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Prevalence of Night Eating in Obese Individuals with Schizophrenia and Schizoaffective Disorder

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Abstract

The prevalence of Night Eating Syndrome (NES) in the general population is estimated to be 1.5%, however, the rates among individuals with schizophrenia and schizoaffective disorder are not yet established. This study sought to examine the frequency and correlates of NES-related behaviors in a sample of obese patients with schizophrenia. One-hundred outpatients diagnosed with schizophrenia or schizoaffective disorders completed the self-report Night Eating Questionnaire (NEQ) and were then interviewed as a follow-up for the specific assessment of NES. Based on a diagnostic interview, 12% of this sample met full criteria for NES, with an additional 10% meeting partial criteria for NES. Based on the NEQ alone, 8% met full criteria with an additional 8% meeting partial criteria. Night eating behaviors were associated with increased insomnia and depression. Our findings suggest that screening for NES among patients with serious mental illness may efficiently identify a subgroup with additional clinical needs.

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1. Introduction

Continued increase in obesity worldwide has prompted a search for explanations for this concerning trend and disordered eating patterns are often one area of focus. Night eating syndrome (NES) is one such pattern, and, first proposed by Stunkard et al. in 1955 [1], is characterized by a delayed pattern of food intake in which the majority of daily calories are consumed in the evening and during nocturnal awakenings. The prevalence of NES in the general population is estimated to be 1.5% [2]. Current literature points toward a strong relationship between night eating and obesity, [3, 4] especially for severely obese patient groups [2]. Although NES is not exclusive to the obese, it is proposed to be an important contributor to later-life obesity [5]. The metabolic and dietary associations with NES are not well established, and recent evidence has refuted an association with metabolic syndrome and body mass index (BMI) [6]. No association between NES and total daily calories consumed has been found to date [7].

The frequency and correlates of NES among individuals with schizophrenia, a patient group at high risk for obesity, metabolic syndrome, diabetes, and cardiovascular disease [8, 9], have not been established. Although we previously reported an association between insomnia and night eating behaviors [10, to our knowledge, the specific prevalence of NES in individuals with schizophrenia has not previously been reported. Previous studies revealed a point prevalence of 12% in psychiatric outpatients [11], and 25% in overweight individuals with serious mental illness [12]. In the general population, night eating has previously been associated with psychopathology, specifically with depression [6, 13–16]. Several self-report measures for assessing the presence of night eating behaviors and NES have been constructed in recent years [15, 17, 18]. The Night Eating Questionnaire (NEQ), developed by Allison and colleagues [19] is designed as a Likert scale self-report measure to assess for the presence of night eating behaviors and frequencies. The primary behaviors evaluated by the NEQ are: evening hyperphagia, nocturnal awakenings with ingestion of food, morning hypophagia, initial insomnia, and mood disturbances. The NEQ includes an additional item which screens for possible Sleep Related Eating Disorder (SRED) through evaluating an individual's level of awareness for nocturnal eating episodes. The present study sought to examine the frequency and clinical correlates of NES-related behaviors in a sample of obese patients with schizophrenia utilizing both self report and interview based established instruments.

2. Methods

2.1 Participants

One hundred fifty-three overweight and obese outpatients with schizophrenia or schizoaffective disorder, established using the Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID), were assessed within the context of a randomized study of behavioral intervention for weight loss. Participants were recruited via posted flyers and clinical referral within a large community mental health center. One-hundred of the original 153 were reached by research staff after baseline assessment in order to complete a follow-up interview on night eating behaviors (research staff attempted to reach all 153). Those who were unable to be reached are excluded from all analyses presented in this paper.

Individuals provided written informed consent and study protocols were approved by the Yale University School of Medicine Human Investigation Committee.

Thirty-nine of the 100 participants were male and 61 were female. Forty-three identified their ethnicity as Caucasian, 49 as African American, and 5 as Hispanic. Three identified their ethnicity as “other”. The mean BMI for the sample was 38.2 ± 7.7 and the mean age was 46.5 ± 10 years.

2.2 Measures

Participants were interviewed using the SCID-Patient Edition [20] and the Positive and Negative Syndrome Scale (PANSS) [21]. The interview was conducted by a SCID- and PANSS-trained psychologist, psychiatrist, or psychiatric nurse.

As part of baseline assessment, participants had height measured and were weighed by research staff. Weight was measured with an electronic scale, calibrated to ± 0.1 kg with US National Institute of Standards and Technology certified weights. Participants were weighed in light, indoor clothing and without shoes. Height was measured to the nearest millimeter and BMI (kg/m^2) was calculated. Blood pressure was measured by research staff using a wrist blood pressure monitor following a 5-minute resting period while in a sitting position. Blood fasting glucose, hemoglobin A1C, insulin level, triglycerides, and cholesterol levels were obtained by standard laboratory procedures. Waist circumference was measured at the midpoint between the lowest rib and iliac crest, to the nearest tenth of a centimeter. Presence of metabolic syndrome was assessed in accordance with current guidelines [22]. Diagnosis of diabetes was made based on either history of diagnosis, prescribed diabetes medication, or hemoglobin A1C = 6.5 [23]. A 24-Hour Diet Recall was performed by trained personnel with food models and measuring utensils to assess diet composition and caloric intake using FoodWorks version 12 (The Nutrition Company, Long Valley, NJ) [24]. Current drug use was ascertained by self-reported use within the past 30 days and/or positive urine toxicology. Historical substance abuse was determined by self report.

2.3 Questionnaires

Participants completed the following self-report measures under the supervision and with assistance of research staff: (a) Insomnia Severity Index (ISI). This is a brief sleep questionnaire used to screen for insomnia [25]. Total score on the first 7 items results in the following classifications: 0–7 = no clinically significant insomnia, 8–14 = subthreshold insomnia, 15–21 = clinical insomnia (moderate severity), 22–28 = clinical insomnia (severe). (b) Beck Depression Inventory (BDI). This is a frequently used self-report inventory used to rate current depressive symptoms [26]. (c) Quality of Life Enjoyment and Satisfaction Questionnaire-Abbreviated Version (QLES-Q-18). This is a quality of life measure that has been validated for patients with schizophrenia spectrum illnesses [27]. Scores may range from 18–90. (d) Night Eating Questionnaire (NEQ). This instrument measures night eating behavior and contains 15 self-report items [19]. Scores range from 0–52.

Utilizing the diagnostic criteria proposed by Allison et al. [28], a psychologist determined whether or not individuals met criteria for NES based on the answers provided to the NEQ.

This criteria includes: (A) evening hyperphagia and/or nocturnal ingestions, (B) awareness of night eating, (C) at least 3 of the following: morning anorexia, strong desire/urge to night eat, insomnia, believe that one must eat to get to sleep, lowered mood in the evening, (D) distress or impaired functioning, (E) present for = 3 months, (F) not secondary to medical or psychiatric condition. This resulted in the following subgroups: (1) those who met full criteria for NES, (2) those who did not meet criteria for NES, (3) those given a diagnosis of NES, Provisional, for meeting all criteria with the exception of duration of symptoms. Either individuals reported experiencing symptoms less than 3 months, or this information was missing. (4) diagnosis of NES, Not Otherwise Specified (NOS), which indicated that subjects met the majority of criteria, specifically A, B, and either met only 2 of the 3 required symptoms to meet criteria for C, or had missing/incomplete data for either D or F. (5) a diagnosis of other Sleep-Related Eating Disorder (SRED) [29], was assigned in cases where all criteria was met with the exception of B. Subjects given this diagnosis reported night eating behaviors but also reported that they were largely unaware of these behaviors.

2.4 Night Eating Interview

Subjects were also given follow-up interviews for the specific assessment of night eating behaviors. Interviews were either conducted over the phone or in person, depending on subjects' availability. Individuals were asked questions in a semi-structured manner, based upon the NEQ items, with clarification and elaboration requested from participants as needed. Interviews were either completed by a clinical psychologist, or by a research assistant under the supervision of the psychologist. Final diagnosis was determined by the team's psychologist and based on DSM-IV-TR criteria.

2.5 Statistical Analyses

Comparisons were made by use of Student's t-test, chi-square analysis, and Analysis of Variance (ANOVA). Bonferroni post hoc tests were utilized as needed. Regression analyses were performed where indicated. ANCOVA was utilized to explore potential covariates. Sensitivity, specificity, and positive predictive value were calculated. All analyses were performed using SPSS, version 17.0 for Windows (SPSS Inc, Chicago, IL).

3. Results

3.1 Night Eating Syndrome Diagnosis

Based on the night eating behavior interview, 12 (12%) of the sample met full diagnostic criteria for Night Eating Syndrome. An additional 2 (2%) met criteria for a provisional diagnosis of NES and 8 (8%) of the sample were assigned a diagnosis of NES, NOS, (Table 1). No individuals reported being unaware, or minimally aware of nocturnal ingestions during the interview, and thus did not qualify for a diagnosis of SRED. There were no differences in demographic information between the NES diagnostic groups, Table 3.

In comparison, using data obtained from the self-report measure the NEQ, 17 (17%) individuals from this same sample reported being unaware (or minimally aware of) nocturnal ingestions, thus suggestive of a diagnosis of SRED. Eight (8%) met full diagnostic

criteria for NES, 1(1%) were given a diagnosis provisional diagnosis of NES, and 7 (7%) met criteria for NES, NOS.

Sensitivity and specificity were then calculated for self report NEQ. For the NEQ diagnoses, sensitivity was 18% and specificity was 96%, with a positive predictive value of 25%.

3.2 NES Related Behaviors

Apart from diagnostic categories, individuals in this sample reported a high frequency of NES related behaviors. Twenty-one percent of the population reported strong urges and cravings to eat during the night, and 24% reported that they engage in nocturnal eating during half or more of the times they awaken. Twenty-three percent reported consuming at least half their daily calories after dinner, and 13% reported consuming more than half in the evening. Forty percent reported strong urges to eat after dinner and before bedtime, and 32% reported having none, or little control over their evening eating. Ten percent of individuals who awaken during the night felt strongly that they must eat something to fall back asleep. Furthermore, individuals who reported these behaviors also stated that they had experienced them for a substantial amount of time; 23% reported these behaviors for five or more years, (Table 2).

3.3 Antipsychotic Medications

In terms of antipsychotic medications, 56% were prescribed a second generation (atypical) antipsychotic, 31% were taking a first generation (typical) antipsychotic, and 13% were taking both an atypical and typical antipsychotic. A chi-square analysis revealed that the frequency with which individuals were taking each type of antipsychotic did not differ between those without NES and those either with a diagnosis of NES, either full, provisional or NOS, [$\chi^2=0.03$, $p=0.99$]. This finding remained non-significant independent of method of diagnosis, i.e. interview vs. NEQ.

3.4 Caloric Intake

Total calories and calories per weight (kg), based on 24-hour dietary recall were compared between the diagnostic groups. Based on the interview groups, no differences emerged in terms of total daily calories consumed [no NES 2372 ± 1172 cal vs. Full NES, provisional, and NOS, 2374 ± 1103 , $t=-0.01$, $p=0.99$]. The NEQ based diagnostic groups did differ [$t=-2.94$, $p=0.004$]; those with prominent NES symptoms consumed more calories (3140 ± 1481) than those without (2372 ± 1172).

3.5 Psychiatric Symptoms and Clinical Measures

Examining data by interview-based groups revealed no significant differences in BDI, QLES-Q-18, and ISI [$t=-0.80$, $p=0.43$; $t=1.38$, $p=0.17$; $t=-0.39$, $p=0.70$, respectively]. In addition there were no differences in PANSS for positive, negative, and general psychopathology symptoms [$t=1.15$, $p=0.25$; $t=-0.50$, $p=0.62$; $t=-0.93$, $p=0.36$, respectively], Table 3. No differences were found in terms of quality of life or psychiatric symptoms. However, those diagnosed with NES (full, provisional, and NOS) reported higher depression [BDI: 15.5 ± 11.2 vs. 10.0 ± 9.6 , $t=-1.98$, $p=0.05$]. Additionally, these individuals reported more insomnia [ISI: 12.3 ± 7.0 vs. 8.0 ± 5.8 , $t=-2.45$, $p=0.02$].

3.6 Current Substance Use

In the overall sample, 13 individuals tested positive for drug use at baseline. Individuals testing positive for drugs at baseline were not significantly more likely to receive a diagnosis of NES than those who tested negative; this was true for both those diagnosed based on interview, [$\chi^2=1.92$, $p=0.38$], and for baseline NEQ based groups, [$\chi^2=1.89$, $p=0.17$]. These findings held true after controlling for age and gender.

Individuals who reported a history of substance abuse/dependence treatment were no more likely to be diagnosed with NES at baseline, either based on interview [$\chi^2=4.16$, $p=0.24$] or NEQ data [$\chi^2=4.55$, $p=0.10$]. When history of use was defined as use of the substance for 12 months or more, percentage of individuals with a history of cocaine use did not differ with respect to NES diagnosis by either interview [$\chi^2=2.35$, $p=0.13$] or NEQ category [$\chi^2=2.84$, $p=0.24$].

3.7 Metabolic Measures

Those without a diagnosis of NES had mean high-density lipoproteins (HDL) of 48.1 ± 16.1 and mean low-density lipoproteins (LDL) of 105.5 ± 37.6 at baseline assessment. The mean for those diagnosed by interview with NES, a provisional diagnosis of NES, or NES, NOS was 46.4 ± 13.6 for HDL and 110.3 ± 38.4 for LDL. For HDL, this constituted a statistically significant difference between the groups after controlling for gender, age, and statin medications, [$F=3.15$, $p=0.02$]. The difference in LDL scores was significant when controlling for statin medication and gender, [$F=3.15$, $p=0.04$], but not age.

There was no significant difference in frequency of individuals interviewed who were receiving pharmacotherapy for hypertension between those without NES ($n=31$, 40%) and those with NES, NOS, provisional, [$n=11$, 52%, $\chi^2=1.08$, $p=0.30$], which remained non significant after controlling for age, gender, and BMI, [$F=1.81$, $p=0.14$].

3.8 Diabetes and Metabolic Syndrome

Overall, 69 individuals (73%, $n=94$) met criteria for metabolic syndrome. Comparison between those without NES based on interview and those with either NES, provisional NES, or NES, NOS revealed no significant differences in rates of metabolic syndrome, [$n=54$, 74% vs. $n=15$, 71%; $\chi^2=0.05$, $p=0.82$]. Overall, the rate of diabetes was 39% ($n=39$); Patients without a diagnosis of NES had a significantly higher rate (45%; $n=35$) of diabetes than those with NES (18%; $n=4$), [$\chi^2= 5.14$, $p=0.02$].

4. Discussion

Schizophrenia patients who are obese report rates of night eating and NES well above those reported for the general population. Based on a diagnostic interview, 12% of this sample met full criteria for NES, with an additional 10% meeting partial criteria for NES. When assessed by self-report (NEQ), 8% met full criteria with an additional 8% meeting partial criteria. A major discrepancy between the interview and NEQ based assessment of NES seemed to be rates of potential SRED. While those patients interviewed either in person or over the phone denied experiencing nocturnal ingestions while either unaware or minimally

aware of doing so, 17% of the same sample reporting potential SRED when completing the self-report NEQ. Though we can only speculate, it is possible that this particular question (“when you snack in the middle of the night, how aware are you of your eating?”) is poorly understood and/or misinterpreted by some patients with schizophrenia. It is pertinent to note, that had these individuals reported being aware of their nocturnal ingestions (and thus ruled-out SRED), they would have met full criteria for a NES. This would then have elevated the number of NES cases at baseline NEQ to 25%--more than double that of the interview based NES prevalence. Regardless of whether patients were categorized with NES, the frequency with which these individuals engage in maladaptive eating behaviors is important. The frequency of patients who feel that they have no, or little control over their evening eating (32%), or experience episodes of nocturnal ingestion on a fairly regular basis (24%) are clinically relevant.

The self-reported night eaters also endorse more symptoms of insomnia and depression. This may in part be due to the overlap in symptoms between insomnia, depression, and NES. Two items on the NEQ assess depression and insomnia, possibly resulting in an elevated number of false positives. Additionally, it is unknown if individuals with schizophrenia are more likely to engage in night eating behaviors as a result of difficulty sleeping, or if nocturnal awakenings to eat explain the reports of poor sleep. This is an important distinction given that nocturnal episodes of eating are part of the proposed diagnostic criteria for NES [28]. Clinical interviewing might be beneficial in differential diagnosis between NES and SRED, given the difference in prevalence based on self-report alone.

Our results of the diet recall comparison were mixed. The number of calories consumed did not differ based on interview based NES diagnostic status. However, when examining calories based on the NEQ derived categories, those who endorsed night eating behaviors consumed a higher number of calories. Although every effort was made to promote accuracy in recall, inaccuracy and/or underreporting of caloric intake is probable as this has been shown to occur, particularly in the obese [30].

There were no differences in rates of metabolic syndrome based on night eating status which is in agreement with previous research in obese population [6]. Those with NES had lower HDL and higher LDL; this is contrary a previous study which detected no difference in cholesterol [6]. Unexpectedly, our patients with NES had significantly lower rates of diabetes than those without NES (18% vs. 45%), a finding that should be viewed cautiously pending replication. The only study utilizing interview data that has examined rates of NES in obese diabetics reported a rate of 3.8% [32]. No difference in BMI was found between the night-eating groups, likely due in part to the homogeneity of the sample in terms of BMI. Future research should include a normal weight group. The relationship between night eating and metabolic abnormalities is still unclear and should be investigated in future studies.

5. Conclusion

Overweight and obese individuals with schizophrenia reported high rates of night eating behaviors and these night eating behaviors were associated with heightened depression and

insomnia. These results highlight the need for improved assessment of this disordered eating pattern in patients. The NEQ may be used as a valuable screening tool in this population, particularly when it is clinician-administered or supplemented by follow-up interview, rather than sole reliance on self-report. Further clarification is needed regarding the discrepant rates of diabetes between those who do and do not night eat, given the high rate of medical comorbidities present in this population. Moreover, it is unknown whether night eating in obese schizophrenia patients has any impact on the efficacy of weight loss interventions. A recent study reported that NES did not negatively impact weight loss among obese patients receiving behavioral weight loss treatment at a traditional obesity clinic [31], although this should be explored in future research with schizophrenia patients who suffer greater functioning deficits and may require more specialized behavioral interventions.

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Table 1

Percentage (N=100) of Subjects Meeting Diagnostic Criteria for Night Eating Syndrome (NES) Based on Interview and Questionnaire Data

	Baseline NEQ	Interview
No Diagnosis	67 (67%)	78 (78%)
Full Criteria for NES	8 (8%)	12 (12%)
NES, Provisional	1 (1%)	2 (2%)
NES, NOS	7 (7%)	8(8%)
Other sleep-related eating disorder	17 (17%)	0

Abbreviations: NOS= Not otherwise specified; NEQ= Night Eating Questionnaire

Table 2

Frequency of Night Eating Behaviors in Schizophrenia Outpatients

Have urges to eat snacks after dinner, but before bedtime	
Very much so:	24%
Extremely so:	16%
Amount of control over eating between dinner and bedtime	
None at all:	7%
A little:	25%
% of daily calories consumed after dinner	
Almost all:	2%
More than half:	11%
About half:	23%
Have cravings/urges to eat during the night?	
Extremely so:	5%
Very much so:	16%
Feel the need to eat in order to get back to sleep?	
Extremely so:	4%
Very much so:	6%
Frequency of snacking in the middle of the night?	
Always:	3%
Usually:	11%
Half the time:	10%
Length of time these behaviors have been troublesome	
> 10 years	9 %
5–10 years	14%
1–4 years	18%

Note. N=100 for all.

Table 3
Demographic and Clinical Characteristics of Interview-based Night Eating Syndrome (NES) Groups

	Total Sample	No NES diagnosis	NES (Full Criteria)	NES (Provisional & NOS)	test- statistic	p-value
Gender					$\chi^2 = 2.12$	0.35
Male	39 (39%)	29 (37%)	4 (33%)	6 (60%)		
Female	61 (61%)	49 (63%)	8 (67%)	4 (40%)		
Ethnicity					$\chi^2 = 4.28$	0.64
Caucasian	43 (43%)	32 (41%)	4 (33%)	7 (70%)		
African Am.	49 (49%)	39 (50%)	7 (58%)	3 (30%)		
Hispanic	5 (5%)	4 (5%)	1 (8%)	0		
Other	3 (3%)	3 (4%)	0	0		
Age	46.5±10	46.7±9.2	45.3±11.3	46.6±14.3	F=0.11	0.90
Education (years)	12.7±3	12.8±3.2	12.0±4.5	13.0±1.9	F=0.42	0.66
# of psychiatric hospitalizations	6.4±6.2*	6.6±6.6*	4.5±3.3	6.8±5.8	F=0.62	0.54
Body Mass Index	38.2±7.7	37.7±7.5	38.6±7.7	41.2±9.4	F=0.93	0.40
BDI	11.4±9.8	11.0±9.9	15.5±8.9	9.8±9.6	F=1.25	0.29
QLES-Q-18	62.6±12.3	63.4±11.8	55.3±13.3	63.7±13.3	F=2.23	0.11
ISI	9.3±6.3	9.2±6.2	10.7±5.6	8.4±9.1	F=0.36	0.70
PANSS						
Positive	16.2±6.1	16.6±6.2	14.8±5.5	15.1±6.3	F=0.67	0.52
Negative	14.4±5.4	14.3±5.2	15.9±6.0	13.8±6.2	F=0.55	0.58
General	29.1±7.4	28.7±6.9	30.9±9.0	29.8±9.2	F=0.49	0.62

* 1 subject's data was removed from analyses as an outlier. Subject reported 99 hospitalizations.

Abbreviations: NES=Night Eating Syndrome; NOS= Not otherwise specified; BDI= Beck Depression Inventory; QLES- Quality of Life Enjoyment and Satisfaction Questionnaire -Abbreviated Version; ISI= Insomnia Severity Index; PANSS=Positive and Negative Syndrome Scale.