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Obstructive Sleep Apnea (OSA) Screening

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Introduction

Obstructive sleep apnea (OSA) has a strong link to cardiovascular problems (e.g., myocardial infarction, dysrhythmias, and congestive heart failure). During apneic episodes, OSA causes desaturations, arousals, and large swings in intrathoracic pressure, resulting in elevated sympathetic tone in OSA patients that can last all day. Desaturations, arousals, and increased sympathetic activity all contribute to the progression of atherosclerosis by triggering inflammatory and cellular processes that result in cardiac stress and other disease mechanisms. Recognizing and treating OSA is critical to minimising the disease burden of cardiac disorders, as there is growing evidence that treatment of OSA enhances management of cardiovascular diseases and perhaps improves cardiovascular outcomes.

Diagnosing OSA, on the other hand, can be difficult for non-sleep specialists. There are several screening techniques available to help identify these patients. This post will go over the many screening tools available and make recommendations for the best one based on simplicity of use and sensitivity.

The growing importance of sleep apnea in reducing mortality and morbidity aided the development of numerous screening techniques that are now in use. The most significant and clinically helpful screening technique has the highest sensitivity and specificity, as well as being simple to administer and incorporate into clinic. Stop, STOP-BANG (SB), Epworth Sleepiness Scale (ESS), and 4-Variable screening tool are four widely recognised screening instruments that are relatively easy to administer (4-V) [1].

Description

SDB is characterised by irregular respiratory patterns, such as pauses in breathing and inadequate ventilation during sleep. Upper airway resistance syndrome (UARS) and obstructive sleep apnea are the two most common kinds of SDB (OSA). OSA can be asymptomatic or symptomatic, with substantial neurocognitive and cardiovascular sequelae (i.e., a condition that develops as a result of a previous disease), and is commonly associated with sleep disruption, daytime weariness, and a poor quality of life (QOL). Over 936 million persons aged 30–69 years are thought to have mild, moderate, or severe OSA [i.e., apnea hypopnea index (AHI) threshold values of 5 occurrences per hour] globally, with 425 million of these adults having moderate to severe obstructive sleep (AHI 15). Individuals with AHI 15 are projected to number 66 million in China, 29 million in India, 25 million in Brazil, 24 million in the United States, and 20 million in Russia, for example. Positive airway pressure (PAP) is advised in patients who have excessive drowsiness, poor sleep-related quality of life, and concomitant hypertension, all of which are more prevalent in patients with an Apnea Hypopnea Index of 15 or above [2].

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As the prevalence of OSA raises, so do the health, safety, and economic ramifications, as well as the pressing need to identify those who are affected. Access to type I in-lab attended polysomnography (PSG) and accompanying diagnostic services, particularly in poor countries and isolated areas, remains a barrier. As a result, home monitoring devices such as type II portable monitors (PSG), type III & IV portable monitors, screening questionnaires & clinical prediction tools, and emerging contactless technologies are gaining popularity, particularly for detecting severe OSA in those with no severe comorbidity (where lab PSG may still be required) [3].

The use of a microphone affixed to the face or to bedding, such as a face frame mask, a mattress overlay, two microphones, and oro-nasal based airflow acoustics, are examples of existing contact-based monitoring techniques for identifying OSA. The ability to record sleep and related biometrics wirelessly (i.e., without using contact) has the potential to provide new insights into sleep disorders. Using specialised radio frequency (RF) sensors and artificial intelligence/machine learning (AI/ML) algorithms, fully contactless approaches (i.e., non-contact sensing at a distance, such as where the sensing device is placed on a bedside locker, shelf, or similar adjacent to the bed) have been explored to estimate wake & sleep stages, breathing rate, and OSA. The way people get health-related information is fast changing, and smart devices are increasingly playing a larger role. In 2018, 5.1 billion individuals (67 percent of the global population) had signed up for mobile services, with another 710 million people predicted to sign up for the first time by 2025 (Rising to 71 percent of the population). In 2019, an estimated 3.2 billion people used smartphones, accounting for about 40% of the global population. In early 2018, the number of unique mobile customers in North America reached 300 million (84 percent of the population) and is constantly increasing [4,5].

Conclusion

The meteoric rise has sparked interest in using smartphone sensors and platforms for new sensing and health analysis. For example, there has been new research on using cell phones to identify snore and OSA using passive acoustic analysis and sonar reflections, as well as sleep staging. However, background ambient noise might interfere with the former, while the latter requires a fairly precise setup to acquire correct signals, as well as limited smartphone support. These methods can also evaluate sleep quality or OSA risk, although seldom both at the same time.

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