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Editorial

Sleep Apnea: A Geriatric Syndrome

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> "Most of the time [President Taft] simply did not and could not function in alert fashion…Often when I was talking to him after a meal his head would fall over on his breast and he would be sound asleep for ten or fifteen minutes. He would waken and resume the conversation, only to repeat the performance in the course of half an hour or so."
>
> ~*Senator James Watson*[1]

President William Howard Taft and Joe, the fat boy who was always asleep in Dickens' *The Posthumous Papers of the Pickwick Club* are 2 of the most famous examples of obstructive sleep apnea syndrome (Figure 1, A). Ondine's curse in which she told her unfaithful husband that as long as he was awake he would breathe, but if he fell asleep his breath would desert him, is representative of central sleep apnea (Figure 1, B). Sleep apnea as diagnosed by apneic and hypopneic episodes per hour of sleep [ie, apnea-hypopnea index (AHI)] is most prevalent in older persons and especially those in nursing homes.[2] In 1 study of community-dwelling older persons, 44% had an AHI ≥20, indicating moderate to severe sleep apnea.[3] The Sleep Heart Health Study found that at least 20% of persons over 60 years of age had an AHI ≥15.[4] Although sleep apnea is rarely documented in nursing home residents (<1%),[5] it occurs in 25%–50% of this patient population, making it a widespread condition.[6–8] Although night time observation of apneic episodes by nursing staff has excellent sensitivity and specificity for recognizing sleep apnea in the nursing home,[9] definitive diagnosis in this setting can be made by overnight oximetry[6,9] or a variety of more sophisticated home sleep monitors.[10]

As shown in Figure 2, sleep apnea can present with a constellation of symptoms.[11,12] These can be divided into nighttime and daytime symptoms. The classic indicator of sleep apnea is that the person's bed partner kicks him awake at night because he has stopped breathing and the partner is afraid that he is dead. Other nighttime symptoms consist of loud snoring, gasping for air, restless sleep, insomnia, profuse nighttime sweating, and nocturia. During the daytime, the person is often fatigued and irritable; has poor concentration and forgetfulness; falls asleep inappropriately, and may have mood disturbances such as depression or anxiety. In addition, awakening with a headache in the morning is common. Although these symptoms can be used to reliably screen for obstructive sleep apnea in middle-aged patients, symptoms of sleep apnea change with aging, with less obesity or neck size,[13–15] and fewer witnessed apneas,[4] and more complaints of poor sleep quality and nocturia,[14] and cognitive dysfunction. In general, the "classic" clinical presentation of obstructive sleep apnea is uncommon in older adults may account in part for the reduced prevalence of clinical diagnosis of the disorder in this population. In this context, we should consider sleep apnea in geriatric patients a separate if not unique syndrome (Table 1).

The etiology of obstructive sleep apnea is often multifactorial and can be secondary to abnormalities in the anatomy of the nasopharynx, obesity with a large fatty neck, and/or chronic sinusitis and acid reflux (Figure 3).[16–19] Recently, evidence has emerged that sleep apnea is, like dysphagia,[20,21] associated with the loss of muscle mass and function commonly seen with sarcopenia.[22] Furthermore, there are numerous changes associated with aging that can lead to sarcopenia such as late life hypogonadism, increased circulating inflammatory cytokines, loss of motor nerve units, and insulin resistance.[23–25] In institutionalized adults, resistance exercises have been shown to reduce the apnea-hypopnea index.[26] Also with aging, there is an increase of the prevalence of central sleep apnea. Damage to the brain can occur with cerebral vascular disease, Alzheimer disease, brain tumors, Parkinson disease, and multiple sclerosis and can increase the risk of both obstructive and central sleep apnea.[8,27,28] Other causes of central sleep apnea include congestive heart failure (Cheyne-Stokes breathing), prolonged hypoxia, and opioid medications.[28,29] Geriatric patients are also more susceptible to a "complex" or mixed sleep apnea in which respiratory drive is reduced for reasons just mentioned, but the central component only becomes evident to clinicians after obstructive events are treated.

There is emerging evidence that sleep apnea may accelerate the aging process.[30] Persons with sleep apnea have an increase in oxidative DNA damage, increase in DNA breakage, and poor DNA repair.[31,32] Sleep apnea is also associated with shorter telomere length.[33] Heat shock proteins increase under stress and restore misfolded proteins and heat shock protein70 levels are decreased in obstructive sleep apnea. These levels normalize with continuous positive airway pressure (CPAP) treatment.[34] In addition, excess DNA methylation occurs with sleep apnea,[35] and this epigenetic

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Fig. 1. (A) William Howard Taft, the very obese American President, who had sleep apnea. (B) Ondine, who cursed her unfaithful husband to stay awake as he would stop breathing if he fell asleep (central sleep apnea). (Photographs from Wikipedia).

alteration appears to alter genes involved in endothelial nitric oxide synthase resulting in abnormal vascular responses.[36,37] Although the evidence of the effect of sleep apnea is contradictory, 1 study showed that CPAP treatment could potentially increase the number of endothelial progenitor cells.[38] Furthermore, sleep apnea is associated with mitochondrial dysfunction as evidenced by reduced mitochondrial DNA copy numbers, increased oxidative damage, and decreased antioxidant capacity[39–41] and is associated with an increase in circulating inflammatory cytokines.[42–44] Overall, the evidence suggests that sleep apnea results in an acceleration of cellular senescence, prematurely advancing the aging process.

Figure 4 shows the multiple negative outcomes seen in persons with sleep apnea. Sleep apnea results in an increase in adrenocorticotropic hormone leading to an increase in cortisol and aldosterone as well as an increase in norepinephrine.[45,46] The increase in these hormones leads to hypertension, hypokalemia, and hyperglycemia.[47] It is important to recognize that sleep apnea may be associated with occult nighttime hypertension with the person being relatively normotensive during the day.[48] These nighttime

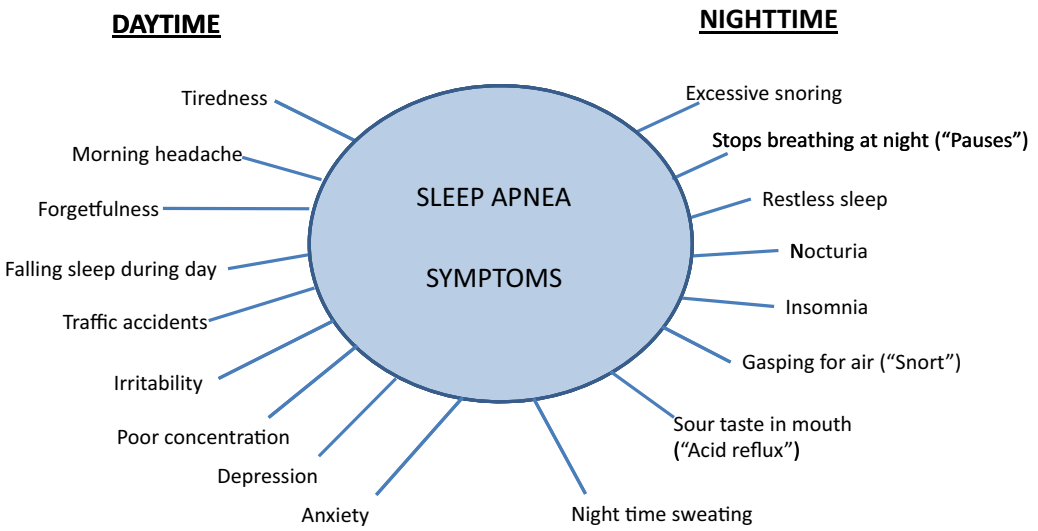

Fig. 2. Symptoms of sleep apnea.