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### **Childhood seizures: Prevalence and its related factors, associated problems and outcome**

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#### **ABSTRACT**

Seizures are the most common pediatric neurological disorder worldwide. Four to ten percent of children suffer at least one episode of seizure in the first 16 years of life. The incidence is highest in children less than 3 years of age. It has an impact on many aspects of a child's development and functioning. The aim of the study is to find out the prevalence of childhood seizure and its related factors, associated problems and outcome of seizures in a tertiary hospital, Guwahati, Assam. Cross-sectional study carried out in the Department of Pediatrics Medicine, Guwahati Medical College Hospital among children with presenting seizures. A purposive sampling technique was adopted and information was gathered through interview schedule, observation and medical records. Out of 854 patients 20 (2.34 per 100) children had seizures as a presenting complain. The incidence is highest 10 (50%) in children less than 3 years of age, with a decreasing frequency in older children and equal number of male 10(50%) and female 10 (50%) were presenting seizures. Generalized tonic clonic seizures were the commonest type of seizure in this study 19(69.9%) and 17(85%) of them were febrile. The study reported that out of total seizure cases, 17(85%) of cases having history of fever, 15(75%) rhinorrhea, 2(10%) vomiting and headache as an associating factors and majority of 18 (90%) cases had no family history of seizure only 2(10%) reported as having family history of seizure. No mortality rate was found due to seizure. 10 % of cases were leave against medical advice (LAMA) and 90% of cases discharged with recovery. Seizures are the most common pediatric neurological disorder. The incidence is highest in children less than 3 years of age, with a decreasing frequency in older children.

**KEYWORDS:** Childhood seizures, related factors, associated problems, outcome of seizures

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## **INTRODUCTION**

Seizures are changes in the brain's electrical activity. These changes can cause dramatic, noticeable symptoms or may not cause any symptoms. The symptoms of a severe seizure include violent shaking and a loss of control. However, mild seizures can also be a sign of a significant medical problem, so recognizing them is important. There are many types of seizures and some have mild symptoms. Seizures fall into two main groups. Focal seizures, also called partial seizures, happen in just one part of the brain. Generalized seizures are a result of abnormal activity on both sides of the brain. Seizures are not a disease in themselves. Instead, they are a symptom of many different disorders that can affect the brain. Some seizures can hardly be noticed, while others are totally disabling.<sup>3</sup> Of the estimated 50 million people with epilepsy worldwide, 40 million live in developing countries (World Health Organization [WHO])<sup>4</sup> and about half of these are children. The incidence of epilepsy is much higher in developing countries (114–190 per 100000<sup>5</sup> than in developed countries (24–53 per 100 000)<sup>6</sup>. Epilepsy is a chronic noncommunicable disease of the brain and it is characterized by recurrent seizures, which are brief episodes of involuntary movement that may involve a part of the body (partial) or the entire body (generalized) and are sometimes accompanied by loss of consciousness and control of bowel or bladder function.<sup>7</sup> The ILAE task force has classified seizures as generalized onset and focal onset seizures.<sup>[14]</sup> Generalized seizure refers to those arising within and rapidly engaging bilateral distributed networks. Generalized seizures include seizures with tonic, clonic, tonic-clonic, absences (typical, atypical, myoclonic absence, eyelid myoclonia), myoclonic seizures (myoclonic, myoclonic atonic, myoclonic tonic), epileptic spasms, and atonic seizures. *Focal onset seizures* refer to those that originate within networks limited to one hemisphere characterized by one or more of aura, motor, autonomic, altered awareness (dyscognitive) that may evolve to bilateral convulsive seizure.<sup>8</sup> One third of children who experience febrile convulsions will have further convulsions with consecutive fevers. This does not mean they have epilepsy and 97 per cent of all children with simple febrile convulsions have no higher risk of developing epilepsy later on. Febrile convulsions tend to occur in families. If a child has had a febrile convulsion, the risk for a sibling of that child to have a febrile convulsion is about 10 per cent or almost 50 per cent if a parent has febrile seizures as well. Presence of fever (temperature >38°C), generalized seizures, seizure duration of less than 15 min with no postictal loss of consciousness are more likely to be febrile seizures. Children with history of fever, seizure, and encephalopathy are likely to have meningoencephalitis. History of developmental delay, perinatal asphyxia or other perinatal or postnatal injury, and positive family history of epilepsy or febrile convulsion points towards an unprovoked epileptic seizures.<sup>9</sup> The provoking factors include fever,

head trauma, previous central nervous system (CNS) infection or tumor, hypoglycemia, electrolyte imbalance (hyponatremia, hypernatremia, hypocalcemia), or history of toxic or drug ingestion. Unprovoked seizure would be considered when the seizure cannot be explained by an immediate, obvious provoking cause such as head trauma or intracranial infection.<sup>1</sup> Some types of epilepsy run in family. There is a genetic influence for occurrence of seizures. Family history of epilepsy may increase risk of developing a seizure disorder.<sup>11</sup> If both parents have epilepsy, the risk is a bit higher. Most children will not inherit epilepsy from a parent, but the chance of inheriting some types of epilepsy is higher.<sup>12</sup> Two aetiologies of childhood epilepsy are commonly seen in India. These are neurocysticercosis are found to be common in older child and adolescents which is accounted for 47% of the identifiable etiology and neonatal hypoglycaemic brain injury commonly seen in infancy which given the evidence of 23% by MRI reports<sup>13</sup> Seizures can affect any age group. If left untreated, they can be life-threatening. Some of the complications related to it are- difficulty in learning in kids, permanent brain damage, aspiration pneumonia, psychological issues, pregnancy complications, injuries from fall, disorientation, cuts while doing daily works like walking down stairs or driving. Side effects associated with the medicines most commonly kidney damage.<sup>14</sup>

## **MATERIALS AND METHODS:**

Cross-sectional hospital-based study conducted in the Department of Pediatrics Medicine, Guwahati Medical College Hospital during the period of November, 2018 to February, 2019. Purposive sampling techniques was adopted for selecting samples for the study. Seizure is defined as sudden stereotyped episode with change in motor activity, sensation, behavior, and/or consciousness due to an abnormal electrical discharge in the brain according to Indian Academic of Pediatrics. Seizure was identified from presenting seizure episode during hospitalization and history of past seizure attack. Cases were validated from medical records. Prevalence of Seizure was calculated as percentage of seizure cases from the total number of cases admitted in the ward during the periods of study. Ethical permission was obtained from the authority and verbal consent was taken from each parents. Information was obtained from the medical records of each patient: age in years, sex, type of seizure, associated symptoms (fever, cough, rhinorrhea, vomiting, diarrhea and headache), family history of seizure or epilepsy, developmental history, laboratory test results (blood sugar and cerebrospinal fluid (CSF) analysis, neuroimaging; CT scan head or cranial magnetic resonance imaging (MRI), electroencephalography (EEG) findings, duration of hospital stay. Final outcome was recorded in four categories; discharged after recovery, left against medical advice (LAMA), mortality and referral to other institutions were also recorded. Statistical analysis was done using frequency and percentage.

There were 854 number of patients admitted in the pediatric Medicine ward during the study period. Monthly average 227 children were admitted in the ward. Out of these patients 20 (2.34 per 100) children had seizures as a presenting complain and this finding is consistent by a study conducted by Hackett et al. in kerala which reported a 5-year period prevalence of 22.2 per 1,000 population among children aged 8-12 years.<sup>15</sup> The prevalence rate represent in higher in developing countries as compared with the developed ones. The previously reported PR/1000 for childhood epilepsy is 3 in Italy, 3.94 in Finland, 3.6 in Estonia, 7.9 in Turkey and 9 in Japan<sup>16</sup>. High prevalence rate of seizure was found in Nepal (12.7%)<sup>17</sup> and Kenya (18.3%)<sup>18</sup> as compared to present study. In previous studies from the Indian subcontinent, the PR has been reported as 5.4 in Haryana<sup>19</sup> (North India), 5.4 in Kerala<sup>20</sup> (South India), 6.2 in Chandigarh<sup>21</sup> and 7.84% in Maharashtra.<sup>22</sup>

Among 20 seizure cases 10(50%) were in the age group below 3 years, 7(35%) were in the age group 3 to 6 years and 3(15%) were in the age group 6 to 8 years. Seizures are the most common pediatric neurological disorder. The study revealed that the incidence is highest in children less than 3 years of age, with a decreasing frequency in older children. The study is supported by a previous study in Telangana which represented the majority of seizure cases (33.3%) were found during the age of 1-3 years of age.<sup>23</sup>

Although most studies show high prevalence of seizures among male children compared to female child in younger age,<sup>24</sup> the present study reported equal number of male 10(50%) and female 10 (50%) were presenting seizures. Kandil et al., reported an almost equal gender ratio for seizures (64 males and 63 females).<sup>25</sup>

Regarding types of seizures, generalized tonic clonic seizures were the commonest type of seizure in this study 19(69.9%) and 17(85%) of them were febrile. Only 1(5%) of total seizure cases found as absence seizure. Prevalence of generalized tonic clonic seizures, { male-10(58%)& female-7(41%)} and febrile seizure {male-10(83%)& Female-2(17%)} are more in male compared to female. Kandil et al., also observed generalized tonic-clonic seizures as the most common type of seizures and was seen in 72.1% cases.<sup>25</sup> and another study reported out of total (326) seizures, 83(25%) of them were febrile seizures where 52 (62.65%) were male and 31 (37.35%) were female, i.e. male to female ratio is 1.68: 1.<sup>26</sup>

It was found that out of total seizure cases, 17(85%) of cases having history of fever, 15(75%) rhinorrhea, 2(10%) vomiting and headache as an associating factors.

In regards of family history, it was found that majority of 18 (90%) cases had no family history of seizure only 2(10%) reported as having family history of seizure. Kandil et al<sup>25</sup> and Mwipopo et al,<sup>27</sup> and CPV. Ramana Sastry<sup>23</sup> observed a positive family history of seizures in 17.3%, 9.5% and 8% of their patients respectively. Majority of 19 (95%) children presented normal developmental milestone only 1(5%) having abnormal development. Blood sugar and CSF examination reported normal findings for all cases.

Regarding duration of hospitalization, it was found that average hospital stay 8.9 days (Min: 3days-20days). No mortality rate was found due to seizure. 10 % of cases were leave against medical advice (LAMA) and 90% of cases discharged with recovery. Majority of cases 12(60%) were seizure disorder in final diagnosis and 8(40%) of cases were diagnosed as meningitis.

**Table 1: Prevalence of seizure according to age and sex**

Age/ years	Sex		Total n, %
	Male (n, %)	Female (n, %)	
0-3	6 (30%)	4 (20%)	10 (50%)
3-6	2 (10%)	5 (25%)	7 (35%)
6-8	2 (10%)	1 (5%)	3 (15%)

**Table 2: Associated symptoms of seizure**

Symptoms	Male		Female		Total	
	n	%	n	%	n	%
Fever	10	50	2	10	12	60
Cough	12	60	3	15	15	75
Vomiting	2	10	0	0	2	10
Diarrhea	0	0	0	0	0	0
Headache	1	5	1	5	2	10

Table 3: Risk factors of seizures

Variables	Frequency	Percentage (%)
<b>1. Family history of seizure</b>		
Yes	2	10
No	18	90
<b>2. Developmental history</b>		
Normal	17	85
Abnormal	3	15
<b>3. Blood sugar</b>		
Normal	18	90
Abnormal	2	10
<b>4. CSF analysis</b>		
Normal	10	50
Abnormal	2	10
<b>5. Neuroimaging</b>		
Normal	5	25
Abnormal	1	5
<b>6. EEG</b>		
Normal	10	10
Abnormal	3	15
<b>7. ECG</b>		
Normal	19	95
Abnormal	1	5

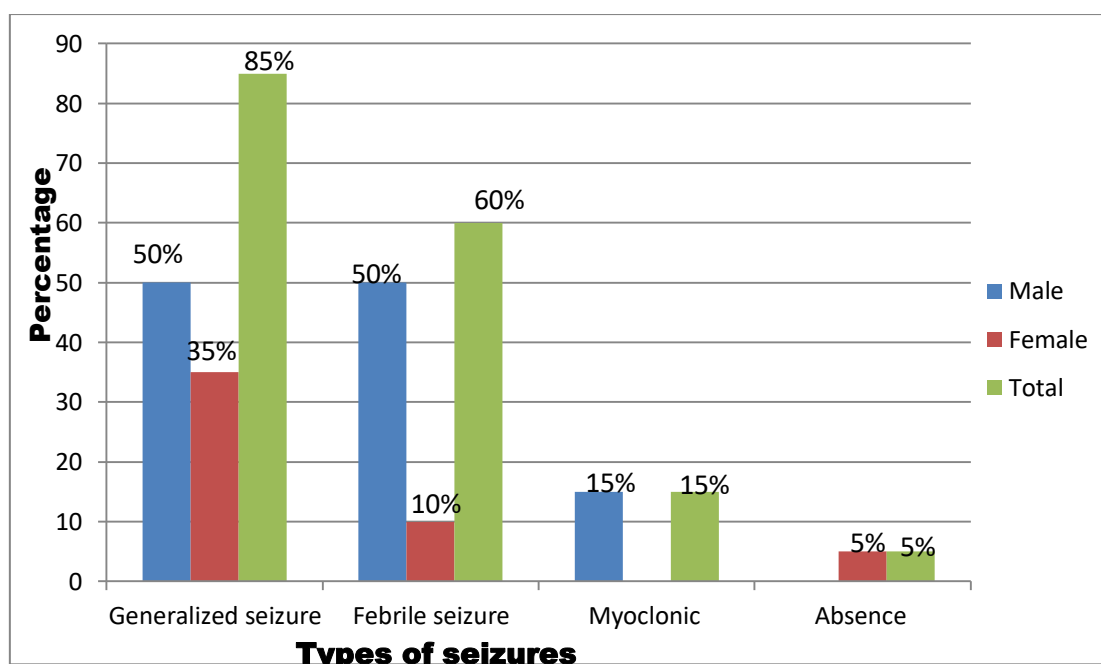


Fig -1: Prevalence of seizures according to types

## **CONCLUSION:**

Seizures are the most common pediatric neurological disorder. The incidence is highest in children below 3 years of age, with a decreasing frequency in older children. All most both male and female children are equally affected in seizure. Fever is the most common associated problem of childhood seizures. It has an impact on many aspects of a child's development and functioning. As a result, many of these children are at increased risk for academic problem, social maladjustment, emotional and behavioural disturbances. Parenting knowledge and awareness are highly required for prompt treatment of childhood seizures.

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