

# STRONG CHILDREN'S RESEARCH CENTER

## Summer 2014 Research Scholar

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### ABSTRACT

#### Title: **Validity of Home Portable Monitoring in the Diagnosis of Obstructive Sleep Apnea in Adolescents**

**Objectives:** Obstructive sleep apnea (OSA) is the repeated occurrence of partial or complete airway obstructions during sleep. Over time, these obstructions can result in neurocognitive deficits, behavioral difficulties, and impairments in cardiovascular and metabolic function. The purpose of this study was to examine the validity of portable home sleep testing (HST) equipment, relative to in-lab polysomnography (PSG), in the diagnosis of OSA in a sample of adolescents seen at the Division of Pediatric Sleep Medicine Services.

**Methods:** Adolescents (N=159; aged 12-19) were enrolled in this prospective study if the child presented with habitual snoring (>3 nights/week) during an office visit. All subjects were scheduled to receive in-laboratory polysomnography in the pediatric sleep lab, in addition to same-night portable testing using the approved Embletta Gold® (FDA 510(k) Number: K073682). Data from both study types were scored using guidelines in the American Academy of Sleep Medicine Manual for Scoring Sleep (2012). Portable HST studies were scored independently and blinded from the in-lab PSG results to prevent any bias in scoring. Individual and sleep-related parameters were collected from the final set of participants with sufficient scorable data from portable testing (a total sleep period of at least four hours) (N=38). Parametric and non-parametric tests were used for specific subgroup comparisons. Sensitivity and specificity values were also calculated for portable testing.

**Results:** Mean obstructive apnea-hypopnea index (AHI) from in-lab PSG testing ( $5.7 \pm 8.6$  events/hour) was significantly higher than that from home testing ( $2.8 \pm 2.9$  events/hour,  $p < 0.05$ ). The mean apnea index (AI) was higher in HST compared to in-lab PSG ( $4.2 \pm 3.9$  vs.  $1.5 \pm 4.0$ ,  $p < 0.05$ ), while the in-lab PSG hypopnea index (HI) was higher than the portable HI ( $5.1 \pm 6.0$  vs.  $3.7 \pm 4.7$ ;  $p < 0.05$ ). Portable monitoring consistently underestimated the severity of OSA when AHI values were classified into five standardized categories ( $\chi^2(12) = 26.8$ ,  $p < 0.05$ ). In-lab PSG AHI was categorized as primary snoring (n=17), mild (n=5), moderate (n=10), moderate-severe (n=4), and severe (n=2). Applying the same groups to portable AHI values yielded primary snoring (n=20), mild (n=12), moderate (n=5), moderate-severe (n=1), and severe (n=0). Three children were incorrectly diagnosed as disease-free (AHI of <2 events/hour) and two children with severe OSA were incorrectly categorized, based on HST v. in-lab PSG classifications. The overall difference between in-lab PSG and portable AHI values did not correlate with either arousal index or sleep efficiency. For adolescent OSA defined as an AHI  $\geq 2$ , portable monitoring exhibited a sensitivity value of 0.52 and a specificity value of 0.53. When the definition was shifted to a more exclusive definition of AHI  $\geq 5$ , the sensitivity remained consistent at a value of 0.50, but specificity increased to 0.90.

**Conclusions:** Portable HST monitoring was found to underestimate obstructive AHI, overestimate apnea index, and underestimate the hypopnea index in the adolescent sample, relative to gold standard in-lab PSG. Portable sleep monitoring also consistently underdiagnosed severity of OSA compared to in-lab monitoring, indicating that HST should not be used as an alternative to in-lab PSG in adolescents. Future studies should identify factors causing the disparities in respiratory indices and consider additional data from at-home portable monitoring.