Section: Radiology

Original Research Article

A STUDY OF MAGNETIC RESONANCE IMAGING FINDINGS IN CHILDREN OF 1-12 YEARS PRESENTING WITH FIRST EPISODE OF UNPROVOKED SEIZURE

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Abstract

Background: To study the MRI findings in children of 1-12 years presenting with first episode of unprovoked seizure. **Materials and Methods:** It is a Cross sectional, observational study for a period of 1 year from April 2021 to March 2022 at Pediatrics Intensive Care Unit (PICU), Department of Pediatrics, 26 Children aged 1-12 years presenting with first episode of seizure. MRI brain was done for all the children included as early as possible once the child is fit for shifting to MRI. Detailed clinical information of each patient along with details of neuro imaging was recorded in a pre-designed proforma. If the children had underwent Electro Encephalogram (EEG) for clinical indications, those EEG findings was also be noted. **Result:** In this study of 26 patients, majority of the children were of 5-10years age (42.3%) followed by 2-5 years (34.6%), and 10-12 years (11.5%) and < 2 years (11.5%) age groups. This study population had 57.7% female children and 42.3% male children showing a female predominance, 1 patient had Focal seizures and the rest had GTCS. 26 children with seizures, EEG was done in 19 patients, and 13 patients had normal EEG patterns (50% of study population). 6 children (23.1%) had abnormal EEG patterns. The mean age of this study population is 72.04(6years) months with minimum age of 1.5 years and maximum age of 11 years 3 months. The mean birthweight in this study population was 2.89 Kg. The mean PMNs, Lymphocytes, Monocytes and Eosinophils are 55.04%, 40.46%, 2.46% and 2.12% respectively. The mean Na+ levels of this study population was 141mmol/L. The mean blood glucose levels of this study population was 129 mg/dL. The mean ionized calcium levels in this study population was 1.21. In this study of 26 children with first episode of seizures. 24 children had normal MRI study. **Conclusion:** Use of MRI and a standardized reliable and valid scoring system demonstrated a higher rate of abnormal findings than previous investigations, including findings that might have been considered incidental in the past. Practice parameters may need to be revised to expand the definition of significant abnormalities and to support wider use of MRI in children with newly diagnosed seizures.

INTRODUCTION

Seizure is defined as transient occurrence of signs and or symptoms resulting from abnormal excessive or synchronous neuronal activity in the brain. Approximately 4-10% of children experience at least one seizure (febrile or afebrile) in the first 16 years of life. Approximately 30% of patients who have a first afebrile seizure later develop epilepsy.[1] Overall annual prevalence of epilepsy in Indian population is estimated to be around 0.5 – 1%. Traditionally epilepsy was defined as 2 or more unprovoked seizures occurring in a time frame of longer than 24 hours. Recent understanding lead to a new concept of epilepsy as in tendency to have recurrence even after single episode of seizure. The first episode of

unprovoked convulsions in children are usually ignored by many pediatricians and are treated by giving symptomatic management without working up for any tendency to recur. Because of which some cases might get missed, which might later progress to epilepsy.

Early identification and timely intervention of recurrent seizures will prevent ongoing neuronal damage. Magnetic Resonance Imaging (MRI) is a valuable adjunct to the assessment of these children.[2]

Epilepsy might arise due to a number of causes which can be grouped into genetic, structural, metabolic, immune, infectious, or unknown categories, of these structural causes form a major chunk. MRI is the preferred neuro-imaging study for the evaluation of a child with seizures. MRI is more sensitive than Computed Tomography (CT) for detecting structural brain malformations and dysplastic lesions as well as subtle temporal lobe pathology particularly in hippocampus, a common site of seizure onset.[3] Currently there is limited data available on MRI changes in children presenting with first episode of seizure. Therefore this study was planned to find out various MRI changes in children with first episode of unprovoked seizures.

MATERIALS AND METHODS

It is a Cross sectional, observational study for a period of 1 year from April 2021 to March 2022 at Pediatrics Intensive Care Unit (PICU), Department of Pediatrics, SVRR Government General Hospital, Tirupati. 26 Children aged 1-12 years presenting with first episode of seizure.

It is assumed that the prevalence of the common structural abnormality, Ventricular enlargement based on the Kalnin et al,[3] study (2008) was 51%3. Taking this prevalence estimate of 51%, the sample size was estimated at 95% confidence interval with a 25% of error of estimate using the below formula.

Where N is the required sample size.

Zα is the 2 tailed Z value for the given alpha error (0.05) at 95% confidence intervals = 1.96

P is the assumed prevalence of ventricular enlargement =51 Q is given by (100- P) = (100-51) = 49

L is the allowable error fixed as 20% by the investigator By substituting the values, we get

= 23.99 (rounded to 24)

Assuming a non-response rate of 5%, the adjusted sample size is calculated

as 26. Thus, the actual sample of 26 is adequate for estimating structural abnormalities of first episode of unprovoked seizure in the current study.

Inclusion Criteria

Children aged 1-12 years presenting with first episode of unprovoked seizure with in the past 3 months.

Exclusion Criteria

Children presenting with seizures with associated history of fever, trauma, toxin ingestion. Children with cerebral palsy, mental retardation and other pervasive developmental disorders.

All the children presenting with first episode of unprovoked seizure were screened for inclusion in this study, those found eligible will be enrolled after obtaining an informed consent from the guardian. MRI brain was done for all the children included in the study at SVRRGGH, Tirupati as early as possible once the child is fit for shifting to MRI. Detailed clinical information of each patient along with details of neuro imaging was recorded in a pre-designed proforma. If the children had underwent Electro Encephalogram (EEG) for clinical indications, those EEG findings was also be noted.

MRI was performed on 1.5 Tesla Philips ingenia machine available in SVRRGGH, Tirupati. A standardized pediatric seizure protocol will be followed. Various abnormal features on MRI Brain include volume loss, leukomalacia/gliosis, other white matter lesion like encephalomalacia, heterotopia, cortical dysplasia, grey matter lesions, mass lesion, increased or decreased (restricted) diffusion, hemorrhage, and vascular lesion. Locations are classified by lobe, hemisphere, and periventricular region, as well as cerebellar, brainstem, or generalized.

RESULTS

57.7% female children and 42.3% male children showing a female predominance. 26 patients, majority of the children were of 5-10years age (42.3%) followed by 2-5 years (34.6%), and 10-12 years (11.5%) and < 2 years (11.5%) age groups. 1 patient had Focal seizures and the rest had GTCS.

Table 1: Demographic distribution

Variable	Number of cases	Percentages
Male	11	42.3
Female	15	57.7
Total	26	100.0
Age of patient		
< 2 years	3	11.5
2-5 years	9	34.6
5-10 years	11	42.3
10-12 years	3	11.5
Seizure type		
Focal(RT)	1	3.8
GTCS	25	96.2

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Table 2: EEG and weight birth

EEG	Number of cases	Percentages
Abnormal	6	23.1
Normal	13	50.0
Not done	7	26.9
Birth Weight		
<2.5Kg	2	7.7
>2.5Kg	24	92.3

In this study population of 26 children with seizures, EEG was done in 19 patients, and 13 patients had normal EEG patterns (50% of study population). 6 children (23.1%) had abnormal EEG patterns.
In this study population 24 children had their birth weight >2.5kg and 2 children had birthweight <2.5Kg.

Table 3: Age and gender association in present study

			SEX		Total
			Male	Female	
Age Distribution	< 2 years	N	2	1	3
		Percentage	18.2%	6.7%	11.5%
	2-5 years	N	4	5	9
		Percentage	36.4%	33.3%	34.6%
	5-10 years	N	4	7	11
		Percentage	36.4%	46.7%	42.3%
	10-12 years	N	1	2	3
		Percentage	9.1%	13.3%	11.5%
Total		N	11	15	26
		Percentage	100.0%	100.0%	100.0%

Females were predominant in all age groups exepts <2years age. Howeever the distribution is statistically not significant. The chi square statistic is and p value is 0.800.

Table 4: Age Vs Length and Weight

Age Distribution		LENGTH	WEIGHT
< 2 years	Mean	76.00	9.267
	N	3	3
	Std. Deviation	4.000	1.1015
2-5 years	Mean	93.56	12.611
	N	9	9
	Std. Deviation	9.180	2.8812
5-10 years	Mean	123.64	22.091
	N	11	11
	Std. Deviation	8.394	3.2390
10-12 years	Mean	139.00	26.667
	N	3	3
	Std. Deviation	2.000	1.5275
Total	Mean	109.50	17.858
	N	26	26
	Std. Deviation	21.801	6.5650
	P value	<0.0001	<0.0001

The distribution of length and weight and Age are statistically significant with p value <0.0001.

Table 5: EEG Vs Hematological parameters

EEG		HB (GM S)	TC	P%	L%	M%	E%	PLT (L)	NA+	Blood Glucose (mg/dl)	Ionized Calcium
Abnormal Mean N Std. Deviation		10.067	8536.67	57.50	37.67	2.67	2.17	2.2667	143.83	121.83	1.1167
		6	6	6	6	6	6	6	6	6	6
		1.2863	1580.907	10.114	10.250	1.366	1.169	.45461	3.656	26.970	.13924
Normal Mean N Std. Deviation		10.654	8899.23	52.85	42.31	2.77	2.31	2.2808	140.69	137.46	1.2615
		13	13	13	13	13	13	13	13	13	13
		1.4163	2496.165	7.163	7.899	1.092	1.032	.78344	3.449	41.938	.21782
Not done	Mean	11.671	8784.29	57.00	39.43	1.71	1.71	2.9029	142.57	121.57	1.198
	N	7	7	7	7	7	7	7	7	7	7
	Std. Deviation	1.3238	2396.260	13.292	12.674	.951	.756	.87816	3.505	27.085	0.093
Total	Mean	10.7	8784.	55.0	40.4	2.4	2.1	2.44	141.	129.58	1.211

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		92	62	4	6	6	2	50	92		
	N	26	26	26	26	26	26	26	26	26	26
	Std. Deviation	1.43 78	2211. 411	9.61 9	9.66 7	1.1 74	.99 3	.775 49	3.62 1	35.077	0.179
	P Value	0.11 6	0.950	0.52 6	0.60 9	0.1 41	0.4 57	0.19 2	0.18 7	0.537	0.266

The distribution of mean Hb, TC, PMN, Lymphocytes, Monocytes, Eosinophils, Platelet N, Sodium levels, Blood glucose levels and ionized calcium levels with EEG findings in our study population was statistically not significant.

In our study of 26 children with first episode of seizures. 24 children had normal MRI study.

Two children had Neurocysticercosis.

One had neurocysticercosis in left frontal lobe and the other had in bilateral temporal and parietal lobe.

Table 6: Comparison of MRI findings with EEG

		MRI Finding			
		Neurocysticercosis		Normal	
		N	%	N	%
EEG	Abnormal	0	0.0%	6	25.0%
	Normal	0	0.0%	13	54.2%
	Not done	2	100.0%	5	20.8%
The Chi square statistic is 5.881 and p value is 0.053					

In the patients with MRI showing Neurocysticercosis EEG was not done. The correlation between the two is not significant.

Table 7: Age distribution among various studies

Study	Country	Age, years (mean ± SD or mean [range])
Chen et al4	China	9.8±3.5
Sun and Zhou et al5	China	7.26±1.62
Zhang et al6	China	6.82±2.79
Liu et al7	China	7.6±2.6
Borggraefe et al8	Germany	8.7±1.7
Huang and Zhu9	China	6
Hu et al10	China	7.0±2.1
Levisohn et al 11	USA	10.6±3.5
Our Study	India	6 years

Table 8: Gender distribution among various studies

Study	Country	Sex (M/F)
Chen et al4	China	58/45
Sun and Zhou5	China	20/14
Zhang et al6	China	56/52
Borggraefe et al8	Germany	15/6
Huang and Zhu9	China	11/16
Hu et al10	China	22/18
Levisohn et al 11	USA	39/25
Our Study	India	11/15

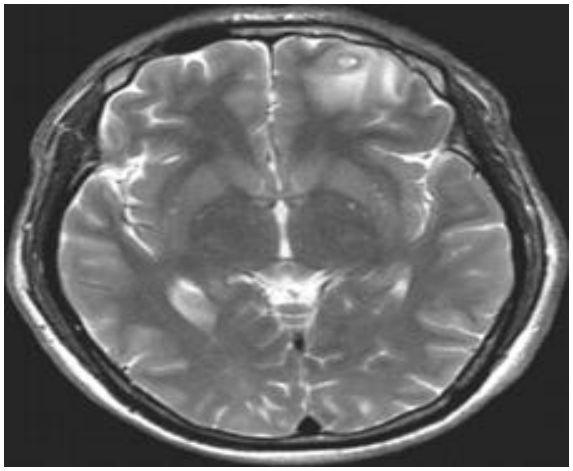

Figure 1: MRI showing Neurocysticercosis in left frontal lobe

DISCUSSION

In our study age-related distribution of cases was done into 4 groups: newborns, toddlers, pre-schoolers, children aged 2 to 5 years, and children aged 6 to 12 years. In our analysis of 26 patients, the bulk of the children were aged 5 to 10 years (42.3%), followed by 2 to 5 years (34.6%), 10 to 12 years (11.5%), and 2 years (11.5%). It implies that the start of seizures occurs more frequently between the ages of 5 and 10.

These results were in line with the findings of a research by Chen C. Y. et al,[4] who discovered that the peak age at which seizures begin is between 1-6 years. In a research conducted by Metsarnata P et al, the mean age of seizure start was 4.5 3.10 years. The SIRE study's overall occurrences for all ages were

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lower than the 51– 74/100,000 reported in previous studies from Europe and the US, and this was especially true for the elderly group. The SIRE research indicated a slightly higher age-specific incidence for infants under one year.[5-12]

88 females, or 44.4 percent, were included in the Berg AT et al,[13] primary analytic sample (N = 198). Average ages at the beginning of the first unprovoked seizure (onset) were 3.7 years (SD 2.2 years) and 4.3 years, respectively (SD 2.1 years). In this study, the mean age at which the first seizure occurred was 6 years old, which is consistent with other studies conducted throughout the world.

Out of the 26 patients evaluated, 15 (51.3%) were female and 11 (48.7%) were male. Patients who were female were more numerous than those who were male, suggesting that females were more likely than men to experience seizure disorders (female: male = 1.36: 1). These results were in line with research done by Metsarnata P et al,[12] where the female to male ratio was 1.08:1, Sidenvall et al,[14] the male to female ratio was 1.1:4,. A select few research, including those who reported a majority of men in their investigations.

None of the 26 children in our research developed birth asphyxia. They were all born to folic acid-treated moms. Additionally, none of the children had a history of epilepsy. In the participants in this investigation, there were no neurocutaneous markers found. The results of a research by Murthy et al.[15] indicated that 50% of all CT brain scans performed had brain lesions discovered. NCC was the most typical brain lesion found using a CT scan (21 in 36 cases; 58.3 percent).

In the 26 children of this research who had a brain MRI, two cases were found to be abnormal and had neurocysticercosis. These results were in line with a research by Sudhir Adhikari et al., in which 111 (45.9%) of 242 patients had abnormal brain imaging, with neurocysticercosis being the most prevalent abnormality in 66 (59.5%) instances. As a result, neuroimaging proved useful in the diagnosis of NCC. In a research by Andrew Kalnin3 involving 281 kids, 87 (31% of the total sample size) showed at least one MRI anomaly. 34 youngsters (12%) were found to have two or more anomalies. The MRI abnormalities in forty children (14%) were deemed noteworthy because they were thought to be possibly etiologically connected to the seizure disease.

In this study, 19 individuals had EEGs performed, of which 6 had aberrant results and 13 had normal results. A 10% anomaly in FUS cases was found in retrospective investigations by Khodapanahandeh in Iran and Alawaneh in Saudi Arabia, despite the fact that in their research there was no differentiation between brain CT scan and MRI in their patients. 16 Five brain haemorrhages, a brain tumour, tuberous sclerosis, SLE, ischemia, an arachnoid cyst, and ADEM were all found in one individual in Khodapanahandeh's five-year research from 1999 to 2004. In another investigation, Shlomo discovered 21% anomaly. Additionally, he discovered that six instances with normal brain CT scans exhibited migration anomalies in subsequent MRIs. He also advised brain imaging for FUS patients.[16] Although Beverly discovered EEG localised abnormality and proposed that these abnormalities may be utilised as a marker for brain imaging, our research found no significant connection, which Jason also validated. Similar to Daniel and Beverly, Andrew Kalnin detected abnormalities in 31% of the patients' imaging studies and advised imaging for all FUS cases.

According to follow-up information and statistics, 50% of FUS patients experienced just one seizure and none that were unrelated to the underlying brain abnormalities. However, discovering aberrant brain is important for better patient care. The participants in Khodapanahandeh's research ranged in age from one month to fifteen years (54.4 percent female, 45.6 percent male). 53 months was the median age. Shinnar conducted a 10-year prospective research with 411 instances and 218 cases with FUS imaging (53 percent). 159 brain MRIs and 159 CT scans. Only 45 instances (21%) of 218 patients exhibited aberrant results, which was a lower percentage than in our study (27/1%) However, none of our instances required surgery, but four of these cases required prompt surgical intervention owing to brain tumours. According to Kings, 12.7% of FUS cases indicated MRI imaging abnormalities in the brain that were likewise less severe than what was really discovered. Bano stated in 2010 that the primary goal of imaging in FUS is to identify structural or metabolic abnormalities that require particular therapy. Although the sensitivity is just 30%, he advised using a CT scan in an emergency. In research conducted in 2008 on 281 individuals (aged 6 to 14), Kalnin found that 31% of the atypical cases had at least one brain lesion, with 12% having two or more lesions. Contrary to what we discovered, the most prevalent lesions were ventriculomegaly (51 percent), gliosis (23 percent), dysplasia or heterotopias (12 percent), brain atrophy (12 percent), white matter disease (9 percent), and encephalomalacia (6 percent).[3]

This research population's average temperature was 98.50 F. These results contrasted with those of a research by Nguefack S et al,[18] who discovered that the average temperature for febrile convulsion upon admission was 39.2°C, or around 102°F. As a disease of poverty and underdevelopment, NCC is now the main cause of convulsions in India and all developing nations. Over the past ten years, serological testing and neuroimaging have made significant advancements in the identification of NCC. NCC was discovered to be the main cause of convulsions in India by Kumar Garg R et al.[19] According to Nguefack et al,[18] 50% of the research group's malaria infections resulted in febrile convulsions.

Shakya KN et al,[20] investigation's produced similar findings as well. 50 Of the 150 instances, partial seizures were seen in 40 (26.6%), of which 12 (31% of the cases) were simple partial seizures and 28 (70%) were complicated partial seizures (CPS). In

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research by Sudhir Adhikari and colleagues,[21] they discovered that partial seizures happened in 19.7% of patients.

One example of focal seizures was found in our investigation, while the remaining 25 patients all experienced GTCS. Situation-related seizures were present in 75.6 percent of cases in a research by Feyzullah et al,[22] symptomatic generalised epilepsy was present in 18.6 percent of cases, and cryptogenic epilepsy was present in 5% of patients. Additionally, they discovered that within the study group, situation-related seizures were present in 45% of cases, symptomatic epilepsy was present in 36% of cases, idiopathic seizures were present in 10% of cases, and cryptogenic epilepsy was present in 9% of instances.

Murthy et al,[15] discovered that in the study group, cryptogenic generalised epilepsy was present in 49 percent of patients, symptomatic generalised epilepsy was present in 48 percent of cases, and idiopathic generalised epilepsy was present in 3 percent of cases. According to Sidenvall et al,[14] the study group was comprised of 42 percent of cases with symptomatic generalised epilepsy, 28 percent with idiopathic generalised epilepsy, and 30 percent with cryptogenic generalised epilepsy. Previous research on seizure disorders points to LRE as the primary aetiology in the studied population. In these research, LREs were discovered by Murthy et al,[15] to be present in 48 percent of the research group's participants. We advise neurophysiologists and epilepsy experts to skip some of the background material.

The mean ionic calcium value in this research was 1.21. The mean ionised calcium levels in the study by Niranjan et al,[23] were 4.62 0.26 mg/dl and 4.88 0.27 mg/dl, respectively, and this difference was determined to be statistically highly significant (p 0.001). There are insufficient studies in the literature linking serum calcium in kids with febrile seizures.

Two recent studies have found a connection between having an MRI lesion and later, ongoing seizures. In a study on temporal lobe epilepsy, a lesion on an MRI was the only independent predictor of seizure outcome. In a report on partial seizures, the early MRI results were also prognostic of the outcome. These research projects and our findings support the hypothesis that some (more or less distinct) imaging abnormalities associated with a poor prognosis in childhood-onset epilepsy already present at the time the condition initially appears. This is a major argument in favour of continuing outcome studies on seizures that start in infancy into adulthood. An increased risk of recurrent seizures has been associated with abnormal neuroimaging after a first seizure. In children with new-onset epilepsy and localization-related or distant symptomatic seizures, imaging examinations are aberrant in 50% of cases, according to a review of 18 papers by the ILAE Subcommittee for Pediatric Neuroimaging. In research using neuroimaging, 8.5% of children with new-onset seizures who presented with status epilepticus had emergent cerebral illness. On the other hand, individuals with focal seizures are more likely to have abnormal brain magnetic resonance imaging (MRI) with a lesion that is "probably epileptogenic" in 28% of cases in adults with new-onset seizures. What qualifies as a "potentially epileptogenic" lesion is unclear. The epileptic seizure has been defined as being caused by a lesion, although this language generates more problems than it does answers because it can be difficult to establish the likelihood of causality. Among the several epileptogenic lesions that have been well-documented are tumours, localised cortical dysplasia, vascular abnormalities, and hippocampal sclerosis. It is estimated that MRI is more reliable than computed tomography (CT) at detecting these and other abnormalities nearly 13% of the time. The cumulative probability of seizure recurrence at one year varies between 41 and 48 percent in patients with normal neuroimaging and between 54 and 65 percent in patients with epileptogenic lesions, regardless of imaging modality. Patients who have had their first seizure should undergo neuroimaging in order to rule out epileptogenic abnormalities that might raise the likelihood of recurrence and make an accurate epilepsy diagnosis. The interaction of this variable with other factors, such as the passage of time after the original event, is very important.

In a research by Umap et al,[24] 100 individuals in total exhibited abnormal MRI results in 89 patients (89.0%). Hypoxic ischemic encephalopathy (HIE) affects 31.5 percent of study participants, whereas infection affects 25.8 percent of participants. 13.5 percent of patients had a developmental malformation. Each of the causes of phakomatosis and mesial temporal sclerosis had five cases (5.6 percent). Neoplasm, other causes, and demyelinating disorders each had four patients (4.8 percent). Three patients had vascular causes (3.3 percent). Inherited metabolic diseases, which only had one case, were the least prevalent (1.1 percent).

In the research by Umap et al,[24] all four patients with mesial temporal sclerosis had hippocampal shrinkage and secondary changes (dilatation of the temporal horn). In 75% of patients, there was hippocampal architectural loss, and in 66.7 % of patients, there was hippocampal T2, FLAIR hyperintensity. 12 individuals suffered developmental anomalies. In 4 individuals, focal cortical dysplasia predominated (33.3 percent). 3 individuals (25.0%) each for corpus callosal dysgenesis/agenesis and polymicrogyria were present. Two individuals (or 16.7%) had pachygyria, whereas one patient (8.3%) each had heterotopia, hemimegalencephaly, holoprosencephaly (Lobar), microcephaly with simplified gyral pattern, and hemimegalencephaly. Four individuals (33.3%) had many diseases. Five Phakomatoses patients were included in the research; three (60.0%) had Tuberous sclerosis, one (20.0%) had Sturge-Weber disease, and one (1 patient) had Neurofibromatosis (20.0 percent). Seven individuals in our research tested positive for tuberculosis. The

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majority of them (71.4%) had tuberculomas, which were then followed by leptomeningeal enhancement (57.1%), infarcts (28.6%), tuberculous abscess (14.3%), and communicating hydrocephalus (14.3%).

In this investigation, 28 individuals had anoxia and HIE. 12 patients (42.8%) were term and 16 patients (57.2%) were preterm. Leukomalacia was the most prevalent of the neuroimaging findings, appearing in 17 patients (60.7%), followed by cystic alterations in 12 patients (42.8%), white matter volume loss in 9 patients (32.1%), and intracranial haemorrhage in 1 patient (3.5 percent).

Haemorrhage was the most frequent result in this research, occurring in 16 individuals (35%) and was followed by periventricular leukomalacia in 13 patients (28.8 percent). This could be because, in our department, the majority of haemorrhage cases are discovered during ultrasound screening in patients with a history of prenatal asphyxia, leading to fewer referrals for MRI. In this analysis, there were 23 patients with infectious etiologies; the most prevalent of these were TB (7 patients, or 30.4%), neurocysticercosis (6 patients, or 26%), encephalitis (3 patients, or 13.0%), meningoencephalitis, and pyrogenic abscess (2 patients) (8.7 percent). One patient (4.3%) each had meningitis (not tuberculous), subdural empyema, and TORCH infection

In contrast to the Zajac A et al.25 research, which included 45 children, our investigation found that only 2 patients (or 4.4 percent) developed brain tumours. One patient had hypothalamic hamartoma, whereas the other had DNET. In our investigation, MRI results in 3 individuals were indicative of a vascular origin. One (33.3%) of them had a venous infarct, whereas 2 (66.7%) of them had arterial infarcts (excluding tuberculous and including moya moya illness). This research does not agree with that of Wongladarom S et al,[26] who found that 5 individuals with vascular disorders had epilepsy (5 percent). One patient had bilateral carotid occlusion, two patients (40 percent) had Moya-Moya disease, one (20 percent) had a cavernous angioma, one (20 percent) had an arteriovenous malformation, and one (20 percent) had the remaining conditions. 89 participants of 100 total patients in our research had abnormal MRIs. Anoxia and HIE was the most frequent cause, found in 24 individuals (45.2 percent), out of a total of 53 patients in the age range of 0 to 3 years, followed by infection in 10 patients (18.8 percent). Seven individuals had developmental abnormalities, which were also most prevalent in this age range (13.2 percent). The most frequent cause was infection, which was found in 3 patients (25.0%), 3 patients (37.5%), and 7 patients (43.7%) out of a total of 12 patients in the age groups 4-6 years, 8 patients in the age groups 7-9 years, and 16 patients in the age groups 10-12 years.

CONCLUSION

Use of MRI and a reliable, valid standardized scoring system in a large sample of children following their first recognized seizure identified a high rate of abnormalities , which may have important implications for practice guidelines with this population. First, some findings that might have been regarded as incidental in the past appear to be present at the onset of seizures and might therefore be clinically significant.

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