



Role of MRI in Seizure Disorders in a Tertiary Care Hospital of South Rajasthan

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Introduction

Epilepsy was first recognised by Hughlings Jackson in the 19th century. In 1873, he proposed that seizures were the result of sudden brief electro-chemical discharges in the brain. He established that the character of the seizures depended on the location and function of the site of the discharges.

The imaging of epilepsy has vastly changed since the end of the 20th century. Prior imaging with computed tomography (CT) scanning infrequently revealed the pathologic substrate for epilepsy⁽¹⁾. MR imaging has revolutionized the evaluation of epilepsy. It is superior to CT for detection of structural abnormalities. Early low-field strength MRI increased the diagnostic yield but it could identify only neoplasms, encephalomalacia and vascular malformation⁽²⁾.

The ILAE has suggested that seizures should be classified etiologically⁽³⁾. MRI has emerged as a powerful tool towards directing treatment, both medically and surgically when a lesion is precisely identified. High-resolution MRI has significantly increased the diagnostic accuracy.

MRI can assist in classification, determine prognosis, predict long-term intractability to antiepileptic medications⁽⁴⁾ and can also identify potential surgical candidates. This has helped in the evaluation and management of epilepsy.

Physiologic imaging by SPECT and PET provides information that is complimentary to MRI, however they are less specific than the focus defined MRI. Though there have been studies pertaining to etiologies, diagnosis and management of epilepsy, few Indian studies have described the wide spectrum of MRI findings that occur in patients belonging to varied age groups and presenting with epilepsies due to a variety of underlying identifiable etiologies.

The role of MRI in epilepsy has been evaluated through research in different contexts. Newly diagnosed epileptic patients on anti-epileptic drugs had higher risk of seizure recurrence if there was an associated lesion detected on MRI.

The role of MRI in detection of focal abnormalities in patients with drug resistant hypermotor seizures⁽⁵⁾.

In a study of volumetric assessment of temporal lobes revealing that patients with temporal lobe epilepsy have significantly lower volumes as compared to those of normal participants.

Hence our study aims at determining whether a structural abnormality of the brain exists, to define its location and extent. And to evaluate and discuss the importance of MRI as the primary imaging modality in patients presenting with seizures. Also it will identify the cause of convulsions (if any) in the sample selected as shown on imaging.

Material and Methods

This study is based on 100 patients who presented with more than one episode of seizures at our institute.

Inclusion Criterion

- Patients with more than 1 seizure episode.
- Patients with any other systemic disease along with it.

Exclusion Criterion

- Patients already having 'lesional MRI'.

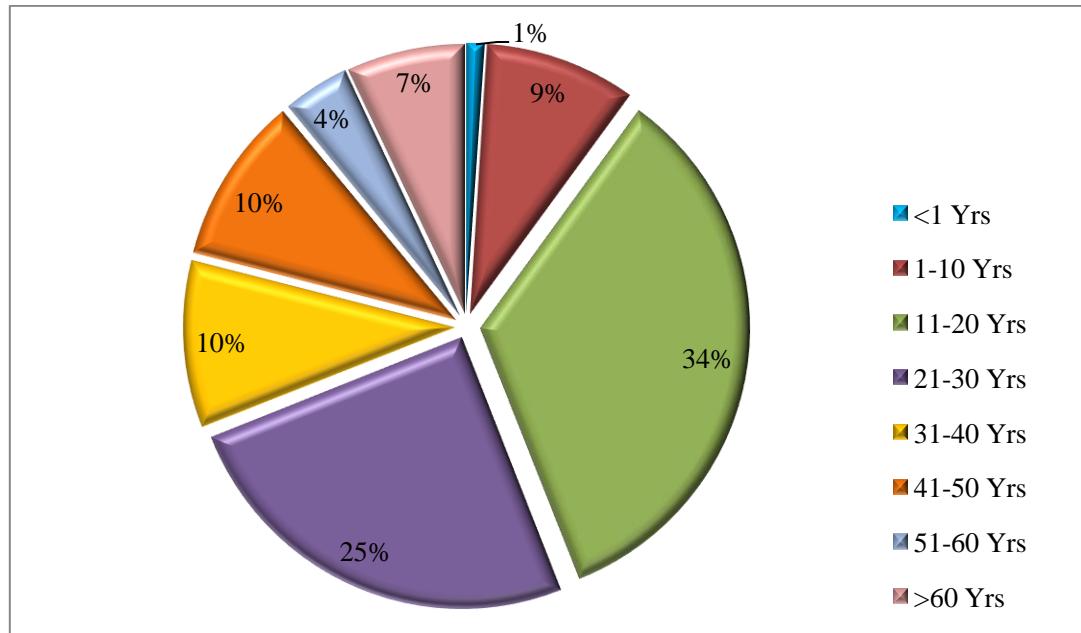
The imaging reports were reviewed. The neuroradiological findings were classified as normal and abnormal. The abnormal finding was classified as infarction, haemorrhage, tumours, trauma, malformations of cortical development, vascular malformation, infection, hippocampal sclerosis and nonspecific lesions.

The MRI seizure evaluation protocol currently in place was performed on a Siemens Magnetom Avento 1.5 Tesla scanner: Axial T1W, T2W, DWI and ADC, Sagittal T1W, coronal T2W, FLAIR and GE sequence images were obtained. Post contrast T1W images were taken as and when needed.

Data was filled in special data sheet and was correlated to the Imaging findings. Our study does not require any interventional procedure.

Results

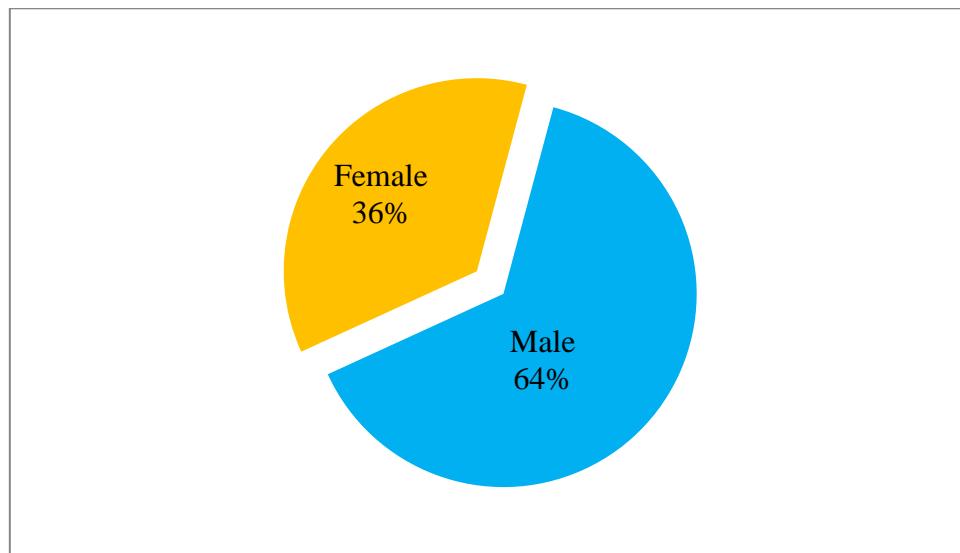
Figure 1: Age distribution in the study group



The above graph shows the age distribution in the study group with the maximum no. of patients is 34% in the age group of 11-20 years.

Table 1 : Sex distribution in the study group

Gender	No.	Percent
Male	64	64%
Female	36	36%
Total	100	100%

**Figure 2:** Graph showing sex distribution in the study group.

The above table and graph show the sex distribution in the study group with 64 % patients

with epilepsy being male and 36% patients being female.

Table 2: Distribution of MRI findings in the study group

Finding on MRI	No. of patients	Percentage
Acute Infarct	2	2%
Chronic Infarct	0	0%
Chronic Ischemic Small Vessel Disease/ Ischemic Lesions	6	6%
Cystic Encephalomalacia / Gliosis	16	16%
Hydrocephalous	7	7%
Haemorrhage/ Micro Bleeds	3	3%
Thrombosis	0	0%
Hypoxic Injury	0	0%
Meningitis	2	2%
Encephalitis	2	2%
Foci Of Demyelination	2	2%
Edema	16	16%
Arterial/Venous Malformation	1	1%
Granulomas	5	5%
Ring Enhancing Lesion/Edema	9	9%
Atrophy	9	9%
Neoplasms	9	9%
Mesial Temporal Sclerosis	10	10%
Developmental Malformation	8	8%
Others	7	7%
Normal	38	38%

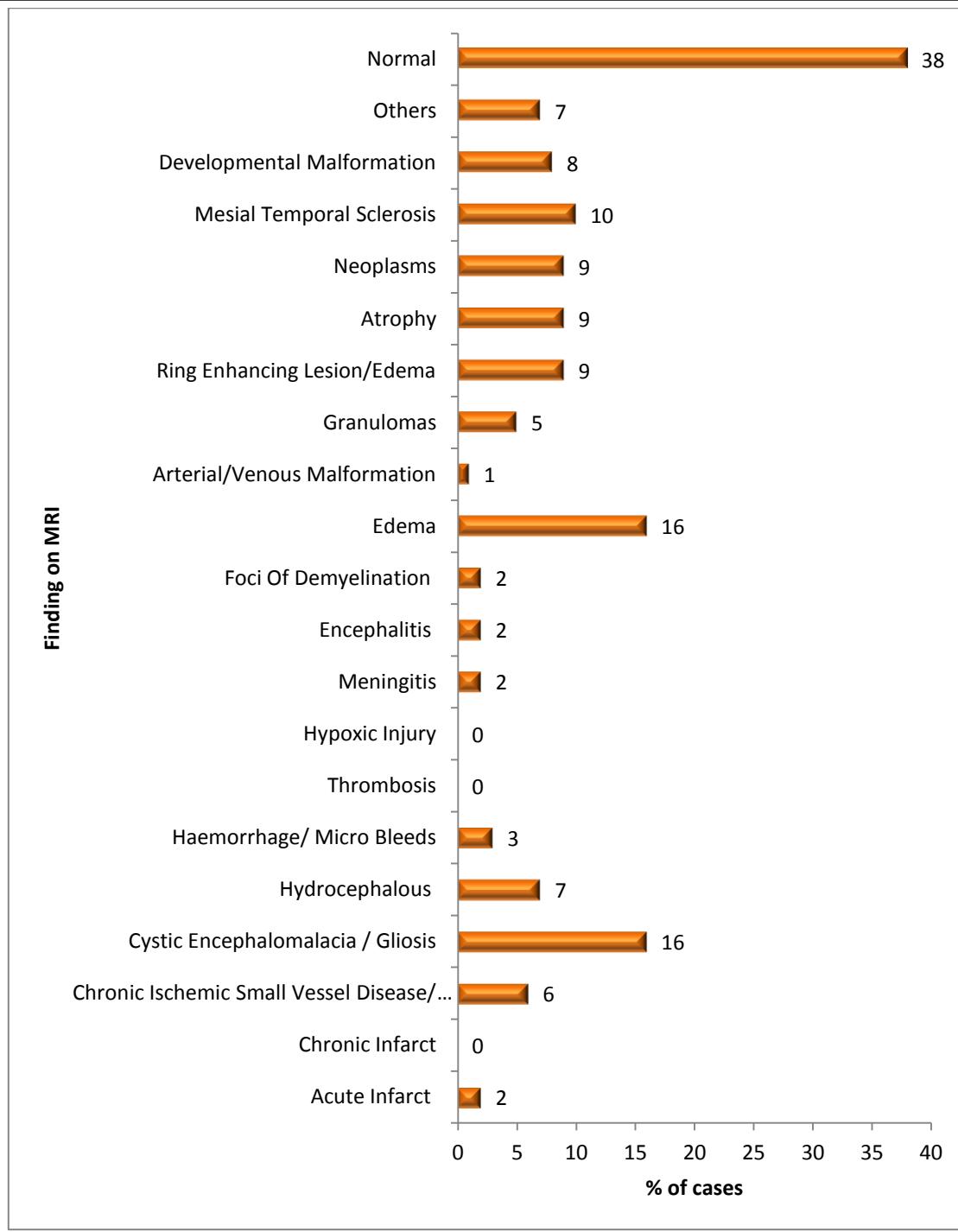


Figure 3 : Graph showing distribution of MRI findings in the study group.

The above table and graph show the distribution of MRI findings in the study group with MRI showing normal findings in 38% and abnormal findings in 62% patients with epilepsy. Out of the MRI showing abnormal findings the most common findings were edema in 16%, cystic encephalomalacia /gliosis in 16 %, mesial temporal sclerosis in 10%, ring enhancing lesions, neoplasms and atrophy in 9% each.

Discussion

In the present study patients presented with different types of seizures with the maximum number 28% of the total were of generalized tonic clonic type.

The maximum number of patients 34% were in the age group of 11-20 years. There was a male predominance with 64% males and 36 % females.

The MRI examination revealed pathological findings in 62% out of the 100 patients which

included acute infarct in 2%, chronic infarct in 0, cystic encephalomalacia with adjacent gliotic changes in 16%, chronic ischemic small vessel disease in 6%, tumors in 9%, hydrocephalous in 7%, developmental malformations in 8%, granuloma in 5%, ring enhancing lesions in 9%, demyelinating lesions in 2%, vascular malformations in 1%, haemorrhage/micro bleed in 3%, thrombosis in 0, meningitis in 2%, encephalitis in 2%, mesial temporal sclerosis in 10%, atrophy in 9%, edema in 16%, hypoxic injury in 0 and others in 7% patients.

Summary and Conclusion

Epilepsy is a major public health problem in developing countries like India with millions of people having no access to appropriate treatment. High-resolution MRI has significantly increased the diagnostic accuracy.

In patients with epilepsy of longer duration, we expect to see both the etiology of the seizure disorder as well as the effect of the seizure disorder on brain to be reflected in the MRI findings; which is in contrast to the findings of the present study.

This may emphasize the importance of using MRI machines with higher resolution like 3 Tesla and onwards and also using advance or hybrid studies like functional MRI/ PET-MRI/ MR spectroscopy in patients with epilepsies of longer duration/ idiopathic epilepsies.

Suggestions and Implications

Every patient having seizure disorder should undergo a MRI brain and if required contrast study also as Epilepsy is a major public health problem in developing countries like India, with incidence rates as high as around 60 per 1,00,000 per year compared to those reported in developed countries.

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