Introduction:

A conceptual definition of “seizure” was formulated by a task force of International League against Epilepsy (ILAE, 2005) that defined “epileptic seizure” as transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in brain.1 Seizure is classified as focal onset, generalized onset and unknown onset as per recent classification given by international league against epilepsy 2017.2 Seizure is one of the common serious neurological problem prevalent in childhood. More than 50% of seizure has their onset in childhood.3

An acute symptomatic seizure is defined as a clinical seizure occurring in close temporal relationship with an acute central nervous system (CNS) insult, which may be metabolic, toxic, structural, infectious, or inflammatory.4 When the duration of seizure activity exceeds 5 minutes, it is regarded as status epilepticus. For focal onset seizure it is termed as epilepsia partialis continua.

Overall acute symptomatic seizure represent nearly 40% of total seizures,5 40% of all cases of afebrile seizures6 and 50–70% of status epilepticus episodes.7 Lifelong risk of developing an acute symptomatic seizure is 3.6% which approaches that of developing epilepsy.5,7 The prevalence of seizure in developed and developing countries range between 3/1000 and 22.2/1000.8-10 1/5th of total children with unprovoked seizures may develop epilepsy.11

Neuroinfections (pyogenic meningitis, encephalitis, neurocysticercosis), cerebral malaria, and epilepsy are common prevalent causes of childhood acute seizure.12-16 Febrile seizure common in age group 6 months to 5 years of age. This occurs in 2–5% of all children experiencing first episode of seizure before 5 years of age. CNS Infections are the major cause of seizures in developing countries.17

Neuroimaging is a major modality in the etiological diagnosis of seizures. Generally, neuroimaging is not indicated in well-appearing children after a first, unprovoked seizure. It is indicated in children to diagnose cause with focal onset seizure or refractory epilepsy, focal neurological deficit, neurocutaneous syndromes, signs of raised intracranial pressure, ventriculoperitoneal shunting,
Clinical profile of children with first onset seizure admitted to pediatric emergency

Original Article

Head trauma or history of travel to cysticercosis endemic countries. Seizure is a common presentation in the emergency care setting, and new-onset epilepsy is the common cause of unprovoked seizures. The problem is even more complicated in resource-limited areas due to lack of proper investigations and technologies in many hospitals. There are only limited studies based on clinic-etiologic profile, types, and etiological causes of seizures in children in rural India. This cross-sectional observational study was therefore conducted with the objective to study the prevalence of first onset seizure in children, clinic-etiologic profile, clinical characteristics, neuroimaging, and use of antiepileptic drugs in children presenting with seizures.

Materials and Methods

This was a prospective cross-sectional study carried out in Department of Pediatrics, BPS Government Medical College for Women, Khanpurkalan, Sonepat, Haryana. This medical college is located in rural area of North India that caters mainly rural population. Children admitted with first onset seizure in age group of 1 months to 15 years coming to pediatric emergency comprised our study population. The study was conducted over a period of 6 months from October 2018 to March 2019. The study was approved by Institutional Ethics Committee (IEC), BPS Govt. Medical College for Women Khanpur Kalan (Sonepat) and prior written informed consent from each patient guardian taken.

Inclusion criteria

1. Children admitted to pediatric ward with first onset seizure
2. Age group of 1 months to 15 years.

Exclusion criteria

1. Known neurological disability eg. cerebral palsy, mental retardation
2. Any previous episode of seizure.

The patients were diagnosed with help of routine investigation, serum electrolytes, serum calcium, CSF analysis and MRI brain. The study was approved by the institute’s ethical committee board. Data was recorded in predesigned proforma by investigator himself and analyzed using SPSS 20. Descriptive statistics and chi square were used for analysis. P value of less than 0.05 was considered statistically significant.

Results

Among 1223 children admitted to the Pediatric department over a period of six months, 242 patients (19.8%) were admitted with convulsion. By excluding the patient with repeated seizure, cerebral palsy and children with neurodevelopmental delay, 92 children (38% of all seizure patients) fulfilled the inclusion criteria and thus were subjected to analysis. First onset seizure was present in 92 children, among which 56 were boys (60.9%) and 36 were girls (39.1%), with youngest age of 1 months. 74 (80.4%) children had generalized onset seizure, 16 (17.4%) had focal onset seizure and 2 (2.1%) had unknown onset seizure. Generalized onset seizure was more common than focal onset and unknown onset in both gender (M = 80.4%; F = 80.6%). There was no statistical significant difference in the distribution of seizures with gender (P = 0.489) (Table 1).

Children having first onset seizures were subdivided into 4 age groups: < 1 years, 1-5 years, 6-10 years, and 11-15 years. Generalized onset seizure was again more common in all the age groups when compared to focal onset and unknown onset seizure. There was no statistical significant difference between the different age groups and seizure onset (P = 0.419) (Table 1). With the increase in the age group, the prevalence of seizure decreased i.e 44.5% in age of 1 month -5 years, 30.4% in age group of 6-10 years and 22.8% in age group of 11-15 years. Loss of consciousness (87%), fever (34.8%), vomiting (57.6%), and headache (38%) were four leading clinical complaints in admitted seizure patients. Status epilepticus was present in 52.2% of patients coming to pediatric emergency with first onset seizure. Among 80 children with loss of consciousness, 6 (7.5%) were having focal onset, 73 (91.2%) were having generalized onset and 1 (1.2%) was having unknown onset seizure. The association of type of seizure with loss of consciousness was found to be statistically significant (p = < 0.05),
suggesting children with unconsciousness were related more with seizure of generalized onset. There was no statistical significance in occurrence of other clinical features (fever, vomiting, headache and status epilepticus) in children with type of seizure (Table 2).

Table 3: Neuroimaging in children with Generalized onset, focal onset and unknown onset seizures

| MRI Results | TOTAL NUMBER n (%) | Focal Onset | Generalized Onset | Unknown Onset | P value |
|-------------|-------------------|-------------|-------------------|---------------|---------|
| NORMAL      | 32 (34.8%)        | 0           | 7                  | 0             |         |
| Pyogenic meningitis | 7 (8.7%)       | 0           | 7                  | 0             |         |
| Typhoid encephalopathy | 1 (1.1%)      | 0           | 1                  | 0             |         |
| Hypocalcaemic seizure | 3 (3.3%)       | 0           | 3                  | 0             |         |
| Idiopathic seizure | 9 (9.8%)        | 1           | 8                  | 0             |         |
| Febrile seizure | 9 (9.8%)         | 0           | 9                  | 0             |         |
| Hypertensive encephalopathy | 2 (2.2%) | 0           | 2                  | 0             |         |
| Infantile spasm | 1 (1.1%)        | 0           | 0                  | 1             |         |
| ABNORMAL     | 60 (65.2%)        | 0           | 1                  | 0             |         |
| Pyogenic meningitis | 1              | 0           | 1                  | 0             |         |

Neuroimaging (MRI) was done in all 92 patients with first onset seizure, where 32 (34.8%) were normal and 60 (65.2%) were abnormal. Out of 32 children with normal neuroimaging findings, nine had idiopathic seizure and febrile seizure each, seven had pyogenic meningitis, three had hypocalcaemic seizure, two had hypertensive encephalopathy and one each had typhoid encephalopathy and infantile Spasm. And out of remaining 60 children with abnormal MRI findings, 43 had neurocysticercosis, 6 had tuberculoma, 5 had thrombotic infarct, two had hypoglycaemic changes, one each had demyelination disorder, tuberculous meningitis and neurological cyst. (Table 3).
In infants, most common cause of seizure was found to be pyogenic meningitis (30.8%), followed by hypocalcaemic seizure (23.1%), febrile seizure (23.1%), idiopathic seizure (15.4%) and infantile spasm (7.7%). In children in age group of 1-5 years, main causes were neurocysticercosis (32.1%), febrile seizure (21.4%), tuberculoma (10.7%) and thrombotic infarct (10.7%). Other causes were hypoglycaemic infarct (7.1%), idiopathic seizure (7.1%), demyelination disorder (3.6%), tuberculous meningitis (3.6%) and neurological cyst (3.6%). Among 6-15 years age group, neurocysticercosis also was the most common cause. Others were idiopathic seizure and pyogenic meningitis. (Table 4).

Table 5: Antiepileptic drugs used in children with Generalized onset, focal onset and unknown onset seizures

| Response to Anti-epileptic Drug | Number | Focal Onset | Generalized Onset | Unknown Onset |
|-------------------------------|--------|-------------|------------------|--------------|
| Single Medication             | 86     | 15 (93.8%)  | 69 (93.2%)       | 2 (100%)     |
| Multiple drugs                | 6      | 1 (6.2%)    | 5 (6.8%)         | 0            |

Discussion

In our study, among all the patients admitted to pediatric emergency, 19.8% children were admitted with seizure and among them 38% experienced first onset seizure. In the study done by Soni V et al at Chandigarh20, out of 604 children admitted with seizure 105 (17.3%) experienced first onset seizure. This difference may be due to variation in inclusion criteria in Chandigarh study (age group included 3 months-12 years) and exclusion criteria (febrile seizure was excluded). Sartori S et al21 conducted the study at Italy, observed that out of 214 patients with convulsive disorder, 108(50.5%) experienced first ever episode of seizure. The variation in finding may be due to difference in the study area and variation in the disease profile between the two countries.

We observed the higher prevalence of seizures in younger age group and decrease in prevalence with the age (44.5%, 31.6% and 22.8% in age groups of 1month-5 years, 6-10 years and 11-15 years respectively). The finding was in concordance to many studies.22-26

The present study showed that seizure was more prevalent in males (male/female = 1.5:1). Similar study conducted at Chandigarh and South India also showed males has more chances of seizure.
compared to female. Other studies also support this finding. According to ILAE Classification 2017, 74 (80.4%) children had generalized onset seizures, 16 (17.4%) had focal onset seizure and 2 (2.1%) had unknown onset seizure. In all other studies, seizure was classified according to older version of ILAE Classification. These all studies suggest generalized seizure were more common in children.

Fever was present in 32 (34.8%) children with majority (87.5%) having generalized onset seizure. Saravan S in his study observed fever in 51.5% patients. Chaudhary N et al reported fever in 39.9% children with majority (89.5%) having generalized onset. Fever was present in 76.27% patients with seizure in the study done by Shiaprakash NC et al. Fever with seizure frequency was 53.5% and 39.9% in a similar study conducted in Nepal by Adhikari et al and Chaudhary et al.

In the present study 80 (87%) children had loss of consciousness, among which 6 (7.5%) were having focal onset seizure, 73 (91.2%) had generalized onset seizure and 1 (1.2%) had unknown onset seizure. The association of type of seizure with loss of consciousness was found to be statistically significant, suggesting children with unconsciousness were related more with seizure of generalized onset. In the study done by Chaudhary N et al, unconsciousness was present in 55.4% of patients, among which 83.9% had GTCS and 16.1% had partial seizure.

Other symptoms were vomiting (57.6%) and headache (38%). Chaudhary N et al found that 35.1% seizure patients had vomiting and 16.1% patients had headache. The present study depicted status epilepticus in 52.2% children among which 20.8% had focal onset seizure (epilepsiapartialis continua) and 77.1% had generalized onset seizure.

Neuroimaging (MRI) was done in all 92 patients with 60 (65.2%) children showing abnormal findings. Maximum prevalence was found in neurocysticercosis 46.7%. In the study done by Soni V et al at Chandigarh, abnormal neuroimaging was reported in 62.8% children with CNS infection (82%) being the most important cause. Neuroimaging done in all seizure patients in the study done by Chaudhary N et al suggested abnormal readings in 95 individuals (56.5%), with prevalence of neurocysticercosis to be 42.9% (72 out of 168 children), whereas in study done in western Nepal by Adhikari S et al showed 45.9% of seizure patients (111 out of 242 patients) with abnormal brain imaging and prevalence of neurocysticercosis being 59.5%. This proves that neurocysticercosis is more common cause of seizure with first onset seizure. Majority of neurocysticercosis children had generalized onset (72.1%) when compared to focal onset seizure (25.6%) and unknown onset (2.3%) but the result was statistically insignificant. Singh RD et al in his study revealed CNS infections to be the commonest cause of seizure followed by space occupying lesions, epilepsy, febrile seizures and metabolic causes.

The present study shows 93.5% patients responded to single medication (Phenytoin) and 6.5% children responded to multiple medications (more than one medicine). Phenytoin was used as first line anti-epileptic due to free availability by government. In the study by Chaudhary N et al, phenytoin was the most commonly preferred antiepileptic drug (58.3%) in treating seizures followed by valproate (32.7%). Poudyal P et al in his study found seizure in patient was controlled by monotherapy in 69.16% cases and was resistant in 7.50% of the cases.

Conclusions

Seizures in children are major indication for indoor admissions in developing countries. Among them nearly 1/3rd presented as first onset seizure. Generalized onset seizure being the commonest. There are multiple etiology of first onset seizure. Majority of patients were diagnosed with neuroinfections and they are treatable with excellent prognosis. Neurocysticercosis found to be most common intracranial lesion in this part of country. A population based study should be done to analyse the risk factor of the disease, so that appropriate control measure can be taken, as the treatment outcome of this condition is good.

Limitations of Study

We could not study the outcome of those seizure patients which could have helped to understand
the exact disease burden, mortality, and morbidity. We included small sample size, which limits the generalization of findings on larger population as well as prevalence of different disease could not be accurately generalized. EEG facility was not present in the institute because of which we could not make the final diagnosis of epilepsy.

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**Conflicts of Interest:** Nil

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