



False negative Home sleep apnea testing- An important concept to prevent misdiagnosis in patients with underlying Sleep apnea



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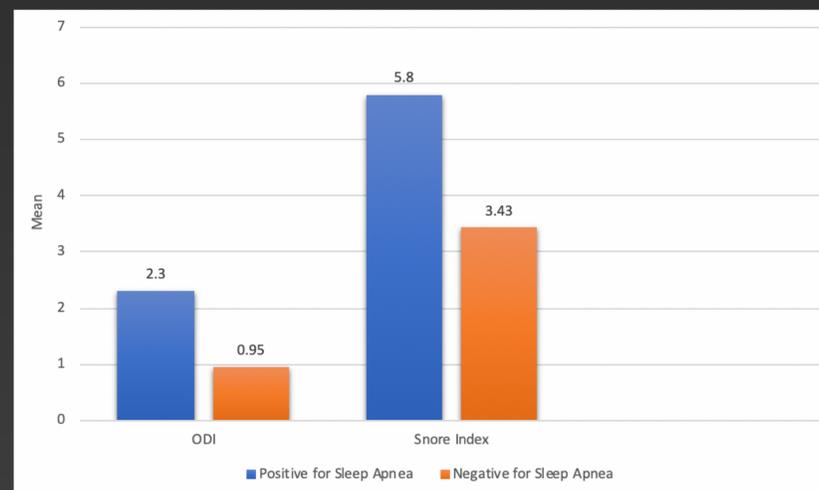
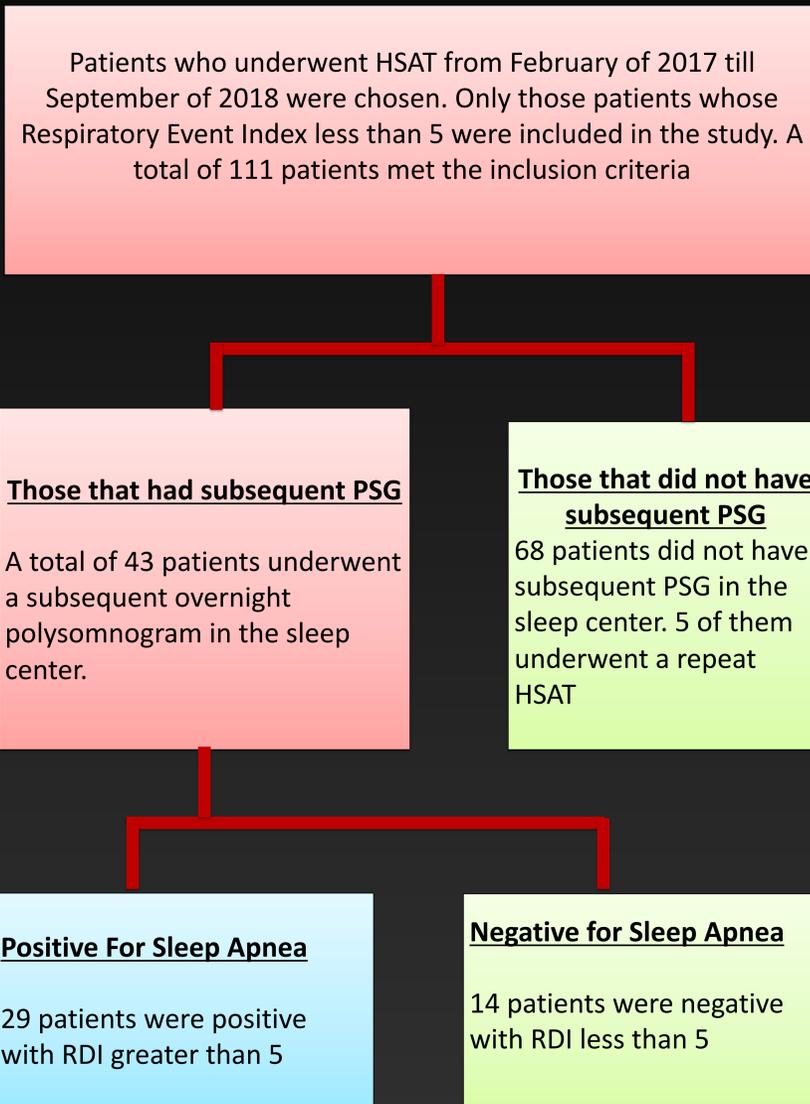
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Abstract and Background

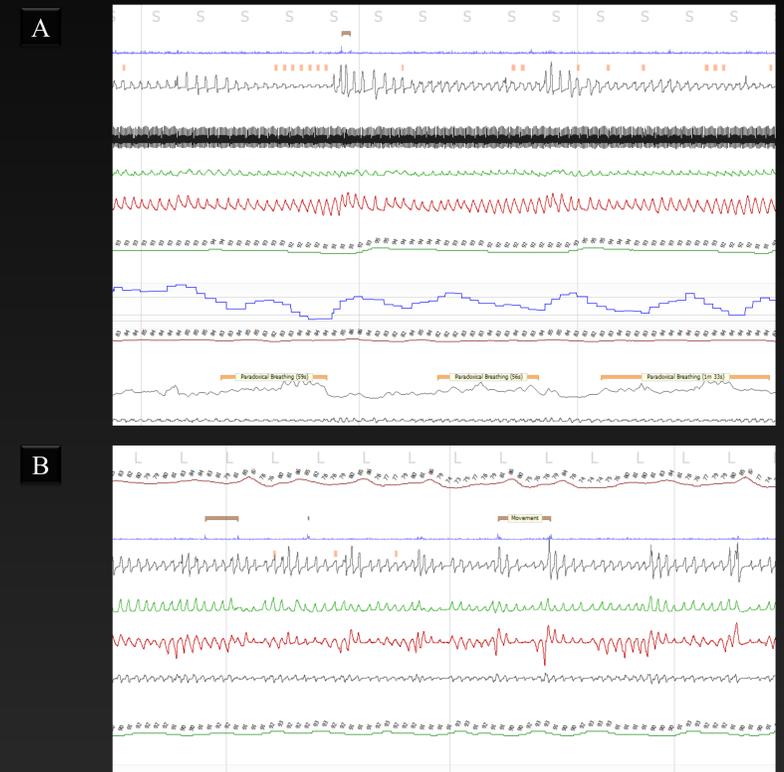
- **Obstructive Sleep Apnea (OSA)** syndrome is characterized by repetitive reduction or cessation of airflow due to partial or complete obstruction of the airway leading to hypoxemia, arousals from sleep and fragmented sleep.
- It affects 5% of adult men and 2% of women in western countries and is **associated with comorbidities** such as cardiovascular and cerebrovascular diseases and several neurobehavioral morbidities.
- The **current gold standard** for a definitive diagnosis of OSA is an overnight Polysomnography (PSG). The overnight polysomnogram performed in a sleep center will give the comprehensive report of that includes the number of apneas, hypopneas and respiratory effort related arousals(RERAs). The total number of apneas and hypopneas per hour of sleep is called Apnea Hypopnea Index(AHI) while the total number of apneas, hypopneas and RERAs per hour of sleep is called 'Respiratory Disturbance Index'-RDI. Sleep Apnea is diagnosed if the RDI is 5 or more per hour of sleep.
- Home Sleep Apnea Testing(HSAT) has become an important tool in identifying high risk population. As the name suggests, the study is done while the patients sleep in their homes. One of the limitations of the study is the lack of Electroencephalographic (EEG) data. This prevents the inclusion of RERAs in the diagnosis of Sleep Apnea.
- The results of this preliminary analysis serves as the foundation to elucidate whether subtle changes in breathing patterns recorded during a sleep study are reflected in changes in cortical activity.

Research Methods

- Patients in this study were those that underwent HSAT from February of 2017 till September of 2018. The studies read by a single Sleep expert were selected for this study.
- Only those patients whose REI in their HSAT less than 5 were included in this study. All these patients had multiple airflow fluctuations in their HSAT that raised the suspicion for the presence of RERAs.
- Those patients with REI of less than 5 and did not have airflow fluctuations were excluded from the study.
- Of the 111 patients selected, only 43 patients underwent subsequent Polysomnogram at the time of the study.
- Of the 43 patients, 29 of them were eventually diagnosed with sleep apnea while 14 patients did not end up with the diagnosis of sleep apnea.



HSAT analysis



Both figure A and B show airflow fluctuations in the absence of scorable respiratory events like apneas or hypopneas.

Discussion and Conclusion

- Home Sleep Apnea Testing(HSAT) has become one of the mainstay diagnostic tests in the assessment of Sleep Apnea.
- However, HSAT has multiple limitations. One of the major limitations is the lack of EEG recording during the study.
- Because of this limitation, one of the important respiratory events of sleep apnea, the RERAs (Respiratory Effort Related Arousals) could not be scored. This typically results in underestimation of the severity of the sleep related breathing disorder.
- Our study shows that a negative HSAT does not always mean the lack of sleep apnea.
- 67% of the patients who initially had a negative HSAT eventually were diagnosed with sleep apnea with an overnight polysomnogram done in the sleep center.
- This study highlights the importance of analyzing the airflow and thoraco-abdominal waveforms during the HSAT interpretation to predict the possibility of underlying sleep related breathing disorder.