RESPIRATORY POLYGRAPHY WITH PULSE TRANSIT TIME ANALYSIS FOR THE DIAGNOSIS OF OBSTRUCTIVE SLEEP APNEA IN CHILDREN

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**Objective**

To compare the use of respiratory polygraphy with pulse transit time with polysomnography (PSG) for diagnosing obstructive sleep apnoea (OSA) in children.

**Background**

OSA is an increasingly common condition in children. Yet there is often a gap from referral to diagnosis, with a long wait for the gold standard PSG, and also requires overnight hospital stay. Research has shown home studies namely respiratory polygraphy (RP) lack electroencephalographic leads to identify arousals and thus underestimates the total apnoea hypopnea index (AHI)\(^1\)-\(^2\). Pulse transit time (PTT) has been demonstrated a reliable indicator of cortical arousals\(^3\)-\(^4\) and incorporated with RP in our study to derive an AHI (AHI-'RP+PTT’) for comparison to that derived from the PSG (‘AHI-PSG’).

**Method**

In this study 45 patients were recruited and eligible for PSG and RP from January to December 2019. Data from PSG and RP were scored independently by two accredited sleep technicians according to 2016 American Academy of Sleep Medicine guidelines. The sleep time for the RP study was determined by observation of the sleep technician. A drop in PTT will be used to identify arousals necessary to meet scoring criteria for hypopnoea events. The AHI was the primary outcome compared. Spearman plots are used to demonstrate correlation and Bland Altman plots are used to demonstrate agreement between RP+PTT and PSG.

**Results**

The Spearman plot (r=0.987) and Bland Altman plot (figure 1) demonstrate ‘RP+PTT’ derived AHI had good correlation and agreement to PSG derived AHI. With use of PTT, underestimation of AHI from RP in previous studies was not evident. Comparison showed that the difference of AHI between RP and PSG results of the two one-sided tests showed that the difference was within the equivalence limit of ±1, which was clinically insignificant. There were differences between the PSG and RP obstructive apnoea index (OAI) and total hypopnoea index (THI), however they are not statistically significant.

**Conclusion**

The gold standard for diagnosing OSA remains to be PSG. However, issues such as long referral to diagnostic time, the need for in-hospital manpower and unfavourable sleep environment remains as ongoing challenges particularly in paediatrics, hence exploring the use of home studies. With use of PTT to identify and score hypopneas causing arousals during RP improved the diagnostic accuracy that is comparable to PSG. Good correlation between AHI-‘RP+PTT’ and AHI-PSG demonstrated suggests that RP with PTT can be explored as a promising home diagnostic tool for diagnosing OSA in children particularly with limited resources settings. Further research into home based studies and to include a wider range of conditions should be considered.

**References**

1. Tan HL, Kheirandish-Gozal L, Gozal D. Pediatric home sleep apnea testing: slowly getting there!. Chest. 2015 Dec 1;148(6):1382-95  