The Rhythms of Epilepsy

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Epilepsy is a very prevalent chronic neurologic disease characterized by recurrent unprovoked seizures whose pathophysiology is related to uncoordinated neuronal electrical activity. It is known that this disease is influenced by endogenous factors like the sleep-wake cycle and the circadian rhythm. Some studies go as far as proving that epileptic seizures in humans have a circadian rhythm according to the epileptogenic lesion. However, these studies were based in data gathered during hospital admission with the conditionings and modifications of daily routine that are proper of admission, resulting also in the interruption of the intake of antiepileptic medication. Is it possible that this circadian pattern also exists in outpatient care? And if so, would it be related to the patient's daily sleep habits?

The study that 6th year student Ruben Duarte Ferreira is developing at the EEG/Sleep Laboratory of Santa Maria Hospital and at the Clínica Universitária de Neurologia under the orientation of Dr. Carla Bentes and Dr. Ana Rita Peralta seeks to answer some of these questions. Entitled "Study of the circadian pattern of seizures in patients with mesial temporal lobe epilepsy in ambulatory care", this study is included in the 13th "Educação pela Ciência" program promoted by the Office for the Support of Scientific and Technological Research and Innovation (GAPIC) of the Faculty of Medicine of Lisbon. The authors decided to study this subject because it was already known that, in mesial temporal lobe epilepsy, the majority of seizures seem to occur in the afternoon period for patients during hospital admission. However, the studies conducted until today had analyzed only heterogenous groups of patients when it came to the site and type of the epileptogenic lesion. Therefore, and by using a more homogenous group of patients (patients with mesial temporal lobe epilepsy), the authors of this study believe to be contributing to a greater degree of certainty about these processes that determine the possible existence of a circadian pattern of seizures in these patients. But why study this pattern and these patients?
The existence of a circadian pattern for the occurrence of seizures also in outpatient care would have an enormous impact in clinical practice. If its existence were verified, it would be possible to, among other things, establish the differential diagnosis of seizures with different epileptogenic lesions according to their circadian pattern, and to plan complementary exams for more appropriate times. In addition, it would be theoretically possible to schedule medication intakes for moments of the day in which the peak of action of the antiepileptic medication was the most appropriate.

The ongoing study analyzed the seizures of patients with mesial temporal lobe epilepsy followed in regular appointments at Santa Maria Hospital. The hourly distribution already revealed peaks at 16h, 20h and 22h, reinforcing the idea that the number of seizures is greater in awake patients, rather than sleeping patients ($p=0.012$). This and other preliminary data suggest that in patients with mesial temporal lobe epilepsy in outpatient care, as had already been verified during admission, seizures are most likely to occur in the afternoon period. Furthermore, seizures are mainly registered during the day, not coinciding with eventual afternoon naps. This information will contribute to a decrease in the unpredictable character of epileptic seizures in these patients and will also significantly improve their quality of life as well as their everyday safety.

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