



## Original Article

# Role of Lumbar Puncture for First Simple Febrile Seizure Among Children 6 to 18 Months of Age

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### Abstract

**Introduction:** Fever with seizure is a common childhood emergency. This may be due to febrile seizure or CNS infection like meningitis. Febrile seizure makes up the most common convulsive event in children 6 months to 5 years of age. Despite the commonness of this clinical problem, the need for routine lumbar puncture following a first simple febrile seizure below 18 months of age to exclude meningitis continues to be debated.

**Objectives:** To evaluate the role of lumbar puncture for first simple febrile seizure among children 6 to 18 months of age and to determine the causes of fever of the patient presented with fever with simple seizure in this age group.

**Methodology:** This cross-sectional type of descriptive study was conducted at Paediatric department of Rajshahi Medical College from January 2013 to December 2014. A total of 73 children ages 6 months to 18 months with first simple febrile seizure were enrolled by purposive sampling technique. Lumbar puncture was performed in all patients to evaluate occult meningitis.

**Results:** A total of 73 children ages 6 months to 18 months with first simple febrile seizure were included in the study. 37% (n = 27) were < 12 months of age and 63% (n = 46) were ≥12 months of age with a mean age 13±3.575 months. 43.8% of our study population had family history of febrile seizure. CSF findings of all children > 12 months of age group 63% (n = 46) were normal but in case of age group <12 months, out of 37% (n = 27) cases, only one case showed abnormal CSF finding.

**Conclusion:** It is concluded that lumbar puncture following first simple febrile seizure without any other features of meningitis may be done in children < 12 months of age.

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### Introduction

Fever with seizure is the most common type of disorder occurring in children.<sup>1</sup> This may be due to febrile seizure or a more serious condition like meningitis. Febrile seizures (FS) is defined as a seizure accompanied by fever (temperature ≥ 100.4°F or 38°C), without central nervous system infection, that occurs in infants and children 6 to

60 months of age; its incidence is 2-5 % in this age group.<sup>2</sup> For clinicians, there are divergent views on how these children should be managed. Lots of controversies exist among different authorities particularly in performing LP in patients below 18 months of age because clinical sign of meningitis may be subtle in this age group.<sup>3,4</sup> While some authorities recommends in its favor because

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meningitis is associated with high mortality and morbidity if not detected and treated early but some other deny.<sup>5,6</sup>

Although CSF examination by LP is the single most informative test for the diagnosis of CNS infection but since complications such as osteomyelitis of the spine;<sup>7</sup> epidermoid tumor of the spinal cord;<sup>8</sup> flaccid paraplegia;<sup>9</sup> and cardiac arrest<sup>10</sup> have all been encountered following spinal tap, so careful consideration of its potential value and risks as a diagnostic tool is mandatory.

The incidence of common communicable febrile illness is high in Bangladesh due to overpopulation and lack of awareness. If lumbar puncture is not routinely done in a patient with simple febrile seizure <18 month of age, the agony of pain, fear of complications and unnecessary expense and workload could be eliminated in many of these patients. So this study was a rationale one to find out the role of lumbar puncture for first simple febrile seizure among children aged from 6 to 18 months, which would be helpful for the concerned physicians, if reliable, to avoid such an invasive procedure.

### Methodology

The study was a hospital based cross-sectional descriptive type of study which included 73 patients fulfilling the selection criteria conducted at indoor pediatric department of Rjshahi Medical College Hospital. All children between 6-18 months of age with first simple febrile seizure were included in this study. The parents were counseled about the nature of the study. An informed written consent was taken from the parents of the patient for doing LP.

After taking all aseptic precaution LP was done under deep sedation by per rectal diazepam 0.5mg/kg/dose. Total 3-4 ml of CSF was collected in two sterile test tubes. Then CSF containing one test tube was immediately sent for biochemical (For protein and sugar) test by automated analyzer and another for cytological examination, Gram's stain and immediate inoculation in culture medium for culture and sensitivity test. Culture of CSF was done in conventional culture media. Also complete blood count, urine routine and microscopic

examination, and x-ray chest was done for reaching a diagnosis.

### Data analysis

All data were checked and edited after collection. Later the data were put into computer and were analyzed with the help of SPSS version 16.0 for windows. Statistical analyses were done by applying concerned appropriate statistical tests with 95% or 99% confidence interval.

### Ethical clearances

This research was carried out after taking approval from Ethical Review Committee (ERC) of Rajshahi Medical College, Rajshahi. Finally informed written consent was obtained from the patient's guardians. Confidentiality of the data was strictly maintained.

### Results

A total of 73 cases who presented with first simple febrile seizure between 6 months to 18 months of age were included. Among them, 45 cases (61.1 %) were male and 28 cases (38.36 %) were female. The ratio of male: female was 1.6:1. They were categorized into two age groups (6 months to <12 months and 12-18 months) according to the American Academy of Pediatrics (AAP) guidelines for evaluating children presenting with febrile seizures. 27 (37%) children aged 6 months to <12 months, 46 (63%) children in 12-18 months age. Majority of children were in the age group of 12 to 18 months. 32(43.8%) cases had a positive family history of febrile seizure. Among them 14(19.2%) had 1st degree and 18(24.7%) had other than 1st degree relatives. 41 (56.2%) had no family history of febrile seizure.

Most of the children 72(98.6%) had CSF protein and cell count within normal limit, only one (1.4%) had raised protein and cell count but Gram's stains and culture were negative in all patient's CSF. According to age group, in case of < 12 months age, out of 27 cases 1 (3.7%) patient had abnormal CSF findings and > 12 months of age group CSF findings of all cases out of 46 children were normal. The causes of fever of our study population were URTI 42(58.3%), Pneumonia 11(15.2%), UTI 9(12.5%), and Meningitis 1 (1.4%), others including ASOM,

Acute Tonsillitis, and Acute Gastroenteritis 10 (13.9%). Highest number of patients 42(58.3%) had been suffering from viral URTI.

**Table-1.** Distribution of the children by CSF findings.

CSF study		Number	Percent
Sugar	Normal (>40 mg/dl)	73	100%
	Decrease (<40 mg/dl)	00	00%
Protein	Normal (<45 mg/dl)	72	98.6%
	increase (>45 mg/dl)	1	1.4%
WBC count	<5/mm <sup>3</sup>	72	98.6%
	≥5/mm <sup>3</sup>	1	1.4%
Gram's stains	Positive	00	00%
	Negative	73	100%
Culture	Growth	00	00%
	No growth	73	100%

Most of the children 72(98.6%) had CSF protein and cell count within normal limit only one (1.4%) had raised protein and cell count from CSF examination finding but Gram's stains and culture were negative in all patient's CSF.

**Table-2** Relationship between age group and CSF findings.

Age group	Normal CSF findings N(%)	Abnormal CSF findings N(%)	Total N(%)
<12 months	26(96.3%)	01 (3.7%)	27 (37%)
≥12 months	46(100%)	00(00%)	46(63%)
Total	72(98.6%)	01(1.4%)	73 (100%)

Above table shows that < 12 months of age group out of 27 cases 1 (3.7%) patient had abnormal CSF findings and > 12 months of age group CSF findings of all cases out of 46 children were normal.

Highest number of patients 42(58.3%) were suffering from URTI, 11(15.2%) from Pneumonia, 9(12.5%) from UTI, 1(1.4%) from Meningitis and 10(13.9%) from others including ASOM, Acute Tonsillitis, Acute Gastroenteritis.

**Table-3.** Distribution of the children by causes of fever.

Causes of fever	Number	Percent
Upper respiratory tract infection (URTI)	42	57.5
Pneumonia	11	15.1
UTI	9	12.3
Meningitis	1	1.4
Others	10	13.7
Total	73	100

## Discussion

In this study, children aged from 6 months to 18 months presenting with first episode of fever with simple seizure to the emergency department of Rajshahi Medical College Hospital were included as the study population. The study result revealed that out of 73 children, 45 cases (61.6 %) were male and 28 cases (38.4%) were female. The male female ratio was 1.6:1. In this study a majority of these children 63% (n = 46) were ≥12 months of age with a mean age 13±3.57 months. About forty three percent (43.8%) of our study population had family history of febrile seizure. Among them 19.2% had 1st degree relatives and 24.7% other than 1st degree. 22% of children of the study populations of van Stuijvenberget al.<sup>11</sup> study had at least one affected first degree relative among 228 children. Similarly another study done by van Eschet al.<sup>12</sup> had shown that 18% (n=21) children had affected first degree relatives and 22% (n=25) children had affected other relatives of a total 115 with a first febrile seizure. So family history of febrile seizure in this study is closely similar to these two studies.

Among the symptoms on presentation, apart from fever and simple seizure, the most common symptoms were runny nose 65% (n=47) and cough 42% (n= 31), vomiting 14 (19%), diarrhoea 5(7%). The common signs on presentation were mildly pale 59(81%), tachycardia 20 (27%), tachypnea 10(13.7%), mild to moderate dehydration 16(22%), cardiac murmur 5(7%) and Ear discharge was present in 4(5.5%) patients. This is comparable to other studies done on febrile seizures. Abuekteishet al.<sup>13</sup> studied 203 children with first febrile seizure and they found that upper

respiratory tract infection was the commonest triggering factor, diagnosed in 53% of cases. Saeed et al.<sup>14</sup> have shown that the causes of pyrexia in 272 cases of febrile seizures are URTI 214 (79%), pneumonia/Bronchiolitis 30(11%), gastroenteritis 20 (7%), meningitis 6(2%), UTI 2(0.73%). In Laditan A.A.<sup>15</sup> study majority of cases were found to be preceded by history of coryza, cough, respiratory distress and bloody stools. Trainor et al.<sup>16</sup> found 12.5% of cases to have a chest radiograph consistent with pneumonia in a child with febrile seizure.

In this study, CSF findings of all children > 12 months of age group (n = 46) were normal and in case of < 12 months age group, (n=27) one patient (3.7%) had shown abnormal cell count and biochemical feature but gram's staining and culture had shown no organism and this patient was treated as a case of meningitis. This patient age was 6 months and had developed seizure on third day of fever and he was drowsy at the time of examination. Many studies have shown the similar result who has worked with the patient with simple febrile seizure. Hampers et al.<sup>17</sup> studied 455 patients who presented with first SFS and found that no patient had bacterial meningitis. In the largest study by Kimia et al.<sup>4</sup> showed that none out of 704 children with first simple febrile seizure had meningitis. Batra et al.<sup>18</sup> had a study in the Indian population aged 6-18 months where prevalence of meningitis was 0.86% in simple febrile seizures. Study conducted by Hom and Medwid<sup>19</sup> in 150 children between ages 6 and 18 months of age with SFS and the overall rate of meningitis was 0% (95% confidence interval [CI] = 0.0% to 3.0%). In other studies<sup>11,16,20,21</sup> also showed that none of the simple febrile seizures had meningitis.

So it is evident that in a patient with simple febrile seizure it is less likely to have meningitis without any other clinical feature of meningitis. Meningitis is a progressive disease and it will manifest at its own. Children with seizures associated with fever should be referred to hospital. A lumbar puncture should be performed when meningitis is suspected. It should not be carried out as a routine procedure.

## Conclusion

The risk of bacterial meningitis presenting as first simple febrile seizure among children 6 to 18 months of age is very low. Lumbar puncture should be done in children < 12 months of age presented with first simple febrile seizure as because one positive case was found in this age group.

## Recommendation

1. In first simple febrile seizure routine LP is not always required. It is recommended in children < 12 months of age, as because one positive case was found in this study belonging to this age group.

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