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Original Research Article

Neuroimaging studies in children aged 6 months to 16 years with new onset afebrile seizures

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ABSTRACT

Background: Seizures are the most common pediatric neurological disorder. With this a study was conducted to determine the frequency of abnormal neuroimaging in children aged between 6 months to 16 years with new onset afebrile seizures.
Methods: Study was conducted in the department of pediatrics, GSL Medical College. Children aged six months to sixteen years, presented with the symptoms of first episode of afebrile seizures were included in the study. After through clinical examinations, findings were recorded, and all the participants underwent imaging studies such as CT and MRI. And the findings were recorded. $p<0.05$ was considered statistically significant.
Results: Total of 80 participants were included in the study; in this, 22.5% (18) had simple partial, 41.3% (33) had complex partial and 5% (4) had partial seizures with 20 generalization and 31.3% (25) had generalized seizures. Seizures were more common among non-vegetarians ($p<0.05$). Bain CT shows localization to the parietal lobe in 54% of these cases.
Conclusions: Neurocysticercosis and tuberculoma are common causes of seizures. Although cysticercosis incidence is greater in pork eaters, but vegetarians shouldn't be excluded. Studies on large sample size for long time are recommended.

Keywords: Abnormal, Aged, Children, Incidence, Neuroimaging, Seizures

INTRODUCTION

Seizures are the most common pediatric neurological disorder. Nearly 4 to 10% of children suffer at least one seizure in the first 16 years of life.[1] Seizures and epilepsy affects infants and children more than any other group.[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% were 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 per 100000 per years.[4] The role of neuroimaging in children presenting with first nonfebrile seizure is still not well-defined. Based on several studies, the prevalence of abnormal neuroimaging in pediatric patients with a new onset nonfebrile 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 is common, and causes for an apparent unprovoked afebrile seizure may be different from western world.

With this a study was conducted to determine the frequency of abnormal neuroimaging in children aged between 6 months to 16 years with new onset afebrile seizures.

METHODS

Study was conducted in the Department of Pediatrics, GSL Medical College, from September 2012 to July 2014. Study protocol was approved by the Institutional Ethics Committee; informed written consent was taken from the parents of all the study participants. Children aged six months to sixteen years, presented with the symptoms of first episode of afebrile seizures were included in the study.

Patients with history of seizures, seizures with fever, meningitis, encephalitis, known idiopathic case of epilepsy/CNS malformations and primary diagnosis other than seizures were excluded. After through clinical examinations, findings were recorded, and all the participants underwent imaging studies such as CT and MRI. And the findings were recorded.

Statistical analysis was done by using SPSS 21 version. Variables were reported as Mean±SD. Chi-square test was used to find the correlation, $p<0.05$ was considered statistically significant.

RESULTS

Total of 80 participants were included in the study; in this, 22.5% (18) had simple partial, 41.3% (33) had complex partial and 5% (4) had partial seizures with 2o generalization and 31.3% (25) had generalized seizures. Seizures were more common among non-vegetarians ($p<0.05$). Bain CT shows localization to the parietal lobe in 54% of these cases. In 51(53%) cases seizures were single in number and multiple in 5(8.25%) cases. A case of epilepticus was seen one (1.04%) due to multiple neurocysticercosis in left frontal region.

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 new onset of 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 of CT scan abnormalities. With this, an emergent neuroimaging is performed in adults having their first seizure.[7] It was reported in the literature, that prevalence of abnormal neuroimaging in children with afebrile seizures was ranged between 0-21%.[5] And the febrile seizures were ranged between 17%-71%.[5,6] It was mentioned that children with febrile seizures, either simple or complex, are at low risk of neuroimaging abnormalities.[8]

Age wise, abnormal neuroimaging was detected in 6.7%, 16.7%, 41.7%, 30% and 5% respectively in <1 year, 1-5 years, 5.1-9, 9.1-13 and >13.1 years age group. High risk was reported to be in <24 months and <33 months, respectively by Adamsbaum et al, and Sharma et al.[9,10] Whereas some investigators reported that recommend emergent neuroimaging can be performed at any age.[11]

Afebrile seizure is a disorder occurring in the young. In this study, most patients (38.8%) were in 5-9 years age group. 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.[12]

In a study by Chaoshuang et al, reported that the urban population is at a higher risk than the rural population.[13] The incidence in urban population was reported to be very high, 86.2% and 93.8%, respectively.[14,15] One south Indian study reported that the incidence was more than twice in the urban group, which was 6.23 vs. 3.04 per 1000).[16] The current study findings were contrast and the prevalence was more in rural population; this is probably related to poor hygienic conditions and higher amount of fecal contamination of drinking water in the rural areas.

In developing countries, it is mainly due to infection and parasitic diseases, particularly neurocysticercosis, tuberculomas.[17,18] Cysticercosis is a disease of low socioeconomic conditions, associated with poor hygiene and food habits. In a study conducted in Kerala, Kuruvilla, et al, found that 73% patients belonged to low socioeconomic category.[19] In similar two studies conducted from Chandigarh, 69% and 82.7% of the patients were of low socioeconomic status.[20,21] In this study, 72.5% cases lower socioeconomic class. Hence, results are similar to other Indian studies.

Another south Indian study reported that 53.2% patients were pure vegetarians.[22] In this study, 70% people were non vegetarians and had history of eating pork twice or thrice. In these, seizures with neurocysticercosis was reported in 58.1%; statistically the difference was significant ($p=0.02$). However, it was reported in 27% pure vegetarians; this is due to poor sanitation, food habits.

In this study lesions were mainly single (53%) and are more common than multiple lesions, which is agreeable with most other Indian studies. In this report, 21(36%) had lesion localized to the parietal lobe with absent to moderate perilesional edema. Literature also reported that parietal lobe has been found to be the most common site of single lesion neurocysticercosis. Baranwal et al, and Singhi et al, reported parietal lobe involvement in 41% and 57.3% patients, respectively.[20,21]

Result of this study also shows a considerably higher proportion of neuroimaging abnormalities which include various findings such as NCC, Tuberculoma, tumor, CNS

malformations. Shipra Mathur et al, study showed prevalence of abnormal neuroimaging was 32%, which is greater than the current report.[22]

CONCLUSION

In this study, neurocysticercosis (49%) and tuberculoma (23%) were common causes of seizures. Although cysticercosis incidence is greater in pork eaters, but vegetarians shouldn't be excluded. Studies on large sample size for long time are recommended.

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