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## Original Research

# Night-eating syndrome and the severity of self-reported depressive symptoms from the Korea Nurses' Health Study: analysis of propensity score matching and ordinal regression

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## ARTICLE INFO

## Article history:

Received 13 June 2016

Received in revised form

19 July 2016

Accepted 21 August 2016

Available online 6 October 2016

## Keywords:

Depression

Eating disorder

Women's health

Mental health

Nurses' Health Study

Korea Nurses' Health Study

## ABSTRACT

**Objectives:** The prevalence of night-eating syndrome (NES) and depression is increasing worldwide. Although nurses, in particular, are exposed to work in an environment of irregular eating, shift work, and stressful settings, limited research exist. In fact, the prevalence of NES among Korean nurses has never been reported. The aim of this study was to determine the prevalence of NES as well as the association between NES and severity of self-reported depressive symptoms among South Korean female nurses.

**Study design:** The Korea Nurses' Health Study, following the protocols of the Nurses' Health Study led by the Harvard University, collected data on Korean female nurses. Survey responses from 3617 participants were included, and 404 responses were analyzed in this cross-sectional study using propensity score matching.

**Methods:** Descriptive, Spearman's and Cramer's correlations, propensity score matching, and multivariable ordinal logistic regression were conducted as statistical analysis.

**Results:** The prevalence of both NES and self-reported depressive symptoms among Korean female nurses were higher compared with nurses in prior studies. Nurses with NES were 1.65 times more likely to have greater severity of depressive symptoms than those without NES (95% confidence interval [1.19–2.10], odds ratio = 1.65) after adjusting for covariates including sociodemographic characteristics, health behavioural factors, and shift work.

**Conclusion:** This study suggests significant association between NES and the severity of self-reported depressive symptoms among Korean female nurses after adjusting for covariates. Policy makers and hospital managers need to develop strategies to reduce depression and NES among nurses for enhancement of nurses' mental and physical health as well as for improvement of care quality.

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## Introduction

Night-eating syndrome (NES) is an abnormality of meal timing and was first identified by Stunkard et al.<sup>1</sup> NES is an eating disorder characterized by morning anorexia, evening hyperphagia, insomnia, or sleepless, and it is described as a unique combination of sleep disorder, mood disorder, and eating disorder related to stressful events.<sup>1</sup> As the initial research, Birketvedt et al.<sup>2</sup> studied the association between behavioural characteristics and neuroendocrine data. In 2013, NES was added as one of the six 'other-specified feeding or eating disorder (OSFED)' categorized by the Diagnostic and Statistical Manual Disorders (DSM) 5.<sup>3</sup>

NES is known to be linked with obesity, and the prevalence rate of NES shows variations, which are 4.3%–8.9% among a weight loss group,<sup>4</sup> 10.1% among class II–III obese adults,<sup>5</sup> and 8.9%–55% among obese patients who need bariatric surgery.<sup>6</sup> The prevalence rate of NES among the obese sample is much higher than general population, which is 1.1%–1.5%.<sup>7,8</sup> NES-related studies on specific study populations other than certain diseases include college students and women. College students are more likely to suffer from sleep deprivation and high stress, and anxiety; thus, studies found emotional factors and eating to be associated among college students.<sup>9–11</sup> The prevalence rate of NES among college students was found to be higher than that of the general population.<sup>12</sup> Women are also found to be more likely to experience NES than men.<sup>13</sup>

Next, associations between NES and depressive symptoms have been noted in numerous studies. Of 106 individuals of various BMI indices with broadly defined NES, 56% had a lifetime history of major depressive disorder.<sup>14</sup> Particularly, NES has been studied extensively in the context of depression, especially in worsening of mood during the latter part of the day.<sup>14–16</sup> Although NES is reported to be not defined by depression, nor a cause, consequence, or feature of NES, it is shown to have a strong association with depression.<sup>17</sup>

Depression has been studied extensively in the context of NES and is known to be strongly related with eating disorders.<sup>18</sup> However, there is limited research on NES and depression regarding working environment or occupation category. Particularly, nurses express higher level of stress compared with people in other occupations;<sup>19</sup> they are exposed to sleep disorders related with shift work<sup>20</sup> and abnormal eating behaviours.<sup>21</sup> Similar to college students, nurses may be a group at particular risk for developing NES symptoms. Prevalence of depression among Korean nurses is high at 38%. Although it is lower when compared with those of nurses in Hong Kong<sup>22</sup> and in China,<sup>23</sup> Korean nurses show higher depression scores when compared to other occupational groups.<sup>24</sup> Also, depression among Korean nurses is increasing showing that 70.5% of nurses express depressive symptoms at a higher level than mild.<sup>25</sup>

Thus, this study aims to investigate the prevalence of NES among Korean female nurses for the first time considering important factors such as shift work.<sup>26,27</sup> Since depression among Korean female nurses is becoming an alarming health issue, we want to investigate factors associated with

depressive symptoms. In particular, we want to test the hypothesis that NES is positively associated with self-reported depressive symptoms.

## Methods

### Study design and sample

The Korea Nurses' Health Study (KNHS) is the first large-scale cohort investigating the health of women in South Korea. The design and the questionnaires follow the protocol of the U.S. Nurses' Health Study being conducted by the Harvard School of Public Health. The KNHS is funded by the Korea Centers for Disease Control and Prevention (KCDC) of the Korea National Institutes of Health (KNIH). The KNHS started in March 2013 with 4 months of preparation including translation of questionnaires and a pilot test. The survey was distributed starting in July 2013; the entry period is 3 years (2013–2015) and consists of a cross-sectional baseline survey. During the entry period, female nurses are asked to voluntarily participate in four different modules every 6 months. In addition, when a participant became pregnant, she was asked to take the early pregnancy module and the postpregnancy module. In this manner, participants will complete a total of six modules. The primary purpose of the KNHS is to investigate health conditions, lifestyles, health behaviours, and diseases among female nurses of childbearing age. The secondary purpose is to investigate occupational health, including work schedule, working conditions, work-related stress, and occupational hazardous exposures.

The study population included female registered nurses aged between 20 and 45 years living in Korea. Nurses who were actually working within 1 year prior to participating in the survey were all included in the study population.

### Recruitment, enrollment and ethical consideration

The recruitment was done by the Korean Nurses Association (KNA) with the help of branches and affiliated organization nationwide. The start of the study was initially announced at a regular KNS delegate conference as well as at conferences with nursing department directors of major hospitals in the capital city and the metropolitan area. The KNA also sent official letters asking for cooperation to the nursing departments of each hospital nationwide. Furthermore, the KNA held biannual research conferences inviting approximately 150 nurses who participated in the study; the KNA research team shared findings from the baseline data and the significance of the study.

The KNA continued its regular promotional efforts by visiting the job training sessions to meet groups of nurses. The KNA sent brochures and posters to nursing departments if the KNHS staff were not able to visit. We encouraged voluntary participation by several promotional activities including social networking services, the Korean Nurse Association news, the KNHS web page, text messages, emails, and more.

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