07.01 - Paediatric Respiratory Physiology and Sleep

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Automated detection of childhood sleep apnea using discrete wavelet transform of nocturnal oximetry and anthropometric variables

Apnoea / Hypopnea, Children, Sleep disorders

A. Crespo Sedano [1*], **F. Vaquerizo-Villar** [2], **D. Álvarez** [1], **G. Gutiérrez-Tobal** [2], **V. Barroso-García** [2], **A. Cerezo** [1], **G. López** [1], **L. Kheirandish-Gozal** [3], **D. Gozal** [3], **R. Hornero** [2], **F. Del Campo** [1]

[1] Río Hortega University Hospital, Section of Sleep Medicine - Valladolid (Spain), [2] Biomedical Engineering Group, University of Valladolid - Valladolid (Spain), [3] University of Chicago, Section of Pediatric Sleep Medicine - Chicago (USA)

Background. Standard pediatric in-lab polysomnography (PSG) is relatively unavailable and particularly intrusive for children. In low resource settings, nocturnal oximetry has been proposed as a feasible and potentially reliable screening tool for childhood obstructive sleep apnea-hypopnea syndrome (OSAHS), although additional confirmatory evidence is needed.

Aims and objectives. Discrete wavelet transform (DWT) could be a useful tool to characterize fluctuations in nocturnal oximetry. We aimed at designing and assessing a model for detecting childhood OSAHS using anthropometric and DWT features.

Methods. A total of 298 children with clinical suspicion of OSAHS underwent in-lab PSG. A cut-off of 5 events/h was stipulated as confirming OSAHS. DWT was used to inspect the spectral content of oximetry in frequency bands linked with apnea pseudo-periodicity: detail levels D9 (0.024-0.049 Hz) and D10 (0.012-0.024 Hz). Mean, variance, minimum, and

maximum of DWT coefficients were computed. Stepwise logistic regression was employed to build an OSAHS model from DWT, age, gender, and body mass index (BMI) z score. Training (60%) and test (40%) sets were randomly allocated.

Results. Age, gender, D9 mean, and D10 variance were automatically selected. Our model reached 79.1% sensitivity, 81.7% specificity, 4.33 LR+, 0.26 LR-, and 80.5% accuracy in the test set.

Conclusions. Features from DWT coefficients and anthropometric variables such as age provide complementary information that enables detection of moderate-to-severe childhood OSAHS in a high pre-test probability cohort.

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