



## RATIONALITY OF CEREBROSPINAL FLUID STUDY IN SIMPLE FEBRILE SEIZURE IN AGE GROUP 6 MONTHS TO 18 MONTHS

### Paediatrics

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### ABSTRACT

**Background:** Febrile seizures are the most commonly encountered emergency visits in the Pediatric Department and it represents the most common form of childhood seizures, affecting approximately 3-8% cases between 6 months to 60 months of age with peak incidence showing between 12 to 18 months. **Aim:** To determine the incidence of acute bacterial meningitis in children between 6-18 months of age presenting with first episode of simple febrile seizure and find out the rationality of performing routine lumbar puncture in these cases. **Materials and Methods:** It was a hospital based prospective study where 81 cases presenting with first episode of simple febrile seizure between age group 6-18 months in Pediatric Department were subjected to CSF analysis by performing lumbar puncture. Meningitis was defined on cerebrospinal fluid analysis having more than 100 white blood cells, raised CSF protein more than 100 mg/dl and decreased CSF glucose less than 2/3rd of blood glucose. Blood sugar was recorded prior to performing lumbar puncture to compare with CSF glucose to interpret the results. **Results:** Among the 81 cases enrolled, 7.4% (6 cases) were diagnosed as acute bacterial meningitis based on CSF findings. 66.7% (4 cases) were females and rest 33.3% (2 cases) were males. 50% (3 cases) of the diagnosed cases of meningitis had no symptoms of refusal to feed, 83.3% (5 cases) had no bulged anterior fontanelle on examination and 100% (6 cases) had no altered sensorium. This study showed a positive co-relation between no symptoms and meningitis in simple febrile seizure (p value <0.0001). **Conclusion:** This study provides evidence that febrile seizure can be the sole manifestation of acute bacterial meningitis in children less than 18 months in whom clinical signs could be subtle or even absent. Therefore, routine lumbar puncture should be done in children presenting with first episode of simple febrile seizure for early diagnosis and treatment.

### KEYWORDS

Febrile seizure, Acute bacterial meningitis, Lumbar puncture.

### INTRODUCTION

Febrile seizures are the most commonly encountered cases during the emergency in the department of pediatrics. It is the most common form of childhood seizures, affecting approximately 3-8% cases between 6 months to 60 months of age with peak incidence between 12 to 18 months of age. Simple febrile seizures are usually benign in nature and hence treated conservatively. However, a seizure associated with fever, is mostly due to febrile seizure but may also be due to meningitis.<sup>[5,6,8]</sup>

Acute bacterial meningitis is defined as inflammation of the meninges. It is one of the major causes of mortality and morbidity in the world mainly in the pediatric population. Even though newer and potent antibiotics are available, the mortality due to ABM (acute bacterial meningitis) remains in the higher side in developing countries like India. It is a medical emergency and, in any child, it should not be missed, as the progression of the disease is very rapid and can lead to long term neurodevelopmental sequelae. The association between acute bacterial meningitis and seizure is well established, but how commonly seizures are the sole clinical manifestation of bacterial meningitis in a child with simple febrile seizure is still a debatable question.<sup>[7,9,10]</sup> Children less than 18 months of age with meningitis show few subtle features only like, vomiting, excessive crying, refusal to feed and typical signs of meningitis such as neck rigidity may be minimal or totally absent. So here the role of lumbar puncture comes into play for the work up of meningitis by CSF analysis.<sup>[11,12,13]</sup>

The American Academy of Pediatrics on febrile seizure recommended obtaining a lumbar puncture in every child less than 12 months of age, and also considering it in children aged 12-18 months, who manifest first simple febrile seizure, for the sake of diagnosing meningitis via cerebrospinal fluid analysis.<sup>[4]</sup> Newer studies show that a lumbar puncture may not be necessary for a first simple febrile seizure episode because, it is quite uncommon for a brief, simple, non-focal seizure to be the sole manifestation of bacterial meningitis. However, the occurrence of meningitis may be more for developing countries like India due to inadequate vaccination, overcrowding and poor nutritional status.<sup>[2]</sup>

With this background, the aim of our study is to find the occurrence of acute bacterial meningitis in children aged 6-18 months presenting

with first episode of simple febrile seizure based on CSF findings and to find out the rationality of performing routine lumbar puncture in these cases.

### MATERIALS AND METHODS

It was a single centre hospital based, prospective study conducted for a duration of one year from 1<sup>st</sup> June 2021 to 31<sup>st</sup> May 2022 in the Department of Pediatrics, GMCH. Cases presenting with first episode of simple febrile seizure between age group 6-18 months in Pediatric Department, GMCH were subjected to CSF analysis by performing lumbar puncture.

An average of 137 simple febrile seizure cases gets admitted in the Department of Paediatrics, GMCH yearly, among which 103 cases fulfil the inclusion criteria. The sample size was calculated to be 81 by OpenEpi sample size calculator using formula:

$n = [DEFF \cdot Np(1-p)] / [d^2 / Z_{1-\alpha/2}^2 (N-1) + p(1-p)]$  taking confidence interval of 95%.

Patients included in the study were both male and female children between 6-18 months age group who had first episode of simple febrile seizure.

Children with history of prior neonatal or afebrile seizure, known case of epilepsy, children with underlying neurological or metabolic conditions which lead to seizure were excluded.

Meningitis was diagnosed with CSF findings of total WBC count > 100 cells/mm<sup>3</sup>, raised CSF protein more than 100 mg/dl and decreased CSF glucose less than 2/3<sup>rd</sup> of blood glucose. Blood sugar was recorded prior to performing lumbar puncture to compare with CSF glucose to interpret the results. Informed consent from parents/caregiver was taken prior to performing a lumbar puncture in them. The procedure was done as per standardized protocol under aseptic measures. CSF was sent to biochemistry and microbiology laboratories for the analysis of white blood cell count, protein and sugar to assess the presence of meningitis. All information was collected through specially designed proforma.

The method used for CSF analysis was Wet Mount method for Total

count estimation and Leishman-stained smear for Differential leucocyte count.

CSF sugar and protein is estimated using the Ortho Clinical Diagnostics Vitros 5600 machine.

#### Statistical Analysis

This was done using IBM SPSS statistic version 26.0. Any p value <0.05 was considered statistically significant.

### RESULTS

The age in the study population was between 6 months to 18 months. The highest frequency was found to be in the 7-12 months age group. The mean age is  $11.27 \pm 3.87$  months.

Among the 81 cases enrolled, 7.4% (6 cases) were diagnosed as meningitis based on CSF findings (Fig 1) among which 66.7% (4 cases) were females and rest 33.3% (2 cases) were males (Table 1).

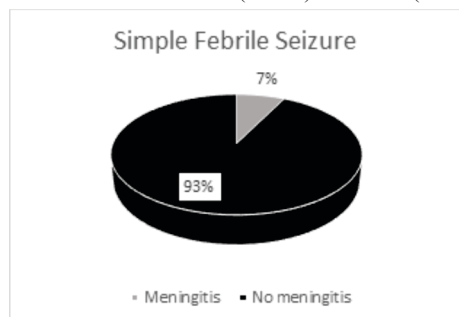


Fig 1: Showing Diagnosed Cases Of Meningitis

Table 1: Showing Clinical Features Distribution Among Patients With Acute Bacterial Meningitis

| SIGNS & SYMPTOMS                                               | ACUTE BACTERIAL MENINGITIS (n=6) | NO MENINGITIS (n =75) |
|----------------------------------------------------------------|----------------------------------|-----------------------|
| Fever                                                          | 100% (6)                         | 100% (75)             |
| Seizure                                                        | 100% (6)                         | 100% (75)             |
| Male                                                           | 33.34% (2)                       | 69.33% (52)           |
| Female                                                         | 66.66% (4)                       | 30.66% (23)           |
| Refusal to feed                                                | 50% (3)                          | 0%                    |
| No refusal to feed                                             | 50% (3)                          | 100% (75)             |
| Altered Sensorium                                              | 0%                               | 0%                    |
| Bulged anterior fontanelle                                     | 16.67% (1)                       | 0%                    |
| No bulged anterior fontanelle                                  | 83.37% (5)                       | 100% (75)             |
| No refusal to feed and meningitis (p value <0.0001)            |                                  |                       |
| No bulged anterior fontanelle and meningitis (p value <0.0001) |                                  |                       |

In this study, out of the 6 diagnosed cases of acute bacterial meningitis, except for fever and seizure, the other neurological signs and symptoms were very minimal (Table 1 and Fig 2). 50% (3 cases) of the diagnosed cases of meningitis had no symptoms of refusal to feed, 83.3% (5 cases) had no bulged anterior fontanelle on examination and 100% (6 cases) had no altered sensorium. The comparison of no refusal to feed and no bulged anterior fontanelle with meningitis in simple febrile seizure was found to be statistically significant (p value <0.0001).

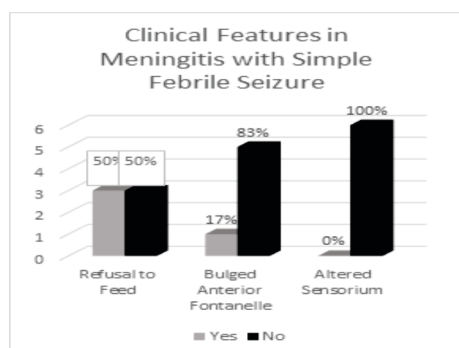


Fig 2: Showing Clinical Features Distribution Among Patients

### With Meningitis

Table 2: Showing Immunization Status In Acute Bacterial Meningitis Cases

| Immunization status in acute bacterial meningitis (n=6) | Administered | Not administered |
|---------------------------------------------------------|--------------|------------------|
| PCV                                                     | 0            | 100% (6)         |
| Pentavalent                                             | 4            | 33.3% (2)        |

In this study, among the 6 cases of acute bacterial meningitis, all the children (100%) were not immunized till date as per their age under National Immunization Schedule.

Out of 6 cases of acute bacterial meningitis (Table 2), 100% (6 cases) cases did not receive 3 complete doses of Pneumococcal vaccine and 33.3% (2 cases) cases did not receive 3 complete doses of pentavalent vaccine.

Table 3: Showing Csf Culture Growth In Acute Bacterial Meningitis Cases

| CSF Culture | Acute Bacterial Meningitis (n=6) |
|-------------|----------------------------------|
| Growth      | 16.67% (1)                       |
| No growth   | 83.33% (5)                       |

Out of 6 cases of acute bacterial meningitis (Table 3) 16.67% (1 case) showed positive CSF culture growth (*Streptococcus pneumoniae*) and rest 83.33% (5 cases) showed no growth on CSF culture.

### DISCUSSION

In this study, a total of 81 cases between 6-18 months of age presenting with first episode of simple febrile seizure admitted in the Department of Paediatrics, GMCH, were included. This study was carried out to find the incidence of acute bacterial meningitis among children who presented with first attack of simple febrile seizure and the necessity of whether a lumbar puncture should be performed for every such case. Meningitis was diagnosed by analysing the CSF which was collected at the time of admission before starting antibiotics. Out of the 81 cases, 6 cases (7.4%) were diagnosed as meningitis based on CSF findings which showed an increase in CSF total cell count with predominance of polymorph neutrophils, high protein concentration and low glucose level.

1 case of acute bacterial meningitis showed positive CSF culture growth of the organism *Streptococcus pneumoniae*.

In this study, 3 complete doses of Pentavalent and PCV 10 vaccination coverage under NIS is being highlighted in the background of organisms causing bacterial meningitis. All the 6 diagnosed cases of meningitis (100%) were not completely immunised with pneumococcal vaccine and 33.3% (2 cases) did not receive complete doses of pentavalent vaccine.

Perna Batra et al in 2011 conducted a prospective cohort study in 497 patients exhibiting first episode of seizures. 20% of the study population presenting with simple febrile seizure had meningitis.<sup>[1]</sup>

C Saluja et al in 2021 conducted a cross sectional study in 200 patients between the age of 6 months to 18 months presenting first episode of febrile seizure to find the incidence of meningitis. 12.5% cases of simple febrile seizure had meningitis. The study concluded that India should have its own guidelines for lumbar puncture in patients with first episode of febrile seizure.<sup>[2]</sup>

Azita Tavasoli et al in 2014 conducted a retrospective study in 681 patients within 1 month to 6-year age group presenting with first episode of febrile seizure cases to determine the incidence of meningitis. 15.8% of simple febrile seizure cases had meningitis. The study concluded that meningitis was more common in patients less than 18 months age and advocated the use of lumbar puncture in children less than 18 months of age presenting with first episode of febrile seizure.<sup>[3]</sup>

In 2011 American Academy of Pediatrics (AAP) committee formulated recommendations to consider meningitis as differential diagnosis in any febrile child. Lumbar puncture should be considered for infant between the age of 6 and 12 months presenting with a seizure and fever and has not received *Haemophilus influenzae* type b (Hib) or *Streptococcus pneumoniae* immunization or whose immunisation

status is unknown.<sup>[4]</sup>

## CONCLUSION

This study provides evidence that febrile seizure can be the sole manifestation of acute bacterial meningitis in children less than 18 months in whom clinical signs could be subtle or even absent thus, misleading a physician to diagnose the disease which is 100% treatable. Therefore, to prevent mortality and morbidity of this treatable disease, routine lumbar puncture should be done in children presenting with first episode of simple febrile seizure for early diagnosis and treatment.

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