

Role of CSF Analysis for the First Episode of Febrile Seizure among Children between Six Months to Five Years of Age

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Abstract

Introduction: A febrile convulsion is defined as a seizure that occurs in association with fever in children from six months to five years of age, with no evidence of a central nervous system infection or other identifiable causes of seizure and no history of an afebrile seizure. Simple febrile seizures are brief (<15 minutes), generalized, and occur in association with fever and only once during a 24-hour period without postictal pathology. Febrile Seizures have longer duration (>15 min), or have focal features or if they recur within 24 hours are defined as complex. In May 1996, the American Academy of Paediatrics (AAP) issued practice parameters regarding the neurodiagnostic evaluation of children with a first simple febrile seizure, who present within 12 hours after the seizure. It may be due to meningitis. This study was done to find out role of cerebro spinal fluid (CSF) analysis to rule out the meningitis in different age group of children presenting with first episode of fever with seizure. **Design:** A prospective study was carried out from June 2008 to July 2009 at the Western Regional hospital, Department of Paediatrics, Pokhara, Nepal. A total of 110 hospitalized children between the age group five months to 5 years were included in the study. **Results:** 16 (14.54%) children were diagnosed to have meningitis. In the age group of 6 – 12 months, 6 (21.4%) had meningitis while in 12-18 months, 6 out of 31 (19.3%) had meningitis and in more than 18 months age group only 4 out of 51 (7.84%) were detected with meningitis. **Conclusion:** In cases of apparent febrile seizure, meningitis should always be considered as a differential diagnosis. Lumbar puncture is must to rule out meningitis in all children between the ages of six months to eighteen months presenting with first episode of fever with seizure to rule out meningitis, even in the absence of meningeal signs.

Key words: Febrile convulsion, CSF, lumber puncture, meningitis

Introduction

Although the relation between fever and convulsion in children had been documented by Hippocrates as early as 5th century B.C. it was not until 1980 that febrile seizures as a separate entity, separate from other types of convulsions in early childhood was discovered^{1,2}. In May 1996, the American Academy of Paediatrics (AAP) issued practice parameters regarding the neurodiagnostic evaluation of children with a first simple febrile seizure (FSFS) who present within 12 hours after the seizure³. FSFS was defined as a first episode of seizure accompanied by fever, manifested as a primary generalized seizure lasting \leq 15 minutes and

not recurring within 24 hours. The term febrile seizure is not intended for use among children with evident central nervous system infections or underlying seizure disorder⁴. Although childhood febrile seizures in most cases are benign and self limiting⁵, witnessing such seizures is a terrifying experience for most parents.

The AAP practice parameters recommended that lumbar puncture (LP) be strongly considered for patients <12 months of age and be considered for patients 12 to 18 months of age, in an effort to diagnose bacterial meningitis among children with FSFS as their sole

clinical manifestation of infection. The issue of whether a well appearing child presenting with an FSFS is at increased risk for bacterial meningitis has remained controversial^{6,7,8}. Probability of bacterial meningitis in children with fever with seizure varies from 0.6 to 6.7%⁹. Although there are quantitative data regarding the lumbar puncture yield among patients presenting with FSFS^{10,11,12}, there is no data from the large cohort of patients.

This study was conducted with the objectives to find out the role of CSF analysis to rule out the meningitis and therefore, to determine whether LP is necessary in children aged 6 months to 60 months presenting with first episode of fever with seizure.

Methodology

The study was a hospital based prospective study, conducted in the department of paediatrics, Western Regional Hospital, Pokhara, Nepal. Data were collected from June 2008 to July 2009. A hundred and ten (110) children aged six months to five years who presented with first episode of fever with seizure were included in the study. Children with other neurological disease like cerebral palsy, mental retardation, past history of meningitis with sequel, other neurological diseases, and fever after occurrence of seizure or on antibiotic for more than 48 hours were excluded from the study.

Children were considered as having fever if axillary temperature recorded at the emergency, OPD, or in the ward was >100.4 degrees fahrenheit. All patients were examined in detail by the Paediatricians of Western Regional Hospital as per standard examination methods. After taking informed consent from parents a lumbar puncture was performed and CSF was collected in two sterile vials. One vial was sent for cell count, differential

count, sugar and protein and the other for Gram's stain and culture. The CSF was analyzed as per standard laboratory methods by laboratory technicians.

Meningitis was diagnosed in a child presenting with fever and seizure if he/she had a combination of all three of the following:

1. CSF cells >5/mm³, protein more than 40 mg% and sugar < 2/3 of blood sugar level.
2. Growth of bacteria in the CSF and/or bacteria seen on Gram's stain was considered as bacterial meningitis.
3. Those growth culture media that grew contaminated/multiple organisms were excluded in the analysis.

Results

There were a total of 110 cases that presented with first episode of fever and seizure between six months to five years of age. Among them, 64 (58%) were male and 46 (42%) were female children. There were a total of 28 children in the 6-12 months age group, 31 in 12-18 months and 51 in above 18 months age. Among them 16 (14.54%) children were diagnosed to have meningitis. Other causes of seizure associated with fever were Upper Respiratory Tract Infection 31 (28%), Urinary Tract Infection 18 (16%), Pneumonia 27 (24.5%), Encephalitis 4 (4%), Gastroenteritis and other non specific infection 14 (13%). As compared to older children, the children less than 12 months of age were detected to have be diagnosed as meningitis, and which was statistically significant ($p = 0.001$). In the age group of 6 – 12 months, 6 (21.4%) had meningitis while in 12-18 months, 6 out of 31 (19.3%) had meningitis and in more than 18 months age group only 4 out of 51 (7.84%) were detected with meningitis (Table 1).

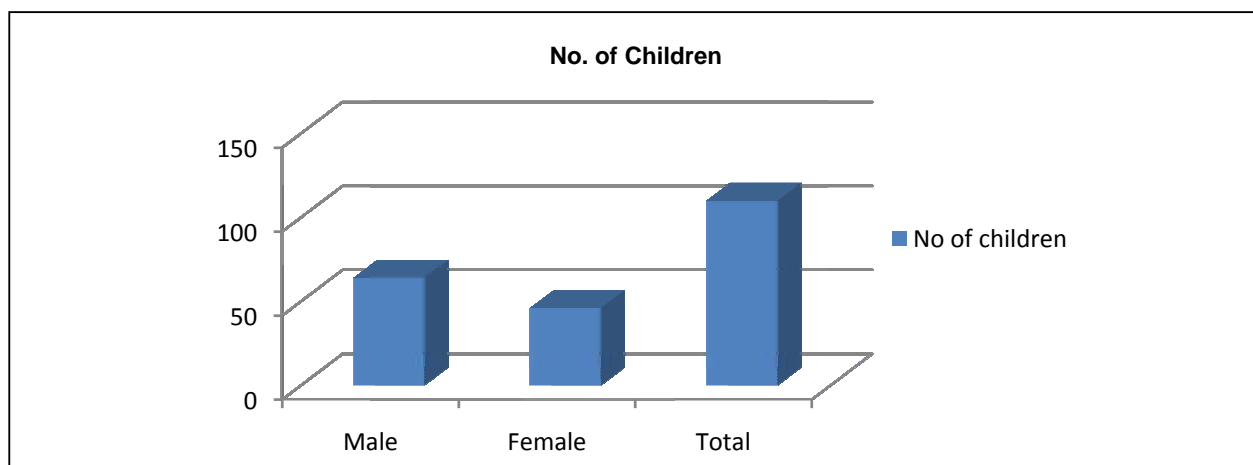


Fig 1: Showing sex distribution which did not show any significance in this study.

Table 1: Showing details of meningitis in this study.

Age	Number of Children	Meningitis	Percentage	p-value
6-12 months	28	6	21.4	0.022
12-18 months	31	6	19.3	0.041
18-60 months	51	4	7.54	0.305
Total	110	16	14.54	

P value < 0.05

Table 2: Showing causes attributed to febrile convulsion in this study.

Cause of Febrile Convulsion	Number (n=110)	Percentage (%)
URTI	31	28%
UTI	18	16%
Pneumonia	27	24.50%
Meningitis	16	14.50%
Encephalitis	4	4%
Gastroenteritis and other	14	13%
Total	110	100%

(URTI=Upper Respiratory Tract Infection, UTI= Urinary Tract Infection)

Discussion

Febrile seizures are the most common form of seizures seen in children; their predominantly benign nature is demonstrated in all researches in this field, but a small minority of children presenting with FS can develop epilepsy later in adolescent or adulthood. Febrile seizures are provoked by fever and usually develop within the first 24 hours of the febrile illness. No specific level of fever is required to trigger FS. Despite the commonly held belief that the rise in fever per se is the main risk factor for developing seizures, there is still no evidence to support this view. There is, as yet, no evidence of the effectiveness of antipyretics in preventing future febrile seizures either^{13, 14, 15, 16}.

Meningitis is a medical emergency in children and should not be missed in any children with fever with seizure. Among the 110 cases, 16 had meningitis showing that almost one seventh of children presenting with febrile seizure have meningitis. In a study done in KCH, 10.9% of patients with apparent first febrile seizure were found to have meningitis¹⁷. Other studies on meningitis in apparent febrile seizure have found the incidence of meningitis to vary from 2-7 %^{18, 19, 20, 21}. Our finding was comparatively higher than from studies done outside the country. It was seen that in the younger age group, there was significant probability of having meningitis without signs of meningeal irritation than in older children²². Guidelines for the neurodiagnostic evaluation and management of febrile convulsion have strongly recommended the performance of LP in all children below 12 months presenting with fever and seizure^{23,24}.

Conclusion

In conclusion, it was found that meningitis is a common presentation in the paediatric emergency department in children who come with apparent febrile seizure thus meningitis should always be considered as a differential diagnosis. Lumbar puncture and CSF analysis is must to rule out meningitis in all children between the ages of 6 months to 18 months presenting with first episode of fever with seizure, even in the absence of meningeal signs. This is more so in children less than one year of age.

Acknowledgements: We would like to thank Dr. Budhi Bdr Thapa, Medical Superintendent, who permit to do this study, to Dr. Vinod Tulachan, head of department of paediatrics for his encouragement, all medical officers and interns of the department of paediatrics who helped me to collect the cases and Dr. Arun Neopane, editor of this journal without his help this article would not have taken its shape.

Funding: None.

Conflict of Interest: None.

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