

[ EDITORIAL ]

## Gender Differences in the Severity of Sleep Apnea

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Although the diagnosis of sleep apnea syndrome (SAS) was defined in the third edition of the International Classification of Sleep Disorders (ICSD-3) (1) published in 2014 by the American Academy of Sleep Medicine, there was no statement about the severity of SAS. Currently, the apnea-hypopnea index (AHI) is generally used to indicate the severity of SAS; however, there are sex differences in the frequency of occurrence of sleep apnea, which tends to be low in women. The severity of SAS can be determined from the associated complications and/or secondary diseases, and it is problematic to determine the severity using only the AHI, which is the number of apnea or hypopnea events that take place during 1 hour of sleep. For this reason, there was no statement about the severity of SAS in ICSD-3.

The prognosis of SAS is related to the onset of ischemic heart disease, congestive heart failure, cerebrovascular disorder, and premature mortality. The onset of these diseases seems to be influenced by complications with hypertension, diabetes, and metabolic syndrome (MetS). Sasanabe et al. (2) studied the relationship between SAS and metabolic syndrome and found a high frequency of severe SAS in patients with MetS. Furthermore, SAS was related to the presence of MetS in men, but no exact relationship was seen in women.

In a study of approximately 1,800 subjects, Mieno et al. (3) demonstrated that a higher AHI is a significant risk factor for the development of MetS in both Japanese men and women, but there was only a moderate degree of involvement in women. However, female sex was inversely associated with the prevalence of MetS, independent of other factors, such as apneic severity, suggesting that apnea may make women more resistant to MetS. However, which factors are responsible for this resistance is unknown, and future studies are expected to shed further light on this subject.

Intermittent hypoxia has been shown to affect hyperten-

sion in sleep apnea (4). However, whether the number of times per hour or the duration of exposure to hypoxia is more influential is unclear at present. Even in patients with the same AHI, there is a wide range in the severity of the decreases in oxygen saturation accompanying apnea and hypopnea, and in some cases, exacerbation only occurs during rapid eye movement sleep. The desaturation is alleviated by aging and exacerbated by an increase in the body mass index (BMI); of note, women typically weigh less than men. Therefore, the severity of SAS cannot be determined based solely on the number of desaturation events.

Similar to the estimated glomerular filtration rate for the detection of chronic kidney disease, a new index representing the severity of SAS that considers the prognosis, sex differences, age, increase in the BMI, hypoxia exposure, and the number of apnea or hypopnea events per hour is needed.

**The authors state that they have no Conflict of Interest (COI).**

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