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### NON INTRUSIVE AND UNATTENDED SLEEP ANALYZER EFFECTIVELY SCREENS PATIENTS SUSPECTED OF SLEEP APNEA: A COMPARISON WITH POLYSOMNOGRAPHY

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**Introduction:** Sleep Apnea Syndrome (SAS) is largely underdiagnosed due to the cost and availability of Polysomnography (PSG). We aimed at evaluating the diagnosis of SAS with the WITHINGS Sleep Apnea Detector (SAD), a non-intrusive pressure and sound sensor placed under the mattress.

**Methods:** 118 patients (67 F, 49 years, BMI 33kg/m<sup>2</sup>) suspected of SAS had an in-laboratory PSG together with Sleep Apnea Detector. From the pressure signal, Sleep Apnea Detector derives respiratory and cardiac signals and movements. From the microphone, snoring and snorting are detected. These features are used to detect sleep periods with a Random Forest classifier and apnea and hypopnea events with a Convolutional Neural Network. The Total Sleep Time (TST) and Apnea Hypopnea Index (AHI) deduced (TST<sub>sad</sub>, AHI<sub>sad</sub>) are compared with the PSG results scored according to AASM rules (TST<sub>psg</sub>, AHI<sub>psg</sub>). AHI and TST were compared using bias and Mean Absolute Error (MAE). Sensitivity, specificity, likelihood ratios (LR) and AUROC were calculated for AHI thresholds of 15 and 30/hr.

**Results:** The average (SD) TST<sub>psg</sub> was 367 (61) minutes. Sleep Apnea Detector overestimated TST by 25 minutes, 7.0% of the average duration in the sample. The precision is acceptable, with a MAE=53 minutes. Average AHI<sub>psg</sub> was 32.5 (30.1) and AHI<sub>sad</sub> 32.8 (29.9). The bias was 0.3 (95% CI [-2.7, 3.3]), MAE=10.3. The sensitivity (Se<sub>15</sub>) and specificity (Sp<sub>15</sub>) and their 95% confidence intervals were Se<sub>15</sub>=88.0% [79.0, 94.1] and Sp<sub>15</sub>=88.6% [73.3, 96.8]. Positive and negative LR were respectively LR<sub>15</sub><sup>+</sup>=7.70 and LR<sub>15</sub><sup>-</sup>=0.136. AUROC<sub>15</sub>=0.926. At the 30 threshold, Se<sub>30</sub>=86.0% [73.3, 94.2] and Sp<sub>30</sub>=91.2% [81.8, 96.7]. Positive and negative LR were LR<sub>30</sub><sup>+</sup>=9.75 and LR<sub>30</sub><sup>-</sup>=0.153. AUROC<sub>30</sub>=0.954.

**Conclusion:** Sleep Apnea Detector has excellent sensitivity and specificity, low bias and good precision. Thus it can be used as an unattended SAS screening device in patients likely to suffer from SAS.

**Support:** WITHINGS

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### HABITUAL SLEEP PATTERN, ANXIETY AND DEPRESSION ARE PREDICTIVE OF EXCESSIVE DAYTIME SLEEPINESS IN A LARGE-SCALE CLINICAL SAMPLES OF OBSTRUCTIVE SLEEP APNEA

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**Introduction:** Excessive daytime sleepiness (EDS) is a common symptom that patients with obstructive sleep apnea (OSA) seek

medical attention for. Prevalence ranged from 20% to 60%. Previous studies reported factors associated with EDS included age, body mass index (BMI), depression, and OSA severity. In most studies, the sample size was small, participants having specific co-morbidities, and the definitions of EDS was heterogeneous. Moreover, the association between anxiety, depression, habitual sleep pattern, and EDS has not been widely studied. Therefore, the present study aims to investigate the prevalence of EDS and associated factors, especially anxiety, depression, and habitual sleep pattern, in a large-scale clinical sample.

**Methods:** Data was prospectively collected from 8,081 adult patients who underwent initial overnight polysomnography (PSG) for the first time were referred from 2009 to 2016. Patients with total recording time less than 240 minutes and missing data were excluded. Data collected include demographics, anthropometrics, co-morbidities, and self-reported habitual sleep patterns. Subjective sleepiness was assessed by the Epworth Sleepiness Scale (ESS) with EDS defined as ESS ≥10. Anxiety and depression were assessed by the Hospital Anxiety and Depression Scale (HADS). The stepwise forward Logistic regression was used to identify predictors for EDS.

**Results:** In 5,780 (82.6%) patients with OSA (apnea-hypopnea index, AHI≥5/h), mean age was 63.9±0.2 yr, BMI was 27.7±0.1, and ESS was 10.4±0.1 and 80.5% were male. Prevalence of EDS in all OSA patients was 55.1% where the patients with severe OSA had higher prevalence (59.8%) than that in mild (49.5%) and moderate OSA (51.8%). Anxiety (OR: 2.036, 95% CI:1.153-1.502), depression (OR: 1.159, 95% CI:1.01-1.33), and short sleep (<6hr/night) (OR:1.316, 95% CI:1.32,1.70) were top three risk factors for EDS. Other risk factors for EDS included AHI, arousal index, % total sleep time with SpO<sub>2</sub><90%, %REM, smoking while hypnotic use and long sleep (≥ 8hr/night) were associated with lower risk.

**Conclusion:** Anxiety, depression, short sleep are predictive and OSA severity are predictive of EDS while long sleep was associated with lower risk.

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### CHARACTERISTICS OF US WOMEN VETERANS WITH SLEEP APNEA: RESULTS OF A NATIONAL SURVEY OF VA HEALTHCARE USERS

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