

# Electroencephalography at the Thies Regional Hospital Center: Implementation and Assessment at 20 Months of Activity

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## Abstract

**Introduction:** Electroencephalography is a method of recording the bioelectrical activity of the brain. It plays an important role in the exploration, among other things, of epilepsy and vigilance disorders in particular. It was set up in the functional exploration department of the Thiès regional hospital in December 2017. The objective of this work was to take stock of the activities after 20 months of operation.

**Methods:** We carried out a retrospective study of the electroencephalography register between December 2017 and July 2019. We included all patients who were referred during this period for the performance of an EEG, regardless of age, sex and the indication. We collected sociodemographic data, particularly in relation to age, sex, etc., but also the indications and results of the EEG. The data was analyzed with Microsoft Excel.

**Results:** 1454 patients were recorded during the period with 50.41% male versus 49.59% female. The average age of the patients was 18, 16 years with extremes of 11 days and 87 years. The most representative age group was 0-15 years with 56.19% of patients. The main indications were represented by seizures (78.06%), disorders of consciousness and alertness (07.29%), headaches (06.5%) and delays in psychomotor development (03.58%). 76.13% of recordings were waking tracings versus 23.87% sleep tracings. The recordings were normal in 52.07% of cases while, in 47.93%, various focal or diffuse abnormalities were found.

**Conclusion:** The implementation of the EEG in the functional exploration department of the regional hospital of Thiès facilitates access to care. The demand is high and the indications are varied. The abnormalities found, diffuse or focal, can often help to advance in the diagnostic search.

**Keywords:** Electroencephalography; Thiès; Regional Hospital; Functional explorations

## Introduction

Electroencephalography (EEG) is a physiological method of choice for recording the electrical activity of the brain via electrodes

placed on the surface of the scalp. It thus makes it possible to measure the bioelectric activity of the brain, which is produced

by thousands of synchronized neurons [1-5]. The first recording in humans were performed by Hans Berger in 1929. However, it was not until the 1960s with the progress obtained in the field of audio-visual that we witnessed the development of the EEG in the clinic [6]. It plays an important role in the exploration of numerous dysfunctions of the central nervous system, in particular epilepsy and vigilance disorders in general [2]. This technique was set up in the functional exploration department of the regional hospital of Thiès in December 2017. The objective of this work was to take stock of the activities after 20 months of operation.

## Methods

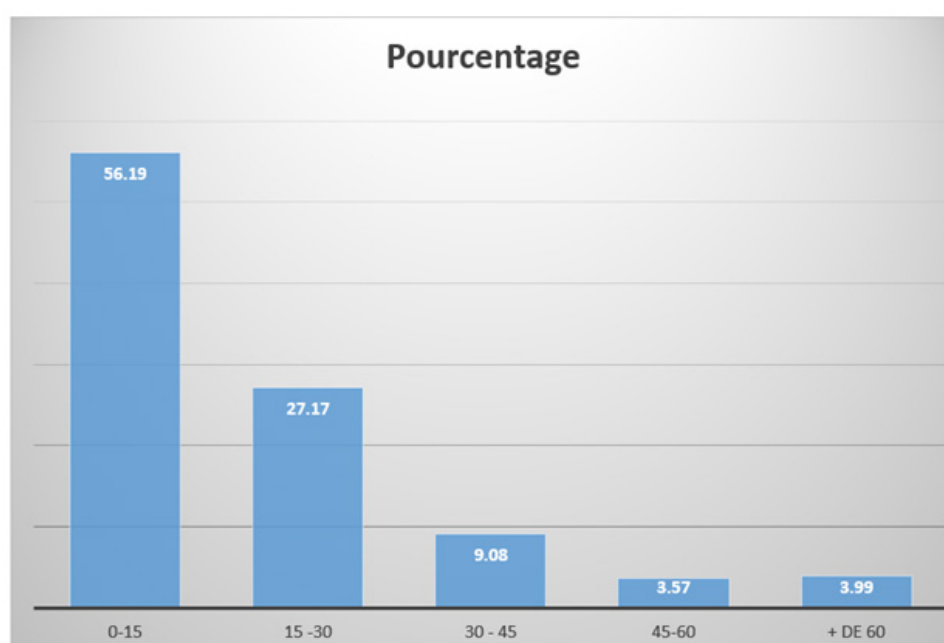
We carried out a retrospective study from the electroencephalography register in which were mentioned all the patients sent for the realization of an electroencephalographic tracing between December 2017 and July 2019. We had therefore included all the patients who benefited from an EEG during the

specified period, regardless of age, gender and indication. From there, we also collected socio-demographic data, particularly in relation to the age, sex, geographical origin of the patients, but also the indications and results of the EEG recording. The data was analyzed with Microsoft Excel 2010.

## Results

### Patients

1454 patients were registered during the specified period, ie approximately 73 patients per month or 18 patients per week or again between 3 and 4 patients per day (for a 5-day working week). There were 733 male patients (50.41%) versus 721 female (49.59%), giving a sex ratio of 1.01 in favor of men. The average age of the patients was 18, 16 years with extremes of 11 days and 87 years. The most representative age group was 0-15 years with 56.19% of patients (Figure 1).



**Figure 1:** Division by age group.

The patients came mainly from the Thiès region (73.36%). The rest of the patients (23.63%) came mainly from the Diourbel region (11.23%) of all patients) but also from several regions of Senegal such as Kaolack, Matam, Saint-Louis, Louga, Kaffrine and even Dakar.

**Table I:** Main clinical indications of the EEG.

Indications	Seizures	Disorders of consciousness and alertness	Headaches	Delayed PM	Others
Numbers	1135	106	88	52	121
Percentage	78,06	07,29	06,05	03,57	08,32

(PM: psychomotor development)

### EEG tracings

- Clinical indications

The main indications were represented by seizures (78.06%) followed by disorders of consciousness and alertness (07.29%) (Table I).

- Tracings types

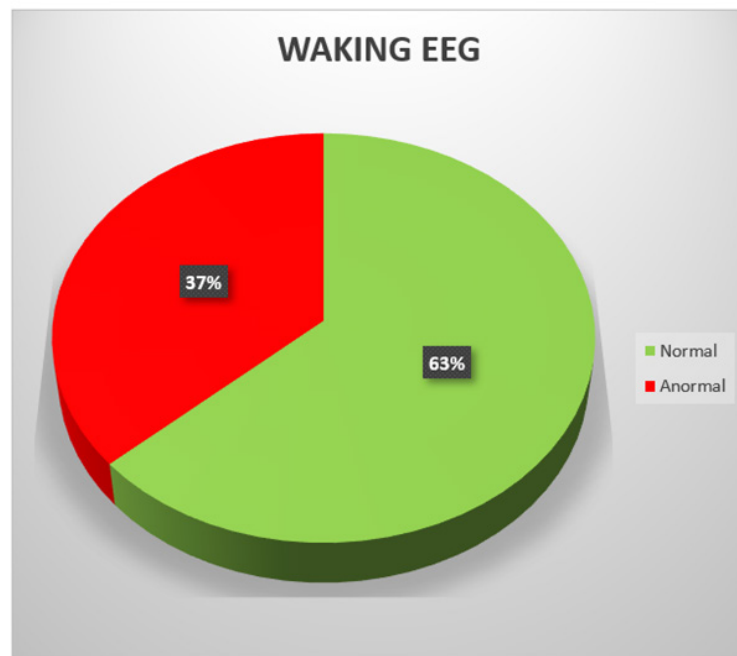
Awake tracings accounted for 76.13% of recordings compared to 23.87% sleep tracings.

- Results of EEG

The waking tracings taken in isolation were normal in 37% of

the cases while the sleep tracings were only normal in 16% of the cases (Figures 2 and 3).

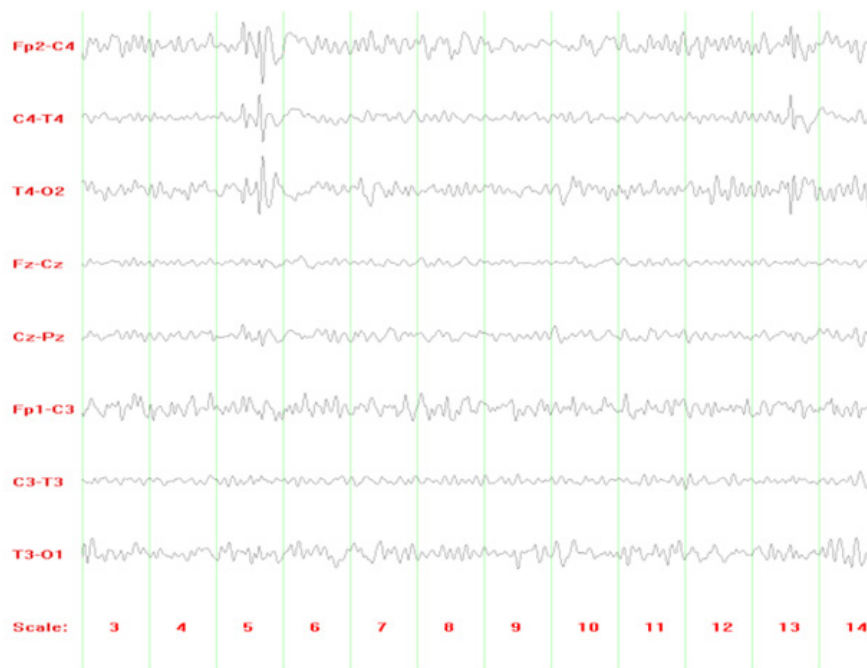
Recordings taken globally (regardless of type) were normal in 52.07% of cases, while in 47.93% various focal (Figure 4) or diffuse (Figure 5) abnormalities were found.



**Figure 2:** Results of waking tracings.



**Figure 3:** Results of sleeping tracings.



**Figure 4:** Example of focal anomalies: Right centrotemporal spikes in relation to epilepsy with rolandic paroxysms (RPE) in a 6-year-old female child who presented with partial motor seizures.



**Figure 5:** Example of diffuse abnormalities: more or less slow and diffuse spike-waves, in favor of a Lennox-Gastaut syndrome, in an 8-year-old child, sex M, who presented with severe and frequent seizures with delayed psychomotor development.

## Discussion

### Patients

The number of patients registered during the study period (1454) attests to the importance of the demand. Slightly more than three out of four patients came from the Thiès region. Despite this

predominance of Thiès, several other regions of Senegal fueled this demand for EEG, thus shedding light on the urgent need to improve the technical platform in the interior of the country. When the EEG is not available in towns as large as those of the Kaolack region in the center of the country, with an estimated population of 1,228,746 inhabitants [3], this really raises the more global problem of access

to care in general and diagnostic tools in particular. In terms of gender, there was a slight male predominance. Lagunju et al also found the same male predominance in their series of EEGs in which all patients were recorded for suspected epilepsy [7]. However, it is known that in the majority of series of epileptic patients, there is a male predominance [13, 12]. The importance of epileptic patients in our series (78.06%) could then somehow explain the very slight male predominance.

Our patients were young with an average age of 18, 16 years and 56.19% of them were under 16 years old. This youthful population conforms to the age pyramid which, in a country like Senegal, is very broad at the base. Moreover, it is reported that the average age of the Senegalese population is 19 years old with a median age of 18 years [3].

### EEG tracings

The indications of the EEG were largely dominated by epileptic seizures. Indeed, in Senegal, as in many developing countries, epilepsy is a public health problem with a prevalence of 14 per 1000 [10]. Factors such as endogamy, consanguinity and various problems related to maternal and child health could explain this prevalence of epilepsy [8,9]. Even if significant advances have been made in Senegal in terms of maternal and child health, the fact remains that nearly 25% of children under five do not receive all the basic vaccines and a little less half of these same children, in case of fever for example, do not receive any advice or treatment. In the same vein, nearly 25% of births still take place without the assistance of qualified personnel [1]. Concerning the type of EEG, a little more than three out of four EEGs were waking tracings. On the other hand, in the Diamutene's series, 59% of the recordings were spontaneous sleep tracings [5]. The difference could be explained by the fact that, in our laboratory, the rule was in general to make waking recording. Sleep tracings were mostly reserved for specific indications.

Our results taken as a whole showed normal tracings in 52.07% of cases; which is quite close to the 57.4% of Tekle-Haimanot et al [13]. On the other hand, in 47.93% of the cases in our study, the results were abnormal, showing then diffuse or focal anomalies, of an irritative nature or not. This proportion of abnormal results highlights the role of the EEG in aiding diagnosis in our locality. Diamutene found a much higher percentage of abnormal EEGs (89%), but in his series the majority of recordings were sleep tracings; and, the activating role of the sleep EEG is known, particularly in epilepsy, with activation rates varying from 31 to 63% according to the authors [11, 4]. This same role explains that the sleep tracings, taken in isolation in our study, showed an abnormal EEG percentage of 84%. This percentage, still in our study, decreased to 63% when only the wakeful tracings were considered.

### Conclusion

The implementation of the EEG in the functional exploration department of the regional hospital of Thiès facilitates access to care because many patients no longer have to travel to Dakar for this examination. Demand is high, fueled even by other regions

of Senegal, apart from Thiès. The indications are varied. The abnormalities found, diffuse or focal, are significant and often help to advance in the diagnostic process.

### Acknowledgement

None.

### Conflict of Interest

The authors declare that they have no conflict of interest in relation to this work.

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