

P397 | Distinct EEG-EMG-coherence patterns associated with sleep-disordered breathing severity grade

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Objectives/Instruction: We investigated whether using EEG-EMG-coherence (EEC) as a feature fed to a support vector machine (SVM) algorithm may allow staging of disease severity among sleep-disordered-breathing (SDB) patients.

Methods: EEG-EMG-coherence data resulted by applying a multitaper processing for estimating the power spectrums separately and calculating the coherence on raw C3-/C4-EEG- and EMG- chin data of polysomnographic (PSG) recordings of 102 SDB patients (33 female; age: 53, \pm 12,4 yrs) acquired on the second of two consecutive PSG nights in each patient. Four epochs (30 s each, classified manually by AASM 2012- criteria) of each sleep stage (N1, N2, N3, REM) were marked (in total 1632 epochs/night) and were included in the analysis. After multitaper processing, EEC values were fed to a SVM algorithm to classify SDB disease severity based on respiratory disturbance index (RDI). Twenty patients had a mild ($RDI \geq 10/h$ and $< 15/h$), 30 patients had a moderate ($RDI \geq 15/h$ and $< 30/h$) and 27 patients had a severe OSA ($RDI \geq 30/h$). Twenty five patients had a $RDI < 10/h$. The AUC (area under the curve) value was calculated for each receiver operator characteristic (ROC) curve.

Results: EEG-EMG coherence values could distinguish between SDB-patients without OSA and OSA patients of the above three severity groups using an SVM algorithm. Using PSG data of the second night, in mild OSA the AUC was 0.616 ($p = 0.024$), in moderate OSA the AUC was 0.659 ($p = 0.003$), and in severe OSA the AUC was 0.823 ($p < 0.001$).

Conclusions: Grading disease severity in SDB patients can be performed using PSG-based multitaper-processed EEC values processed with a SVM algorithm.

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