

Cerebrospinal Fluid analysis in Children with Fever

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Abstract

Introduction: The International League against Epilepsy (ILAE) defines a Febrile seizures (FS) as a seizure occurring in childhood after one month of age, associated with a febrile illness that is not caused by an infection of the central nervous system. A child with the diagnosis of FS cannot have a history of neonatal seizures, a previous unprovoked seizure or meet criteria for other acute symptomatic seizures.

Materials and Methods: This is a prospective and single center study conducted at Department of Paediatrics, Karpagam faculty of medical sciences and research from December 2020 to December 2021 sample size of 94 cases were studied. All children under age group 2 months to 5 years admitted with seizures associated with fever admitted in our hospital were selected for study. Newborns are excluded as the causes of neonatal seizures are different. Convulsions that mimic seizures are excluded. Afebrile seizures, Children age group less than 2 months and more than 5 years. Children with neurodevelopmental anomalies were excluded.

Results: Among 312 children 168 are males (51%) and females are 144 (46%). On the study of the type of convulsions it is observed that out of 94 patients in the age group of 2 months and 5 years who presented with both fever and seizures 36 patients had Generalised tonic clonic seizures and 58 patients had focal seizures.

Conclusion: Most of the children had associated Respiratory tract infection(25%). Out of 94 children with fever and seizure 36 children had Generalised Tonic Clonic Convulsions and 58 children had focal seizures. Lumbar puncture and CSF Analysis was done for 45 children. Out of 45 children admitted with fever and seizure 22 children had Simple febrile seizure which indicates that it is the most common cause of convulsion.

Keywords: Cerebrospinal Fluid, Seizures, Pyrexia.

INTRODUCTION

The International League against Epilepsy (ILAE) defines a Febrile seizures (FS) as a seizure occurring in childhood after one month of age, associated with a febrile illness that is not caused by an infection of the central nervous system. ^[1] A child with the diagnosis of FS cannot have a history of neonatal seizures, a previous unprovoked seizure or meet criteria for other acute symptomatic seizures. The lower age limit of the ILAE definition is younger than the limit proposed previously by the National Institutes of Health (NIH). ^[2] The NIH

Consensus Conference definition of FS is an event usually occurring between 3 months and 5 years of age, associated with fever, but without evidence of intracranial infection or defined cause. ^[3]

FS can be separated into two categories, simple and complex. A simple febrile seizure is isolated, brief and generalized. Complex FS is one with focal onset, one that occurs more than once during a febrile illness, or one that lasts more than 10 to 15 minutes. ^[4] Developmental delay and younger age are associated with prolonged FS. Subsequent febrile seizures can be prolonged if the initial febrile seizure was prolonged. Febrile status epilepticus (FSE) is a subgroup of complex FS. ^[5] Seizure is a common problem evaluated in pediatric emergency departments. A seizure or convulsion is a paroxysmal, time limited change in motor activity and/or Behavior that results from abnormal electrical activity in the brain. ^[6]

Febrile seizures (FS) are the single most common seizure type and occur in 2 to 5% of children younger than age 5 years with a peak incidence in the second year of life. It is currently accepted that most children who have a FS often have normal health and development after the event. ^[7] FS are considered benign, but there is recent evidence that suggests a small subset of children that present with seizures and fever may have recurrent FS or develop epilepsy. ^[8]

The manifestation of the seizure depends upon the threshold of the brain to manifest a clinical seizure. The age and neurodevelopmental maturity status determine the clinical manifestation and the type of seizure disorders encountered. Seizure may signal a potentially serious underlying systemic or central nervous system disorder that requires thorough investigation and management. ^[9] The first seizures with fever in infants younger than 12 months, performance of a lumbar puncture be strongly considered, because the clinical signs and symptoms associated with meningitis may be minimal or absent in this age group. ^[10]

In a child between 12 and 18 months of age, a lumbar puncture should be considered child with clinical signs and symptoms of meningitis may be subtle. In a child older than 18 months, although a lumbar puncture recommended in the presence of meningeal signs and symptoms (ie, neck stiffness and Kernig and Brudzinski signs), which are usually present with meningitis, or for any child whose history or examination result suggests the presence of intracranial infection. ^[11]

In infants and children who have had febrile seizures and have received prior antibiotic treatment can mask the signs and symptoms of meningitis lumbar puncture should be strongly considered. Routine lumbar puncture in children younger than 18 to 24 months with first febrile seizures is indicated. ^[12]

Aims and Objectives: To find out Cerebro Spinal Fluid analysis in children with fever of age group 2months to 5years. To correlate Cerebro Spinal Fluid and hematological findings.

Materials and Methods

This is a prospective and single center study conducted at Department of Paediatrics, Karpagam faculty of medical sciences and research from December 2020 to December 2021 sample size of 94 cases were studied.

Inclusion Criteria: All children under age group 2 months to 5 years admitted with seizures associated with fever admitted in our hospital were selected for study.

Exclusion Criteria: Convulsions that mimic seizures are excluded. Afebrile seizures, Children age group less than 2 months and more than 5 years. Children with neurodevelopmental anomalies were excluded. Newborns are excluded as the causes of neonatal seizures are different.

Every child fitting into the inclusive criteria detailed history taken detailed examination done. Investigation done are CSF: colour, pressure, cell count, sugar, protein, chloride, culture, gram staining. CBC WBC count, polymorphs, lymphocytes, platelet count, hemoglobin.

Results

Among 312 children 168 are males(51%) and females are 144 (46%).

Table 1: Gender Wise Distribution Of Patients Admitted With Seizures

Gender	No of children	Percentage
Male	168	51
Female	144	46
Total	312	100

Table 2: Types of pediatric age group

Age Group	No Of Children	Percentage
Neonatal	66	21
Infant	34	10.8
Toddler	32	10.2
Pre School Going	38	12
School Going	78	25
Adolescent	64	24

Total	312	100
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Table 3: Type of Convulsion in the Age Group of 2 Months to 5 Years who presented with Both Fever and Seizures

S.No	Type of convulsion	Number of cases	Percentage
1	Generalised tonic clonic	36	34%
2	Focal seizures	58	66%
3	Absence seizures	-	-
4	Myoclonic	-	-
5	Atonic	-	-
	Total	94	100

On the study of the type of convulsions it is observed that out of 94 patients in the age group of 2 months and 5 years who presented with both fever and seizures 36 patients had Generalised tonic clonic seizures and 58 patients had focal seizures.

Table 4: Systemic Illness Associated In Patients With Fever With Seizures

S.No	System involved	No of patients
1	Respiratory	24
2	Abdominal	16
3	Cardiovascular	2
4	Central nervous system	36

Table 5: CSF Culture Growth

	Frequency
Growth Present	9
No Growth	35
Acid Fast Bacilli	1

Table 6: CSF Culture Growth Organism

1	Streptococcus Pneumonia	4
2	Haemophilus Influenzae Type B	2
3	Neisseria Meningitidis	1
4	Herpes Simplex	2
5	Acid Fast Bacilli	1

Table 7: CSF Gram Staining

Staining	Frequency
Gram Staining Positive	7
Gram Staining Negative	38

Table 8: Causes of Convulsion in CSF Analysed Children

Causes of convulsion	No of cases	Percentage
Simple febrile	22	46
Acute bacterial meningitis	7	14.8
Viral meningitis	2	4.2
Tuberculous meningitis	1	2
SD DD	13	31
TOTAL	45	100

Table 9: CSF Glucose Values

	Units
Increased	6

Normal	31
Decreased	8
Total	45

Table 10: CSF Protein

	CSF PROTEIN
Increased	10
Normal	33
Decreased	2
Total	45

Discussion

Seizure is a common presentation for which a child may come to the emergency department and may occur in up to 10% of children presenting to the emergency department. Seizures are the most common pediatric neurological disorder worldwide. They are also one of the most frequent causes for visit to the emergency department.^[13] The etiology of seizures are various and are different for each age group. Seizures are usually a manifestation of an underlying pathology. Fever with seizure may be due to simple febrile seizure, complex febrile seizure or secondary to some serious underlying etiology like neuroinfection.^[14]

In our study, most cases of febrile seizures were associated with symptoms of upper respiratory tract infection or acute gastroenteritis. In our study, children having fever with seizures 49% of all our cases. Febrile convulsions are the most common seizures seen in children between 2 months to 5 years of age. Most febrile seizures are brief and do not require specific treatment or extensive workup and have a benign prognosis. But they may also signify a serious underlying acute infectious disease.

In the present study the majority of cases were seen in the age group of 13-24 months. Incidence of infection is also more in this age group because of immaturity of the immunological function. As the age increases the incidence of febrile convulsions were less which can be explained by the fact that maturity and myelination of brain progressively increases.

In our study, out of 94 patients, for 45 patients lumbar puncture was done under aseptic condition and CSF was collected in sterile container and the same was sent for chemical analysis and culture. Out of 94 patients, for 49 patients lumbar puncture was not done due to

the following reasons : Non acceptance of doing the procedure by parents or guardian. Refusal to sign the informed consent. Local skin lesion at the site of lumbar puncture. In CSF analysis meningitis is diagnosed if there is increased white cells, increased protein and decreased sugar. Meningitis is confirmed by culture and sensitivity of CSF.

In our study, out of 45 patients from whom CSF was collected 31 are male child and 14 are female child. Of the 100 cases with sterile CSF on repeat culture, there was no instance of recrudescence of infection during hospitalization. The following characterized the interval changes in CSF profile of this group: 100 (100%) with persistence of pleocytosis; 14 (14%) with differential cell count conversion from polymorphonuclear neutrophil leukocyte (PMN) predominance to relative lymphocytosis; 96 of 98 (98%) with initial positive Gram-stained smear with negative results for organisms. The differences in mean values of CSF total white blood cell counts, percentage PMNs, and glucose and protein concentrations on presentation and between 48-72 hours of therapy were highly significant (P less than 0.0001)...[Bonadio:1990] ^[15]

CSF white blood cell (WBC) count was elevated above the upper limit of normal of 5 cells/mm³ in 9.8% and the absolute number of polymorphonuclear cells was more than 0 cells/mm³ in 26.2% of the complex febrile seizure subjects. Values at the 95th percentile were calculated; a total of 8 WBC/mm³, 4 PMN/mm³, protein of 73 mg/dl and glucose of 119 mg/dl determined the 95th percentile CSF values for the patients with complex febrile seizures..[Mani:2013] ^[16]

In a comparison among groups, we found that absence of anemia, low (< 1,000) CSF white blood cell (WBC) count, and high CRP level at admission were the indicative of poor prognosis. Thirty-six to 48 h after admission, the presence of fever, depressed level of consciousness, high (> 1,000) CSF WBC count, and low CRP level were also poor prognostic factors..[Wang PI:2013] ^[17]

Our study Correlates with the study done earlier and results impress on the guidelines of American academy of paediatrics. ^[18] Impression of correlation Study of CSF Cell Values and Blood Count: By this we can imply that Polymorph can be considered as good predictor for subjecting the children for CSF analysis. Further study with large sample size should be initiated to standardise the result. Out of three available MRI reports one child was diagnosed to have acute bacterial meningitis, one child was diagnosed to have TB meningitis and one child was diagnosed to have viral encephalitis.

Conclusion

Most of the children had associated Respiratory tract infection(25%). Out of 94 children with fever and seizure 36 children had Generalised Tonic Clonic Convulsions and 58 children had focal seizures. Lumbar puncture and CSF Analysis was done for 45 children. Out of 45 children admitted with fever and seizure 22 children had Simple febrile seizure which

indicates that it is the most common cause of convulsion. Next to Simple febrile seizure the major cause of convulsion in children is SD DD(31%). 7 children had acute bacterial meningitis(14.8%), 1 child had tuberculous meningitis (2%), 2 children had viral meningitis (4.2%).

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