	30-45g	2.449	8	0.964
Pulses						
	Toor dal	Rarely	45g	7.452	6	0.281
	Chana Dal	Rarely	45g	6.068	4	0.194
	Urad dal	Never	0			
	Lobia	Rarely	30g	3.201	4	0.525

	Matki	Rarely	30-45g	0.251	4	0.995
	Moong	Rarely	30-45g	7.481	8	0486
	Chana	Rarely	45g	10.145	10	0.428
Nuts	Coconut	Once week	30g	0.031	2	0.985
	Almond	Monthly	5nos.	9.056	6	0.170
	Walnut	Once week	2-3nos.	6.952	6	0.325
	Cashews	Monthly	2-3nos.	8.932	6	0.217
	Pistachios	Once week	2-3nos.	12.142	10	0.276
	Groundnuts	Twice week	10-15nos.	7.010	8	0.536
Milk &Milk Products	Milk	Daily	200ml	8.400	6	0.210
	Curd	Twice week	30g	12.248	10	0.269
	Butter Milk	Twice week	30g	5.273	6	0.509
	Paneer	Fort nightly	30g	6.308	4	0.177
	Cheese	Fortnightly	10g	4.777	4	0.311
Fruits	Apple	Monthly	1 full	9.765	6	0.135
	Pear	Monthly	1 full	8.542	6	0.201
	Orange	Twice week	1 full	22.000	10	0.15
	Pomegranate	Fortnightly	1 full	10.257	8	0.247
	Banana	Twice week	1 full	13.208	8	0.105
	Chikoo	Rarely	1 full	0.395	4	0.983
	Pineapple	Once week	1 full	4.905	6	0.556
	Grapes	Once week	1 full	5.723	8	0.678
Vegetables	Tomato	Daily	25g	7.001	8	0.537
	Onion	Daily	25g	8.659	8	0.372
	Potato	Twice week	100g	3.703	6	0.717
	Cabbage	Once week	25g	2.056	2	0.358
	Cauliflower	Fortnightly	150g	3.802	6	0.704
	Spinach	Twice week	150g	13.026	8	0.111
	Fenugreek	Twice week	150g	14.414	8	0.72
	Carrot	Rarely	50g	13.904	8	0.84
	Beetroot	Once week	150g	0.888	4	0.926
	Radish	Once week	150g	4.905	6	0.556
	Pumpkin	Rarely	150g	1.305	4	0.861
	French Beans	Once week	150g	4.599	6	0.596
	Peas	Rarely	25g	3.169	8	0.923
Flesh Foods	Egg white	Fortnightly	1	2.049	6	0.915
	Whole Egg	Once week	1	4.236	6	0.645
	Chicken	Rarely	25g	7.038	8	0.533
	Mutton	Never	0	0.743	2	0.690
	Fish	Never	0	2.251	2	0.324
Other Food	Maggi	Daily	1 pack	7.663	10	0.662
	Snacks	Twice week	200g	14.318	8	0.74
	Vada Pav	Fortnightly	1	6.336	6	0.387
	Sandwich	Fortnightly	1	11.509	6	0.74
	Samosa	Fortnightly	1	9.221	8	0.324
	French Fries	Monthly	-	15.557	10	0.113
	Burger	Monthly	1	6.099	8	0.636
	Biscuit	Daily	20nos.	21.932	10	0.15

	Alcohol	Never	0	-	-	-
	Papad	Monthly	1	2.858	6	0.826
	Pickel	Fortnightly	2	9.659	8	0.290
	Sweets	Monthly	1	7.761	6	0.256
	Bakery Products	Monthly	2	10.732	8	0.271
	Chips	Monthly	2	10.369	8	0.240
	Manchurian	Fortnightly	2	2.707	8	0.951
	Chinese Bhel	Monthly	1	5.478	6	0.484
	Dosa	Once week	-	11.732	4	0.19
	Idli	Fortnightly	45g	5.136	8	0.743
	cookies	fortnightly	2-3nos.	15.149	10	0.127
	Chocolate	Twice week	15g	10.408	8	0.238
	Juice	Daily	200ml	3.821	6	0.701

Data presented as Correlation R value

* Significance is at the level of $p<0.05$

According to the data provided on various food & its association with night eating habits, no statistically significant associations were found in cereals such as wheat flour ($\chi^2 = 3.414$, df = 6, p = 0.755), bajra flour ($\chi^2 = 4.395$, df = 4, p = 0.355), jowar flour ($\chi^2 = 2.008$, df = 4, p = 0.734), etc. Similarly, among pulses, including Toor dal ($\chi^2 = 7.452$, df = 6, p = 0.281), chana dal ($\chi^2 = 6.068$, df = 4, p = 0.194), moong ($\chi^2 = 7.481$, df = 8, p = 0.486), no significant associations were observed. Nuts, while most types did not exhibit significant associations , almond consumption showed a borderline significant association ($\chi^2 = 9.056$, df = 6, p = 0.170) implying that they were consumed at night . In milk and milk products, including milk ($\chi^2 = 8.400$, df = 6, p = 0.210), curd ($\chi^2 = 12.248$, df = 10, p = 0.269), buttermilk ($\chi^2 = 5.273$, df = 6, p = 0.509), no significant associations were seen. When examining fruits, while most showed no significant associations with each other, orange ($\chi^2 = 22.000$, p = 0.150) and banana ($\chi^2 = 13.208$, p = 0.105) consumption displayed borderline significant associations, suggesting potential relationships. Within vegetables, spinach consumption exhibited a significant association ($\chi^2 = 13.026$, p = 0.111) with other vegetables, indicating potential correlations, while other vegetables did not show significant associations with each other. In flesh foods, including egg white ($\chi^2 = 2.049$, p = 0.915), whole egg ($\chi^2 = 4.236$, p = 0.645), chicken ($\chi^2 = 7.038$, p = 0.533), etc., none showed significant associations with each other, indicating independent consumption patterns. Finally, among other food items, only snacks ($\chi^2 = 14.318$, p = 0.740) and sandwich ($\chi^2 = 11.509$, p = 0.740) consumption showed borderline significant associations, suggesting potential relationships, while other food items did not exhibit significant associations with each other. According to colles et al 2007 Individuals diagnosed with NES who consumed nocturnal snacks reported greater hunger compared to those without this behavior. The consumption of food after dinner was more than 25%& One or more nocturnal eating episodes were seen in the past 28 days.

Table 7:Association of Night Eating Syndrome with Sleep Quality among study participants

	PSQI SCORE			r value	*p*Value
	Non -Night Eaters	Mild Night Eaters	Full Syndrome Night Eaters		
Good Sleep	9(4.5%)	6(3%)	0(0.0)	1.0	0.036
Poor Sleep	104(52%)	76(38%)	5(2.8%)		

*Significance is at the level $p<0.05$

According to the table findings from the provided data suggest a significant association between PSQI (Pittsburgh Sleep Quality Index) scores and the classification of individuals into different night eating categories. In comparison, among individuals classified as Mild Night Eaters, 6 individuals (3%) reported good sleep, and 76 individuals (38%) reported poor sleep. Interestingly, none of the individuals classified as Full Syndrome Night Eaters reported good sleep, with only 5 individuals (5%) falling into this category. The correlation analysis revealed a statistically significant Pearson r value of 1 it shows postive correlation between night eating syndrome & poor sleep quality & with a corresponding p-value of 0.036. This indicates a association between PSQI scores and the classification of individuals into different night eating categories. Specifically, as the night eating symptoms increases from Non-Night Eaters to Mild Night Eaters and Full Syndrome Night Eaters, the likelihood of reporting poor sleep also increases. Night eating syndrome (NES) was found to be significantly related to sleep duration with students exhibiting NES symptoms reporting shorter sleep time. Due to evening hyperphagia the sleep duration was lessYahia al 2017.

Table 4.13:Association of Night Eating with Chronotype among study participants

	NEQ			r value	*p*Value
	Non -Night Eaters	Mild Night Eaters	Full Syndrome Night Eaters		
Evening Type	12(10.4%)	8(10%)	5(100%)	1.0	0.030
Intermediate Type	115(80.9%)	80(86.3%)	0(0.0%)		
Morning Type	10(8.7%)	3(3.8%)	0(0.0%)		

*Significance is at the level $p<0.05$

Among individuals classified as Full Syndrome Night Eaters, 5 individual (100%) was identified as an Evening Type, none as Intermediate Types, and Morning Types. The correlation analysis revealed a statistically significant Pearson r value of 1 it shows postive correlation of night eating syndrome with evening type and intermediate type (neither evening or morning) with a corresponding p-value of 0.030. This indicates a moderate association between MEQ scores and the classification of individuals into different night eating categories. Specifically, there appears to be a trend where individuals classified as Evening Types are more likely to be Mild Night Eaters or Full Syndrome Night Eaters compared to those classified as Intermediate or Morning Types. According to Allison et al 2012 his study suggested that exploring the link between chronotype and night eating behaviors could enhance the characterization of disorders like night eating syndrome (NES).

Discussion:

In this study, Mild Night Eating was observed in 53%& Night Eating Syndrome (NES) was observed in a small percentage of participants, with only 1.5% classified as having NES, indicating a higher tendency to eat at night. Most of them had poor sleep quality as indicated by PSQI scores, there was a notable association between poor sleep quality and the severity of night eating symptoms.. Remarkably, none of the individuals classified as Full Syndrome Night Eaters reported good sleep, indicating a strong correlation between NES severity and poor sleep quality.Similarly, MEQ scores revealed a significant association with NES classification. Evening Types those who scored below 41 were more prevalent among individuals classified as Mild Night Eaters or Full Syndrome Night Eaters . This suggests that individuals with evening chronotypes may be more prone to night eating behaviors.In terms of gender differences, the analysis found no significant association between gender and PSQI scores, indicating that sleep quality was similarly affected across genders in relation to NES. Likewise, there was no significant association between gender and MEQ scores, suggesting that chronotype distribution did not differ significantly between males and females who had night eating syndrome.Additionally, no significant association was observed between gender and NEQ scores, indicating that night eating habits were consistent across genders in this study sample..Furthermore, the analysis of dietary habits did not reveal any significant associations with NES.The overall dietary patterns did not differ significantly among individuals with night eating The strengths of this study is that this is one of the few studies which has tried to analyzed the association of night eating syndrome in urban Indian population.This study is a contribution towards association of night eating syndrome with dietary habits& nutritional status and Circadian rhythm & sleep quality.

Limitation of the study

The study had a small sample size and a short duration, limiting the generalizability of the findings.

Future Research recommendations :

Findings suggest a need for further research to understand the complex interplay between NES, sleep quality, and chronotype, while demographic and lifestyle factors may not directly influence the occurrence of NES in the studied participants.

Conclusion: In this study, Mild Night Eating was observed in 53% of participants, while 1.5% exhibited full Night Eating Syndrome (NES). There was a strong association between NES severity and poor sleep quality. Gender did not significantly influence NES prevalence or dietary habits. The study also found a significant association between NES and both sleep quality and chronotype, suggesting a correlation between night eating behaviors and disrupted sleep patterns, as well as individual preferences for morningness or eveningness.

However, no statistically significant correlations were found between NES and demographic variables, anthropometric measurements, or dietary habits.

References

1. Anderson, D. A., Shapiro, J. R., & Lundgren, J. D. (2003). The freshman year of college as a critical period of weight gain: An initial evaluation. *Eating Behaviours*, 4, 363–367. doi: 10.1016/S1471-0153(03)00030-8
2. Niemeier, Heather M., et al. "Fast food consumption and breakfast skipping: predictors of weight gain from adolescence to adulthood in a nationally representative sample." Journal of adolescent Health 39.6 (2006): 842-849.
3. Stunkard A, Grace WJ, Wolff HG . The night-eating syndrome; a pattern of food intake among certain obese patients. Am J Med 1955; 19: 78–86.CAS PubMed Google Scholar
4. Nolan LJ, Geliebter A. Validation of the Night Eating Diagnostic Questionnaire (NEDQ) and its relationship with depression, sleep quality, "food addiction", and body mass index. Appetite. 2017 Apr 1;111:86-95. doi: 10.1016/j.appet.2016.12.027. Epub 2016 Dec 23. PMID: 28017909
5. Hone JA, Ostberg O. A self-assessment questionnaire to determine morningness-eveningness in human circadian rhythms. Int J Chronobiol 1976; 4: 97–110 [PubMed] [Google Scholar]
6. Buysse DJ, Reynolds CF 3rd, Monk TH, et al The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry Res 1989; 28: 193–213 [PubMed] [Google Scholar]
7. A Study On The Prevalence, Demography And Phenomenology Of Night Eating Syndrome In Patients Attending A Tertiary General Hospital Psychiatric Clinic Suresh Sathe Lokmanya Tilak Municipal General Hospital and Lokmanya Tilak Municipal Medic… Nilesh Shah Lokmanya Tilak Municipal General Hospital and Lokmanya Tilak Municipal Medic…. (n.d.). https://doi.org/10.30877/IJMH.3.2.2016.192-196
8. Adami, G. F., Campostano, A., Marinari, G. M., Ravera, G., & Scopinaro, N. (2002). Night eating in obesity: A descriptive study. Nutrition, 18(7–8), 587–589. https://doi.org/10.1016/S0899-9007(02)00761-X
9. Andersen, G. S., Stunkard, A. J., Sørensen, T. I. A., Petersen, L., & Heitmann, B. L. (2004). Night eating and weight change in middle-aged men and women. International Journal of Obesity 2004 28:10, 28(10), 1338–1343. https://doi.org/10.1038/sj.ijo.0802731
10. Anthonisamy, A. N., Misra, S., & Barua, A. (2022). Prevalence of night eating syndrome among inbound call centre employees in Kuala Lumpur, Malaysia. Https://Doi.Org/10.1177/02601060221081198, 29(3), 505–512. https://doi.org/10.1177/02601060221081198
11. Beşoluk, Ş. (2011). Morningness–eveningness preferences and university entrance examination scores of high school students. Personality and Individual Differences, 50(2), 248–252. https://doi.org/10.1016/J.PAID.2010.09.038
12. SharkeyK.M. et al. (2011) Effects of an advanced sleep schedule and morning short wavelength light exposure on circadian phase in young adults with late sleep schedules Sleep Med https://www.sciencedirect.com/science/article/abs/pii/S1389945714003463
13. ApplemanK. et al. (2013)Controlling light-dark exposure patterns rather than sleep schedules determinescircadianphasehttps://www.sciencedirect.com/science/article/abs/pii/S1389945713000075
14. Peuhkuri K, Sihvola N, Korpela R. Diet promotes sleep duration and quality. Nutr Res. 2012 May;32(5):309-19. doi: 10.1016/j.nutres.2012.03.009. Epub 2012 Apr 25. PMID: 22652369.
15. McHill AW, Phillips AJ, Czeisler CA, Keating L, Yee K, Barger LK, Garaulet M, Scheer FA, Klerman EB. Later circadian timing of food intake is associated with increased body fat. Am J Clin Nutr. 2017 Nov;106(5):1213-1219. doi: 10.3945/ajcn.117.161588. Epub 2017 Sep 6. PMID: 28877894; PMCID: PMC5657289.
16. Allison KC, Lundgren JD, O'Reardon JP, Geliebter A, Gluck ME, Vinai P, Mitchell JE, Schenck CH, Howell MJ, Crow SJ, Engel S, Latzer Y, Tzischinsky O, Mahowald MW, Stunkard AJ. Proposed diagnostic criteria for night eating syndrome. Int J Eat Disord. 2010 Apr;43(3):241-7. doi: 10.1002/eat.20693. PMID: 19378289; PMCID: PMC4531092.
17. O'Reardon, J. P., Ringel, B. L., Dinges, D. F., Allison, K. C., Rogers, N. L., Martino, N. S., & Stunkard, A. J. (2004). Circadian Eating and Sleeping Patterns in the Night Eating Syndrome. Obesity Research, 12(11), 1789–1796. https://doi.org/10.1038/OBY.2004.222
18. Pawlow, L. A., O'Neil, P. M., & Malcolm, R. J. (2003). Night eating syndrome: effects of brief relaxation training on stress, mood, hunger, and eating patterns. International Journal of Obesity 2003 27:8, 27(8), 970–978. https://doi.org/10.1038/sj.ijo.0802320
19. Randler, C., Prokop, P., Sahu, S., & Haldar, P. (2015). Cross-cultural comparison of seven morningness and sleep–wake measures from Germany, India and Slovakia. International Journal of Psychology, 50(4), 279–287. https://doi.org/10.1002/IJOP.12098
20. Rose, D., Gelaye, B., Sanchez, S., Castañeda, B., Sanchez, E., Yanez, N. D., & Williams, M. A. (2015). Morningness/eveningness chronotype, poor sleep quality, and daytime sleepiness in relation to common mental disorders among Peruvian college students. Psychology, Health & Medicine, 20(3), 345–352. https://doi.org/10.1080/13548506.2014.951367
21. Sakthivel, S. J., Hay, P., Touyz, S., Currow, D., & Mannan, H. (2023). Association of participants who screened positive for night eating syndrome with physical health, sleep problems, and weight status in an Australian adult population. Eating and Weight Disorders : EWD, 28(1). https://doi.org/10.1007/S40519-023-01603-X
22. Striegel-Moore, R. H., Franko, D. L., Thompson, D., Affenito, S., & Kraemer, H. C. (2006). Night Eating: Prevalence and Demographic Correlates. Obesity, 14(1), 139–147. https://doi.org/10.1038/OBY.2006.17
23. Vargas, P. A., Flores, M., & Robles, E. (2014). Sleep Quality and Body Mass Index in College Students: The Role of Sleep Disturbances. Journal of American College Health, 62(8), 534–541. https://doi.org/10.1080/07448481.2014.933344
24. Yoshida, J., Eguchi, E., Nagaoka, K., Ito, T., & Ogino, K. (2018). Association of night eating habits with metabolic syndrome and its components: A longitudinal study. BMC Public Health, 18(1), 1–12. https://doi.org/10.1186/S12889-018-

6262-3/TABLES/4
25. Zuraikat, F. M., Makarem, N., Liao, M., St-Onge, M. P., & Aggarwal, B. (2020). Measures of Poor Sleep Quality Are Associated With Higher Energy Intake and Poor Diet Quality in a Diverse Sample of Women From the Go Red for Women Strategically Focused Research Network. Journal of the American Heart Association, 9(4). https://doi.org/10.1161/JAHA.119.014587
26. Luz CSDS, Fonseca AETPD, Santos JS, Araujo JF, Duarte LL, Moreno CRC. Association of Meal Timing with Sleep Quality and Anxiety According to Chronotype: A Study of University Students. Clocks Sleep. 2024 Mar 11;6(1):156-169. doi: 10.3390/clockssleep6010011. PMID: 38534799; PMCID: PMC10969532.
27. Magalhães ACO, Marques CG, Lucin GA, Nakamoto FP, Tufik S, Thomatieli-Santos RV, Dos Santos Quaresma MVL. The relationship between sleep- and circadian rhythm-related parameters with dietary practices and food intake of sedentary adults: a cross-sectional study. Sleep Biol Rhythms. 2023 Sep 26;22(1):113-124. doi: 10.1007/s41105-023-00490-0. PMID: 38476859; PMCID: PMC10900051.
28. Kanbay, M., Copur, S., Demiray, A. et al. Cardiorenal Metabolic Consequences of Nighttime Snacking: Is it an Innocent Eating Behavior?. Curr Nutr Rep 11, 347–353 (2022). https://doi.org/10.1007/s13668-022-00403-6
29. Gallant AR, Lundgren J, Drapeau V. The night-eating syndrome and obesity. Obes Rev. 2012 Jun;13(6):528-36. doi: 10.1111/j.1467-789X.2011.00975.x. Epub 2012 Jan 4. PMID: 22222118.
30. Stunkard A, Grace WJ, Wolff HG . The night-eating syndrome; a pattern of food intake among certain obese patients. Am J Med 1955; 19: 78–86.CAS PubMed Google Scholar
31. Goel N, Stunkard AJ, Rogers NL, Van Dongen HP, Allison KC, O'Reardon JP et al. Circadian rhythm profiles in women with night eating syndrome. J Biol Rhythms 2009; 24: 85–94.CAS PubMed Central Google Scholar
32. Rogers NL, Dinges DF, Allison KC, Maislin G, Martino N, O'Reardon JP et al. Assessment of sleep in women with night eating syndrome. Sleep 2006; 29: 814–819.PubMed Google Scholar
33. Allison KC, Lundgren JD, O'Reardon JP, Geliebter A, Gluck ME, Vinai P et al. Proposed diagnostic criteria for night eating syndrome. Int J Eat Disord 2010; 43: 241–247.PubMed PubMed Central Google Scholar
34. Kuldau J, Rand C . The night eating syndrome in the morbidly obese. Int J Eat Disord 1986; 5: 143–148.Google Scholar
35. Rand C, Kuldau J . Morbid obesity: a comparison between a general population and among postoperative obesity surgery patients. Int J Eat Disord 1993; 17: 657–661.CAS Google Scholar
36. Stunkard A, Berkowitz R, Wadden T, Tanrikut C, Reiss E, Young L . Binge eating disorder and the night-eating syndrome. Int J Obes Relat Metab Disord 1996; 20: 1–6.CAS PubMed Google Scholar
37. Stunkard AJ, Allison KC . Two forms of disordered eating in obesity: binge eating and night eating. Int J Obes Relat Metab Disord 2003; 27: 1–12.PubMed Google Scholar