PREVALENCE OF NEUROIMAGING ABNORMALITIES IN CHILDREN WITH NEW ONSET AFEBRILE SEIZURES IN TERTIARY CARE HOSPITAL

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ABSTRACT

BACKGROUND

Seizures are the most common Paediatric neurological disorder with worldwide prevalence of 10.5 million children under 15 years have active seizures. The role of neuroimaging in children presenting with first non-febrile seizure is still not well-defined. The American Academy of Neurology states that these evidences are not sufficient to make a commendation at the level of guideline for the use of routine neuroimaging in children with a new-onset seizure. But in developing countries like India, where the incidence of CNS infections like neurocysticercosis and tuberculoma are common the data is insufficient about role of neuroimaging.

AIM

To know the prevalence of neuroradiological abnormalities in first episode of unprovoked afebrile seizures.

MATERIALS AND METHODS

This was a prospective study done over periods of 24 months involving 80 patients. The statistical analysis was performed by using SPSS-20 version and MS-Excel 2007.

RESULTS

Neuroimaging was performed in 80 patients, and abnormalities were found in 75% of cases and 25% were normal. Most common neuroimaging abnormality observed was NCC (49%) followed by tuberculoma (23%).

CONCLUSION

This study concludes that neuroimaging should be considered for even first episode of unprovoked seizures.

KEYWORDS

Unprovoked Seizures, Neuroimaging, Neurocysticercosis, Tuberculoma.

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INTRODUCTION

Seizures are the most common Paediatric neurological disorder with 4 to 10% of children, who suffer at least one seizure in the first 16 years of life.⁽¹⁾ In the developing world, its onset is more common in older children and young adults due to the higher rates of trauma and infectious diseases.⁽²⁾ Worldwide, it was estimated that 10.5 million children under 15 years have active seizures representing about 25% of the global seizure population. Of the 3.5 million people who develop seizures annually, 40% are younger than 15 years and more than 80% live in developing countries.⁽³⁾ The seizure incidence rates reported from India were higher and reached 60.0 per 100000 person-years.⁽⁴⁾ The role of neuroimaging in children presenting with first non-febrile seizure is still not well-defined. Based on several studies, the prevalence of abnormal neuroimaging in paediatric patients with a new-onset non-febrile seizure is estimated to be 0% to 21%.^(5,6)

There is lack of data that has looked at Neuroimaging in all children after a first afebrile, unprovoked seizure from developing countries, where the incidence of CNS infections are common and causes for an apparent unprovoked afebrile seizure may be different from Western World. The aim of our study is to know the prevalence of neuroradiological abnormalities in first unprovoked seizures in afebrile children.

MATERIALS AND METHODS

Children in the age group of 6 months to 16 years who presented to the Department of Paediatrics, GSL Hospital, with the symptoms of first episode of afebrile seizures were evaluated prospectively. Cases with first episode of afebrile seizures that came to Paediatrics Department during the period between September 2012 and July 2014 were taken (Sample- 80 patients). Detailed history was taken and seizures categorized according to the Classification proposed by International League Against Epilepsy (ILAE) 2006. Thorough clinical examination was performed to detect any abnormality in the nervous system. Diagnosis was verified by Neuroradiological tests (MRI).

Inclusion criteria is the 1st episode of afebrile seizures, age group 6 months–16 years and exclusion criteria is past h/o seizures, seizures with fever, meningitis, encephalitis, CNS malformations. Primary diagnosis other than seizures were excluded. The purpose of this study was explained to the parents/guardian and written consent was taken prior to the study. Permission was obtained from the Independent

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Ethical Committee of GSL Medical College before starting the study. The statistical analysis was performed by using SPSS-20 version and MS Excel - 2007. Variables were reported as mean $\pm$ SD. Chi-square test was performed to determine the correlation. P value of <0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

A total of 80 cases presented within one week of throwing seizures; 18 (22.5%) cases were simple partial, 33 (41.3%) cases were complex partial and 4 (5%) cases were partial seizures with 2^o generalization, 25 (31.3%) cases were generalized seizures respectively (Table 1). Maximum number of seizures presented in age group between 5-9 yrs. 38.8% (n=31) followed by 9-13 yrs. 26.6% (n=21). (Figure 1). Out of 80 cases, abnormal neuroimaging is seen 60 cases (75%) in which highest number of abnormal neuroimaging is seen in 5-9 years (41.7%), followed by 30% in 9-13 years. Normal neuroimaging is seen in 25% cases.

There is significant correlation seen between age and neuroimaging ($p < 0.05$) (Figure 2). Abnormal neuroimaging observed in 60 (75%) patients out of total 80 patients. Abnormal neuroimaging observed in 37 patients (52.54%), out of 51 patients with partial seizures. Abnormal neuroimaging observed in 23 patients, out of 29 patients with generalized seizures (Fig. 3). Highest number of abnormal neuroimaging are due to neurocysticercosis 48.8% (n=39), followed by tuberculoma 22.5% (n=18), CNS tumours (n=2) namely medulloblastoma and astrocytoma, CNS malformation (n=1) namely porencephaly (Table 2).

Out of total 60 abnormal neuroimaging findings NCC are 39, in which single lesions are seen in 34 cases, multiple (>2 in no) in 5 cases, 16 are calcified, 14 are non-calcified. Ring enhancement in 18 cases. Seizures were more on the right side; 3 cases were localized to the face. Seizures involving all the four limbs associated with loss of consciousness in 25 (31.3%) cases. The MRI scan shows localization to the parietal lobe in 54% of these cases. Seizures were mainly single in number in 51 (53%) cases and multiple (>2) in number in 5 (8.25%) cases. The associated symptoms were mainly headache in 25 (31%) cases, vomiting in 22 (27.5%) cases, loss of consciousness in 30 (37.3%) cases, deviation of mouth in 63 (78.6%) cases. Muscle weakness in 30 (31.2%) cases and automatism in 4 (5%) cases.

Patients presenting with 1st episode afebrile seizures showed very few clinical signs even after a thorough neurological examination, speech abnormality, dysarthria in 4 (5%) cases, ptosis in 2 (2.5%) cases, facial weakness in 12 (15%) cases, raised ICT in 2 (2.5%) cases. Papilloedema in 2 (2.5%) cases. Only one case presented with status epilepticus, duration of convulsion mainly ranged from 10 to 15 minutes with the loss of consciousness from 1 to 2 hours. Signs of raised ICT was seen only in 2 cases. (Obstructive hydrocephalus + Bil. papilloedema). Immunization with BCG was given in total 60% cases; 60 (75%) cases belong to grade I malnutrition, 15 (18.75%) cases belong to grade II malnutrition, 5 (6.3%) cases belong to grade III malnutrition.

Head circumference was appropriate for the age in all cases. CBP showed that 20 cases had eosinophilia, out of which neurocysticercosis was detected on neuroimaging in 6 cases and tuberculoma identified in 5 cases: remaining 9 cases had MRI scan normal study. ESR was raised in 6 cases.

Mantoux test was positive in 19 cases 6 cases showed ring enhancing, 1 showed an infarct and other had an obstructive hydrocephalus on MRI scan. There has been observed significant relation between Mantoux testing and neuroimaging ($p < 0.05$). X-ray Chest: Only 2 cases had paratracheal haziness; 32 gave a history of eating pork. There is significant increase in ring enhancing lesions diagnosed as neurocysticercosis in pork eaters (58.1%) ($p = 0.02$). Though cysticercosis has been reported to be higher among non-vegetarian people, especially pork eaters, many (27%) of our patients were pure vegetarians, thereby supporting the fact that faeco-oral contamination is also a major route of the disease.

Seizure Type	Frequency	Percent
CPS	33	41.3
GTCS	25	31.3
Sec GTCS	4	5.0
SPS	18	22.5
Total	80	100.0

Table 1: Seizure Type Incidence

Neuroimaging Findings	Frequency	Percent
Astrocytoma	1	1.3
Medulloblastoma	1	1.3
NCC	39	48.8
Normal	20	25.0
Porencephaly	1	1.3
Tuberculoma	18	22.5
Total	80	100.0

Table 2: Abnormal Neuroimaging Causes

DISCUSSION

Approximately, 4–6% of children are expected to have a seizure by the age of 16 years. The role of emergent neuroimaging for children with a new-onset afebrile seizure is not well understood; this is because the prevalence of neuroimaging abnormalities in this group has yet not been determined. However, regarding the results reported in the literature for adults, there has been a relatively high prevalence (Between 34–45%) of CT scan abnormalities in adults with a new seizure. As a result, a recommendation has been published to perform neuroimaging in a large population of adults having their first seizure.⁽⁷⁾ Practice parameters, which have been recently published recommend neuroimaging to be performed in a child of any age.⁽⁸⁾ Our study enrolled 80 patients with their first afebrile seizure.

All patients with simple or complex febrile seizures as well as those with recurrent seizures were excluded. Neuroimaging was performed in 80 patients and abnormalities were found in 75% of cases and 25% were normal. The results showed that there was a significant relationship ($P < 0.05$) between age and seizure type. In our study, most patients, i.e. 38.8% belong to age group of 5–9 years. This observation is in accordance with other studies done including all age groups, which states that the majority of the patients were below the age of 20 years. In our study, male sex (55%) is more affected than female sex (45%).

In a study conducted by Chaoshuang, et al from China found that the urban population is at a higher risk than the rural population.⁽⁹⁾ Similar observations seen in urban populations in two Brazilian studies were 86.2% and 93.8%, which showed urban population are at greater risk than rural population.^{(10),(11)} In a study conducted by Rajshekhar et al, who studied active epilepsy as an index of burden of Neurocysticercosis in Vellore District, India, found that the prevalence in urban clusters was more than twice in the rural cluster (6.23 vs. 3.04 per 1000).⁽¹²⁾ Contrast to the current

literature and studies, our study has a high percentage of rural patients (74%), probably related to poor hygienic conditions and higher amount of faecal contamination of drinking water in the rural areas. Cysticercosis is a disease of low socioeconomic conditions associated with poor hygiene and sanitation and poor safe drinking water. In a study conducted in Kerala, Kuruvilla et al found that 73% patients belonged to low socioeconomic category.⁽¹³⁾ In similar two studies conducted from Chandigarh, 69% and 82.7% of the patients were of low socioeconomic strata.^(14,15) Majority (72.5%) of the cases in the our study were of lower socioeconomic class. Hence, our results are similar to other Indian studies.

The commonest MRI abnormality observed were Neurogranulomas was seen in 57 (71.2%) cases in our studies. Shipra Mathur et al study conducted in North India, which showed prevalence of abnormal neuroimaging was 32%, although our study result are greater than stated prevalence of Shipra Mathur et al.⁽¹⁶⁾ Most common neuroimaging abnormality observed was NCC (49%) followed by tuberculoma (23%), which are similar to Shipra Mathur et al which was compatible with Sharma et al and Mayatal et al's studies.⁽¹⁷⁾ In our study lesions were mainly single (53%) and are more common than multiple lesions, which is agreeable with most other Indian studies. Most of them, 21 (36%) had lesion localized to the parietal lobe with absent-to-moderate perilesional oedema. Parietal lobe has been found to be the most common site of single lesion neurocysticercosis.

CONCLUSIONS

Incidence of neuroimaging abnormality in children presenting with first afebrile seizure is high in developing countries like India, due to the high prevalence of neurocysticercosis and tuberculosis. So neuroimaging should be considered in any child with first afebrile seizure.

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