



Prevalence of night eating syndrome and obesity among urban adult females of Amritsar (Punjab)

Ramanpreet Randhawa*, Jaspreet Kaur, Damanjit Kaur, Sharda Sidhu

ABSTRACT

Introduction: Night Eating Syndrome (NES) was first time described by Stunkard and his coworkers in 1955 as a stress-related eating disorder mainly characterized by morning anorexia, evening hyperphagia and insomnia. This disorder is gaining increased recognition for its role in the development and maintenance of obesity. Therefore, in the present study, an attempt has been made to assess the prevalence of NES and obesity among urban adult females of Amritsar (Punjab).

Methods: This cross-sectional study was conducted in various areas of Amritsar and data was collected from 300 urban adult females ranging in age 20-40 years. For this study, a well-designed and pilot tested questionnaire was used. For data collection, the questionnaire was tested among 50 subjects before the initiation of main survey. Necessary corrections and modifications in the questionnaire based on the findings of pilot study were made. Night Eating Questionnaire (NEQ) is the only published, validated and suitable assessment instrument that is used for screening the severity of NES among adults. A total score ≥ 25 for the NEQ items were used as the criteria for the presence of NES. Two anthropometric measurements (height and weight) were taken on each subject.

From height and weight measurements, Body Mass Index (BMI) was calculated. Percent Body Fat (PBF) was estimated using body fat analyzer (Bodystat-1500) with the help of Bioelectrical Impedance Analysis. Prevalence of obesity was assessed with the help of BMI and PBF in the present sample.

Results: Out of 300 females, 9 (3%) females were screened positive for Night Eating Syndrome on the basis Night Eating Questionnaire (NEQ) score. In the pooled sample, the prevalence of obesity was found to be almost similar 75.3% and 72.7%, respectively by using both Body Mass Index criteria as well as Percent Body Fat criteria. It is an interesting finding of this study that all the females having NES were found to be obese by using both the methods of assessing obesity. The prevalence of NES among obese females was about 4%.

Conclusion: The results of the present study show that as the value of Body Mass Index and Percent Body Fat increases, the value of Night Eating Questionnaire score also increases. Higher score is indicative of greater severity of Night Eating Syndrome. Hence, more studies with large sample size are needed to confirm the validity of these initial findings as well as to define NES features in Indian population.

Key words: Amritsar, Body Mass Index, Night Eating Syndrome, Obesity, Percent Body Fat

Introduction

Night Eating Syndrome (NES) was first time described by Stunkard *et al.* [1] as a stress-related eating disorder mainly characterized by morning anorexia, evening hyperphagia and insomnia. To this core criteria for diagnosis of NES, the presence of nocturnal ingestions and mood variations which is generally lower in persons with NES and often worsens in the evening and night time were

added later [2]. The increased attention to NES within the past decade has promoted several modifications to its core diagnostic criteria which helped in a better understanding of its etiology [3]. NES is manifested by dysfunction of circadian rhythm with disassociation between eating and sleeping accompanied by a phase onset delay of morning appetite and continuation of evening eating [4].

The diagnostic criteria of NES have been varied and disputed in literature causing underestimation of its prevalence and made it difficult to compare various studies. The prevalence of NES in general population have ranged from 1.1 to 1.6% [5-8]. Some studies showed that NES is more prevalent in obese people than in general population. Various studies [8,9-14] reported the prevalence of NES among obese people ranging from 4.3 to 64%. A population based study conducted by Tholin *et al.* [15] observed the prevalence of NES as 3.4%. They further reported that night eating was 2.5 times more common among obese individuals than normal weight individuals.

All the above mentioned studies were conducted in developed countries and in literature such studies have not come to attention from India. Therefore, in the present study, an attempt has been made to assess the prevalence of NES and obesity among urban adult females of Amritsar (Punjab).

Materials and Methods

The present cross-sectional study has been conducted among 300 urban adult females (age 20-40 years) of Amritsar (Punjab) during the period of February 2013-December 2013. Field work of the present study was carried out in two phases. Firstly, among 50 individuals, pilot field work was conducted with the aim to see the feasibility of the study and to test the questionnaire and standardise the techniques. After standardisation of the techniques, modifications were incorporated and the final field work was conducted. Keeping in view the socio-cultural conditions of the Indian population, data was collected through interview schedule based on Night Eating Questionnaire (NEQ) devised by Allison *et al.* [16]. NEQ is the only published, validated and suitable assessment instrument that is used for screening the severity of NES among adults. It is comprised of 14 questions for assessing morning anorexia, evening hyperphagia and insomnia by asking questions regarding the level of appetite in the morning, craving patterns throughout the day, urge to eat after evening meal, percentage prevalence of calories ingested after dinner, the time period when mood is often low during the day, trouble in getting sleep, frequency of nocturnal awakenings with ingestions per week in a conscious state. All these questions were answered with a scale ranging from 0-4 and total score was calculated from these questions. As reported by Allison *et al.* [16] a total score ≥ 25 for the NEQ items was used as the criteria for the presence of NES. Higher score is indicative of greater severity of NES. For assessing presence or absence of night eating behaviour all the subjects were interviewed in

person at their homes. After fully explaining nature, procedures, aims and objectives of the study, signed consent form was obtained from each subject. Study protocol was approved by the Ethical Review Committee of Guru Nanak Dev University, Amritsar.

Two anthropometric measurements (height and weight) were taken on each subject. From height and weight measurements, Body Mass Index (BMI) was calculated. Percent Body Fat (PBF) was estimated using body fat analyser (Bodystat-1500) with the help of Bioelectrical Impedance Analysis. Prevalence of obesity was assessed with the help of BMI by using criteria of WHO [17] and PBF by using criteria given by Gomez-Ambrosi *et al.* [18]. The subjects having BMI ≥ 25 kg/m² and PBF ≥ 35 were considered as obese.

Results

For assessing the presence of NES, the prevalence of core components associated with NES was estimated in 300 urban adult females of Amritsar. It is apparent from tabular column (Table: 1) that the most common component among Amritsar adult females was trouble in sleeping and this was observed in 56% females. Strong urge to eat something after evening and to eat between dinner and sleep onset was found in 50% females. About 30% females had shown very low level of morning hunger or lack of desire to eat in the morning. The NEQ score of all the subjects ranged from 0 to 34 in the present sample. Out of 300 studied participants, 9 (3%) were screened positive for NES and these individuals reported two or three episodes of night eating per week.

In the present study, the prevalence of obesity was assessed with the help of BMI and PBF. The mean values of BMI and PBF of studied participants were 24.77 kg/m² and 31.74, respectively (Table: 2). The prevalence of obesity among studied participants was 75.3% on the basis of BMI whereas it was 72.7% according to PBF criteria. The difference in the percentage prevalence of obesity (Table: 3) assessed by BMI and PBF was statistically non-significant ($\chi^2 = 0.176$, $df = 1$, $p = 0.674$). It is apparent from tabular column (Table: 4) that maximum score of NEQ in the NES subjects was 34 and minimum was 26. All the subjects were obese according to BMI criteria (Mean BMI: 28.38 kg/m²) and PBF criteria (Mean PBF: 38.50). It can be easily concluded from this table that as the BMI and PBF value increases, the NEQ score also increases. The prevalence of NES among obese subjects was also assessed. It is clear from tabular column (Table: 5) that the prevalence of NES among obese females was about 4%.

Table: 1. Presence of the core components of Night Eating Syndrome in the Urban Adult females of Amritsar

Core Components of Night Eating Syndrome	Percentage Prevalence
Morning anorexia	30.00 (90)
Evening hyperphagia	50.00 (150)
Insomnia	56.00 (168)
Three episodes of night eating per week to fall back asleep along with morning anorexia, evening hyperphagia and insomnia	3.00 (9)

Figures in parenthesis indicate the number of subjects

Table: 2. Baseline Characteristics of Urban Adult females of Amritsar

Variables	Mean \pm SD
Age (years)	40.23 \pm 10.35
Height (cm)	155.92 \pm 5.90
Weight (kg)	65.19 \pm 14.90
Body Mass Index (kg/m ²)	24.77 \pm 3.80
Percent Body Fat	31.74 \pm 8.86

Table: 3. Percentage prevalence of obesity according to Body Mass Index and Percent Body Fat criteria among the Urban Adult females of Amritsar

Variables	Non-obese	Obese	$\chi^2 = 0.176$ df = 1 p = 0.674
Body Mass Index (kg/m ²) (N=300)	24.70 (74)	75.30 (226)	
Percent Body Fat (N=300)	27.30 (82)	72.70 (218)	

Figures in parenthesis indicate the number of subjects

Table: 4. Night Eating Questionnaire Score, Body Mass Index and Percent Body Fat values of Night Eating Syndrome subjects

Night Eating Questionnaire Score	Obesity Variables	
	Body Mass Index (kg/m ²)	Percent Body Fat
34	34.60	52.20
33	29.69	49.70
31	29.69	48.43
30	29.30	45.64
29	27.06	42.93
28	27.03	41.10
27	25.80	40.33
26	25.63	39.64
26	25.60	36.56
Mean 29.3 \pm 2.81	28.38 \pm 2.94	38.5 \pm 8.06

Table: 5. Percentage prevalence of Night Eating Syndrome in the Urban Adult females of Amritsar”

Status	Obesity Variables	
	Body Mass Index (kg/m ²) (N=226)	Percent Body Fat (N=218)
Normal	96.00 (217)	95.80 (209)
Night Eating Syndrome	4.00 (9)	4.10 (9)

Figures in parenthesis indicate the number of subjects

Discussion & Conclusion

To our knowledge, this is the first cross-sectional study in which the prevalence of NES was assessed among urban adult females of Amritsar (Punjab). Majority of the women of the pooled sample have shown lack of control over evening eating and nocturnal eating episodes (Table: 1). Out of 300 females, 9 females met the criteria for NES, thus showing the prevalence of NES as 3%. Almost similar prevalence (3.4%) was reported by Tholin *et al.* [15] who conducted a population based study among Swedish Twin Registry. Various scientists from developed countries reported the prevalence of NES among general population as 1.1% [5-8]. Obesity is a complex health condition accompanied by number of comorbidities [19]. Now these days NES is gaining increased recognition for its role in obesity. Therefore, in the present study, an attempt has been made to assess the prevalence of NES among obese subjects also. Among all the studied participants, the prevalence of obesity (Table 3) according to BMI criteria and PBF criteria was 75.3% and 72.7%, respectively and the difference in the percentage prevalence of obesity assessed by both criteria was statistically non-significant which proves that both these methods for assessment of obesity are appropriate for Punjabi population. The prevalence of NES among obese females was about 4%. Various scientists from developed countries studied the relationship between NES and weight status and reported estimates of the prevalence of NES among obese individuals as 4.3% [5], 6.0% [11], 8.9% [12], 26.0% [8], 27.0% [13], 43.0% [10], 51.0% [9] and 64.0% [1].

The night eaters exhibited significantly higher values of BMI and PBF (Table 4). From BMI and PBF values, it is apparent that all the subjects had severe obesity. It is confirmed that obesity occurs when energy intake exceeds energy expenditure. All the subjects who were screened positive for NES consume extra calories during night that is why they have more values of BMI as well as PBF than normal weight individuals. It can be concluded from the

present data that as the BMI and PBF value of subjects' increases, NEQ score also increases. The subject having maximum score of NES, also had maximum value of BMI (34.60 kg/m²) and PBF (52.20) which suggests that NES may be a risk factor for obesity and its score increases with the severity of obesity. To validate the results of the present study, future longitudinal studies are required for better understanding the night eating behavior that contribute to the development of NES.

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AUTHOR(S):

1. Ramanpreet Randhawa, Research Fellow, Dept. of Human Genetics, Guru Nanak Dev University, Amritsar – 143005, Punjab, India
2. Jaspreet Kaur., (M.Sc.), Dept. of Human Genetics, Guru Nanak Dev University, Amritsar – 143005, Punjab, India
3. Damanjit Kaur., (M.Sc.), Dept. of Human Genetics, Guru Nanak Dev University, Amritsar – 143005, Punjab, India
4. Dr. Sharda Sidhu, Professor, Dept. of Human Genetics, Guru Nanak Dev University, Amritsar – 143005, Punjab, India

CORRESPONDING AUTHOR:

Ramanpreet Randhawa,
 Research Fellow,
 Dept. of Human Genetics,
 Guru Nanak Dev University,
 Amritsar – 143005, Punjab, India
 Email: raman.randhawa19@gmail.com
 Mobile no: +918427016021

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