

# A descriptive study of non-obese persons with night eating syndrome and a weight-matched comparison group

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## Abstract

The purpose of this study was to characterize the Night Eating Syndrome (NES) and its correlates among non-obese persons with NES, and to compare them to non-obese healthy controls. Nineteen non-obese persons with NES were compared to 22 non-obese controls on seven-day, 24-hour prospective food and sleep diaries, the Eating Disorder Examination and the Structured Clinical Interview for DSM-IV Diagnoses interviews, and measures of disordered eating attitudes and behavior, mood, sleep, stress, and quality of life. Compared to controls, persons with NES reported significantly different circadian distribution of food intake, greater depressed mood, sleep disturbance, disordered eating and body image concerns, perceived stress, decreased quality of life, and more frequent Axis I comorbidity, specifically anxiety, mood, and substance use disorders. These findings are the first to describe the clinical significance of night eating syndrome among non-obese individuals in comparison to a non-obese control group, and they suggest that NES has negative health implications beyond that associated with obesity.

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*Keywords:* Night eating syndrome; Eating disorders; Sleep; Mood; Stress; Clinical significance

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## 1. Introduction

Night Eating Syndrome (NES) is conceived as a delay in the circadian pattern of food intake (Stunkard, Grace, & Wolff, 1955). The original definition of NES, based on clinical observation of obese persons, operationalized the syndrome as evening hyperphagia (the consumption of  $\geq 25\%$  of total daily food intake after dinner), morning anorexia, and depressed mood that worsens in the evening (Stunkard et al., 1955). Since this definition was proposed, over 50 publications on the characterization and prevalence of NES have been presented. Naturally, as the circadian eating patterns of additional populations have been studied, the operational definition of NES has evolved (Birketvedt et al., 1999; O'Reardon et al., 2004). Currently, NES is operationalized as engaging in evening hyperphagia (consumption of  $\geq 25\%$  of total daily calories after completion of the evening meal) and/or nocturnal awakenings accompanied by ingestions of food ( $\geq 3$  episodes/week) (Allison, Grilo, Masheb, & Stunkard, 2005). Morning anorexia and depressed mood that worsens in the evening are considered associated features of the syndrome (Engel, 1995).

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NES was originally seen as a behavioral phenotype of obesity (body mass index [BMI]  $\geq 30$  kg/m<sup>2</sup>); the earliest description of NES noted a prevalence of 64% among difficult to treat obese patients (Stunkard et al., 1955). Current research supports the association between NES and excess weight for some people. For example, we found (Lundgren et al., 2006) that obese psychiatric outpatients were five times more likely than non-obese psychiatric outpatients to meet criteria for NES. Also, Andersen, Stunkard, Sorensen, Pedersen, & Heitman (2004) found that obese women enrolled in the longitudinal Danish MONICA study who endorsed the question “do you get up at night to eat” gained significantly more weight over 6 years than did obese women who did not endorse the night eating question; no weight differences across time were found for men or non-obese women.

The association between NES and obesity has also been supported with prevalence estimates suggesting that NES is more common among obese persons (6–16%) (Adami, Campostano, Marinari, Ravera, & Scopinaro, 2002; Ceru-Björk, Andersson, & Rössner, 2001) as compared to the general population (1.5%) (Rand, Macgregor, & Stunkard, 1997).

Despite this elevated incidence among obese samples, not all persons with NES are obese or overweight (Birketvedt et al., 1999; de Zwaan, Roerig, Crosby, Karaz, & Mitchell, 2006; Marshall, Allison, O’Reardon, Birketvedt, & Stunkard, 2004; Striegel-Moore, Franko, Thompson, Affenito, & Kraemer, 2006). Most literature has focused on obese night eaters;<sup>1</sup> Marshall et al. (2004), however, noted that 40 non-obese night eaters who completed an online version of the Night Eating Questionnaire (NEQ; Allison et al., 2008) responded similarly to obese night eaters who completed the NEQ online or in an outpatient clinic. No differences were found between non-obese and obese night eaters for morning appetite, evening hyperphagia, difficulty with sleep and mood, perceived need to eat in order to fall asleep, or cravings and control over eating in the evening and upon awakening in the middle of the night. The only differences were that non-obese night eaters were significantly younger and reported significantly more nocturnal awakenings and nocturnal ingestions of food.

Similarly, Birketvedt et al. (1999) found no differences between non-obese and obese night eaters on 24-hour circadian levels of melatonin, cortisol, blood glucose, and plasma insulin in an inpatient sleep and eating study. Plasma leptin levels, as expected, were lower among non-obese than among obese night eaters.

The limited number of studies describing NES among non-obese persons suggests that additional investigation among this group is warranted. For example, it is important to know if NES is a clinically significant syndrome among persons of all levels of body mass. This question can be approached in two ways: 1) comparing non-obese night eaters to obese night eaters and 2) comparing non-obese night eaters to non-obese healthy controls. In the former comparison, the impact of weight on abnormal circadian eating behavior can be examined; in the latter comparison, the effect of eating behavior on psychosocial functioning, when controlling for BMI, can be examined. The reports by Birketvedt et al. (1999) and Marshall et al. (2004) have addressed the first approach. In this study we address the second approach, describing the nature and correlates of NES among non-obese night eaters in comparison to weight-matched control group. We hypothesize that non-obese night eaters will differ significantly from non-obese healthy controls on circadian eating and sleeping patterns, disordered eating attitudes and behavior, mood and stress, quality of life, and psychiatric histories. In sum, we propose to establish the clinical significance of NES among non-obese persons.

## 2. Methods

### 2.1. Participants

Nineteen non-obese night eaters (BMI < 25.0 kg/m<sup>2</sup>) and 22 non-obese controls enrolled in an outpatient study of the characterization of NES at the University of Pennsylvania. This study was reviewed and approved by the University Institutional Review Board. Demographic comparisons are presented in Table 1. Night eaters did not differ significantly from controls on age, gender, ethnicity, marital status, education, or BMI.

### 2.2. Procedure

Participants with Night Eating Syndrome were recruited by television and newspaper advertisements seeking persons endorsing night eating behaviors. The ads asked for persons who were “troubled by overeating at nighttime,” and either ate at least a quarter of

<sup>1</sup> In this paper, non-obese refers to persons with a BMI 18.5–24.9 kg/m<sup>2</sup>, as it would be a misnomer to refer to people with a BMI in this range as “normal” or “average” weight given the current prevalence of overweight and obesity in the U.S.

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