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Differences of subcortical structures in patients with nocturnal, diurnal and mixed seizures.

D. Ciolac¹, V. Chiosa¹, M. Muthuraman², N. Koirala², A. Vataman¹, M. Moldovanu³, G. Gonzalez-Escamilla², S. Groppa², S. Groppa¹

¹Neurology and Neurosurgery, Municipal Clinical Emergency Hospital, Chisinau, Moldova, ²Department of Neurology, Neuroimaging and Neurostimulation, University Medical Center of the Johannes Gutenberg University Mainz, Mainz, Germany, ³German Diagnostic Center, Chisinau, Moldova

Background and aims: Sleep and daytime seizures are important pathophysiological models that can be addressed to improve our view on epileptogenic networks. Little is known about subcortical structures as parts of involved networks. We aimed to investigate MRI derived properties of subcortical structures involved.

Methods: 3D MPRAGE, 3T MRI were recorded from 13 patients (age: 25±10.8 years, 9 male) with nocturnal, 12 patients (25±10.1, 3 male) with diurnal and 12 patients (24±5.4, 2 male) with mixed seizures and analysed with Freesurfer for subcortical volumes. Amygdala, hippocampus and thalamus volumes were included into a GLM-ANOVA with factors group and side and post hoc tests.

Results: We identified significant differences in volumes of amygdala and hippocampus between nocturnal and diurnal seizure groups. Amygdala analysis showed significant group difference ($F_{2, 34}=3.772$, $p<0.05$) with post hoc test indicating ($p=0.01$) larger volumes in nocturnal (right/left 1729.1±185.0/1797.3±323.5 mm³) vs diurnal (1490.1±235.1/1500.5±246.2 mm³) seizures. For hippocampus, the analysis showed similar group difference ($F_{2, 34}=3.875$, $p<0.05$), with larger volumes in patients with nocturnal (4713.9±982.1/4421.9±621.0 mm³) vs diurnal (3945.7±618.0/3859.1±508.1 mm³, $p=0.013$) seizures. Amygdala and hippocampus volumes did not differ in comparison to the studied patients with mixed seizures ($p>0.1$). There were no differences of thalamus volume between the groups. There were no differences between groups on epilepsy syndrome types (χ -tests, $p>0.1$).

Conclusion: Our results indicate significant differences in volumes of amygdala and hippocampus between nocturnal and diurnal seizure groups. These differences could endorse the pathophysiological alterations linked to epileptogenesis that provoke different types of sleep and daytime seizures.

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