Study of Seizures in Children and their Correlation with EEG and Various Types of Ring Lesions Found on Cranial CT

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Abstract
Introduction: Seizures is one of the most common neurologic disorders seen in children, with the highest incidence in the first year of life. Electroencephalography and neuroimaging can be critical in determining etiology and syndrome.
Objectives: This study aimed to assess the clinical profile of children having seizures including its type and its correlation with EEG and various types of ring lesions found on cranial CT and also to assess the cases showing ring lesions on cranial CT of enhancing and non enhancing types.
Methods: A prospective observational study was conducted over two years at Sarawathi Institute of Medical Sciences, involving 150 infants meeting inclusion criteria. A detailed clinical history and physical examination was obtained from each patient and their parents, to find out previous episodes of seizures and were subjected to various investigations.
Results: Among the 150 infants studied, 55.4% of low birth weight infants and a significant portion of high-risk infants experienced hypoglycemia within the first 48 hours. Factors such as birth weight, gestational age, and maternal health significantly influenced glucose levels.
Conclusion: The study highlights the prevalence of hypoglycemia in exclusively breastfed high-risk newborns, emphasizing the need for targeted monitoring and early intervention strategies to optimize neonatal health outcomes.

Keywords: Seizure, Epilepsy, Neurocysticercosis, Tuberculoma

Introduction

In paediatric practice, seizures are a common occurrence, with approximately 5% of children enduring seizures until they reach the age of five. The frequency decreases with age, with younger children experiencing the highest occurrence.
Some researchers have been using the terms "seizures" and "epilepsy" interchangeably, which has caused misunderstanding. While epilepsy affects everyone who has it, not everyone who has seizures also has epilepsy.
Excessive nerve-cell discharges in the brain cause a seizure. It is described as an abrupt anomalous function of the body, frequently accompanied by altered or lost consciousness, excessive or decreased muscle activity, unusual feeling, or abnormal autonomic behavior. Excessive nerve-cell excitation or discharges can cause partial seizures if they stay localized in a small area of the brain, or they can cause generalized seizures if they extend over the entire brain and spinal cord. There is a broad range of clinical manifestations observed since these discharges might differ not only in location but also in severity and extent. Another name for a seizure is an assault, convulsion, or fit. However, seizures with tonic-clonic muscular movements are typically referred to as fits or convulsions.
Many illnesses can result in seizures, and when this is the case, a clinician frequently needs to order multiple studies to identify the underlying cause of the seizures. In a situation like this, one of the often-used tests to try and determine the cause of the

problem is cranial computed tomography (CT). Although the origin of seizures is unknown in a number of cases, cranial CT scans reveal ring lesions in a significant proportion of patients. Although there may be several of these lesions in the supratentorial area of the brain, they are typically observed as a single, tiny, well-defined ring lesion. Although some of these lesions may not enhance at all, most of them do so when seen in contrast. Many illnesses, including tuberculomas and neurocysticercosis (NCC), may be the source of these ring lesions. Pyogenic abscess, histoplasmosis, blastomycosis, sarcoidosis, post-infectious vasculitis, primary and secondary brain tumors, and vascular abnormalities are a few more unusual causes.

There is a positive link between the results of the CT scan and the clinical findings for partial seizures with predominant motor presentation. There is a demonstrable greater incidence of structural cause, particularly in the form of neurological infections. CT scans are a vital imaging modality that should be examined for all children exhibiting motor manifestations of partial seizures due to their high diagnostic yield and incremental therapeutic relevance

Our study was designed to assess the role of CT scan and EEG in children who have partial seizures, as we have a significant number of such children. In light of the aforementioned information, we carried out this study to ascertain the contribution of both EEG and CT scan to the etiology of partial seizures in our locality as well as the frequency of partial seizures involving abnormalities in both parameters—CT scan or EEG—and the frequency of partial seizures involving only one of the parameters.

Material and Methods

The study was conducted at the Department of Pediatrics**,** Saraswathi Institute Of Medical Sciences, Hapur, Uttar Pradesh**.** 150 children ranging between 1 year & 18 years, presenting with different types of seizures from September 2022 to June 2024 were taken up for the study coming to OPD(Out Patient Department) & IPD(In Patient Department) in Saraswathi Institute of Medical Sciences , Hapur, UP.

150 children ranging from 1 year and 18 years, presenting to OPD (Out patient Department) and IPD(In Patient Department) with different types of seizures from September 2022 to June 2024 were taken up for study

It was an Observational Prospective Study

After taking clearance from Institutional Ethical committee, this descriptive study was done in children presented with clinical evidence of seizures with first episode attending Pediatric OPD and IPD in Saraswathi Institute of Medical Sciences September 2022 to June 2024.

A detailed clinical history and physical examination was obtained from each patient and their parents, to find out previous episodes of seizures.

The following investigations were carried out for all patients:

Blood examination

Urine routine and microscopic examination

Tuberculosis screen

Stool examination for evidence of Taenia solium infection

EEG

Results

Majority (63.33%) of the patients was between 5 and 12 years of the age and (17.33%) patients were below the 5 yr of age.

Gender distribution, shows that male & female patients are almost equal in number.

Distribution of patients by religion depicted Hindu patients outnumbered Muslim patients, the latter constituted a significant part.

As is clear, complex partial seizures was the most common type of seizure, observed in 52.6% of the patients and after that generalized seizures was the second commonly observed type in 29.03% of the patients enrolled in our study.

Frequency of seizure in patients shows majority (49.3%) had a single episode of seizures.

Majority of the cases had a duration of the seizures between 5-10 minutes, observed in 65.33% of the patients.

Other symptoms observed were also noted. Majority of the children complained of headache (31.33%), followed by vomiting then vomiting and headache.

Majority (54.66%) of patients were vegetarian by diet but there is no history of pork eaters among the non-vegetarian group.

As found on general examination, pallor was the most frequently observed sign (58.66%).

A large number (80%) of the patients are normal, but majority of the cases showed no central nervous system (CNS) abnormality.

Majority (42.6%) of patients had a single enhancing lesion on CECT. Majority of the patients had perilesional edema (42.0%) followed by calcification. Majority of the patients (50.66%) were diagnosed as a case of Neurocysticercosis followed by NAD.

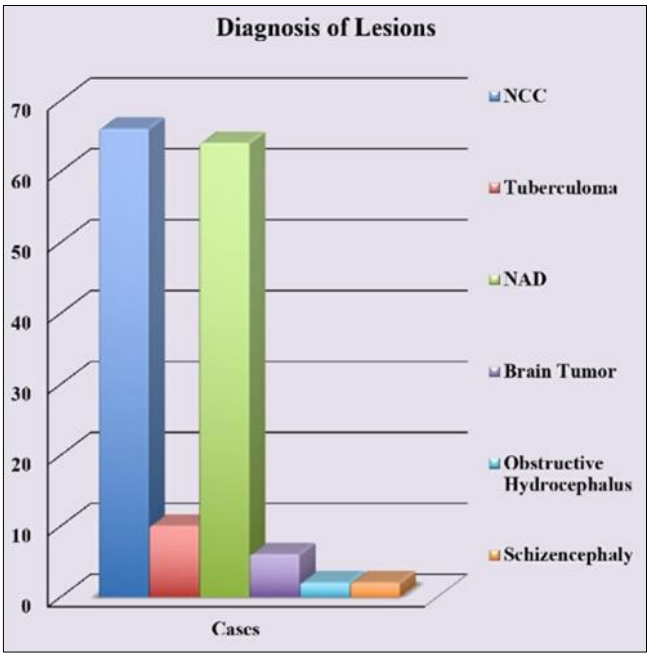

Fig 1

Discussion

The present study focused mainly on two aspects, viz. profile of children having seizures and secondly, the ring lesions found on radiological imaging, along with their correlation with the types of seizures. The finding of the study are discussed below.

Majority (63.33%) of the patients was between 5 and 12 years of the age and (17.33%) patients were below the 5 yr of age. In a study by Adhikari *et al*, maximum cases of seizures were seen in an age group of 11-15 years. Another study by

Bhaskar *et al*, of 50 cases of the seizures found that the most number of children were encountered in the age group of 6 to 10 yrs. In a study by Shrestha *et al*, the age of patients varied from 2.6 years to 14 years with the mean age of 10.6 years and the peak age of 12 years. Another study done in the West by Duggan *et al*, on 440 children ranging from 1 to 18 years showed that the majority were less than 10 years old. This shows that the age distribution in our study was not much different from the other studies on this subject.

Gender distribution, shows that male & female patients are almost equal in number. As studied by Jain *et al*, of the 172 of the northern Indian children with seizures, 65.11% were male and 34.88% were female. Another study by Adhikari *et al*, was done in 94 patients, in which 61.3% were male and 38.7% were female.

Distribution of patients by religion is depicted shown in table 15. Though Hindu patients outnumbered Muslim patients, the latter constituted a significant part. A study done in north India by Kumar *et al*, also stated that most of the patients belonged to Hindu religion.

Majority (54.66%) of patients was vegetarian by diet but there is no history of pork eaters among the non-vegetarian group. In a study by Kumar *et al*, out of 79 children with seizures, vegetarians were 73.4% and non-vegetarian 26.6%.

Frequency of seizure in patients, shows majority of the patients (49.3%) had a single episode of seizures. Previous researchers had given different results. Duggan *et al*, studied 440 seizure patients, among these, 23% had single episode of seizure while 8% had more than two seizures per day.

The most common type of seizures in our study were complex partial seizure. In a study done in north India by Kumar *et al*, out of 74 children admitted with complaint of seizures, (70.3%) had partial complex seizures, followed by generalized seizures (17.6%) and simple partial seizures (9.5%).

We can conclude that the observations of our study in this regard are similar to most of the previous workers that partial seizures were the most common type.

Other symptoms observed in the patients are shown in table 19. Majority of the children complained of headache (31.33%), followed by vomitting then headache and vomiting.. In a study by Bhattacharjee *et al*, the complaint of headache and vomiting was found in 63.2%, focal neurodeficit in 10.5% and combination of symptoms in 60.5% cases. Therefore, it can be said that our results are more or less similar to the result of other workers.

A large number (80%) of the patients are normal, but majority of the cases showed no central nervous system (CNS) abnormality. Another Indian study by Dhamija *et al*, conducted on 58 cases of the seizures reported papilloedema in 24 cases and nerve palsy in 3 cases and pyramidal signs in 4 cases. Study by Puri *et al*, on 27 cases of childhood neurocysticercosis, reported papilloedema in 48.1% of the cases pyramidal signs in 25.9% cases and nerve palsy in 11.1% of the cases. Thus, while in the respect of the papilloedema, our results are comparable with other workers, other neurological signs were very few in our study, for instance, We could find cranial nerve palsy (7^{th} nerve) in one case only.

Conclusion

The study was conducted at the Department of Pediatrics, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh. 150 children ranging between 1 year & 18 years, presenting with different types of seizures from AUGUST 2022 to JULY 2024 will be taken up for the study coming to OPD(Out Patient Department) & IPD(In Patient Department) in Saraswathi Institute of Medical Sciences , Hapur, UP

The aims & objectives of the study were to study the clinical profile of children having various types of seizures, subject them to investigations including the cranial CT, and to study the correlation between the clinical profile and radiological lesions including their type, number and size.

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