

FREQUENCY OF ACUTE BACTERIAL MENINGITIS IN CHILDREN PRESENTING CLINICALLY AS FIRST SIMPLE FEBRILE SEIZURES UNDER 6 YEARS OF AGE.

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ABSTRACT

OBJECTIVE: To determine the frequency of acute bacterial meningitis in children (6 months to 6 years) presenting with first episode of simple febrile seizures.

STUDY DESIGN: A Cross sectional study.

PLACE AND DURATION OF STUDY: Rawal Institute of Health Sciences Islamabad over a period of one and half year from 1st August 2013 to 31st January 2015.

METHODOLOGY: One hundred and fifty patients of both genders aged from 6 months to 6 years were included who presented with fever and first episode of seizures but with no definite signs of meningitis. Sample of cerebrospinal fluid was sent to laboratory for cerebrospinal fluid (CSF) routine examination including cell count, protein and glucose content of CSF.

RESULTS: There were 103 males and 47 females with mean $\pm$ SD of age 2.31 $\pm$ 1.65 years. The mean $\pm$ SD of protein, glucose and TLC were 53.89 $\pm$ 51. Mg/dl, 69.27 $\pm$ 22.51 mg/dl and 4.91 $\pm$ 4.37/mm³ respectively. Among 150 children, 14 children had an acute bacterial meningitis.

CONCLUSION: Meningitis have been documented in significant number of children with fever and seizures. Children less than six years of age is a major group at risk and Lumbar Puncture (LP) should be performed in every case of febrile seizures in this age group.

KEY WORDS: Simple Febrile Seizure, Lumbar Puncture, Bacterial Meningitis

INTRODUCTION

A febrile seizure is accompanied by temperature $>100.4^{\circ}\text{F}$ but without central nervous system infection, occurs in children of 6 months to 6 years of age.¹ First simple febrile seizures (FSFS) are defined as first episode of primary generalized seizures that lasts for less than 15 minutes and do not recur within 24 hours.² Febrile seizures occur in 2-5% of all children.³

Febrile seizures occur in children during development phase when the threshold for seizures is low. At that time children are more prone to frequent infections such as otitis media, upper respiratory tract infections, viral infections, and they present with comparably higher temperature.⁴ Infections other than central nervous system that leads to febrile seizure include otitis media, pharyngitis, and viral infection, which are difficult to assess clinically in children less than 1 year of age.⁵ Fever with seizures can be a manifestation of meningitis. Meningitis should be entertained in differential diagnosis of febrile seizures as clinical signs of meningeal irritation like Kernig's, Brudzinksi,

and neck stiffness are not present in children less than 2 years of age.⁶

Incidence of meningitis was found to be high in children presenting with first episode of fever and seizures.⁷ Various studies showed that children between 6-18 months with first episode of simple febrile seizures were evaluated for meningitis even though they had no evidence of meningeal irritation.^{8,9} In one study the incidence of meningitis was about 10% in children presenting with first simple febrile seizures.¹⁰ 12-15% of individuals with bacterial meningitis die in developing countries, compared to 5% in developed countries.¹¹ Meningitis is a major cause of child mortality in Pakistan where 5% of deaths under five years of age are due to meningitis.¹²

The matter of well-appearing children presenting with first simple febrile seizures are at increased risk or not for bacterial meningitis has remained controversial¹³, due to less quantitative data and the inclusion from the pre-*Haemophilus influenza* type B vaccine era data.¹⁴ Febrile seizure is a frequent cause of hospitalization. Its management remains problematic. According to the American Academy of Pediatrics (AAP) in 1996, lumbar puncture, which is not devoid of risk, is strongly recommended in infants under 1 year.¹⁵

This study is designed to find out the frequency of meningitis in children (6 months to 6 years) presenting with first episode of febrile seizures. So to give recommendations regarding doing lumbar puncture in children (6 months to 6 years) presenting clinically as first simple febrile seizures (FSFS).

METHODOLOGY

This Cross sectional study was done over a period of one and half year from 1st August 2013 to 31st January 2015 at Rawal Institute of Health Sciences Islamabad. 150 patients were studied according to Non-probability consecutive sampling. Children of age 6 months to 6 years having first simple febrile

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seizures as mentioned in operational definition, presenting to emergency or outpatient within first 24 hours of seizures were included in study. Exclusion criteria was Children having complex febrile seizures, that is more than 15 minutes, is focal and /recurs within 24 hours of similar illness, A febrile status epileptics that is a febrile seizure lasting >30 minutes, Children having cerebral palsy, epilepsy, mental retardation and seizures due to other causes. Written informed consent for enrolment in study was obtained from the patient's caretaker. Lumbar puncture was done with complete aseptic measures and samples were sent to the hospital laboratory. Results were documented by hospital pathologist, and numbers of patients with positive cerebrospinal fluid R/E were calculated.

Data was analyzed by SPSS version 14. Qualitative variables like sex, acute bacterial meningitis were presented in frequency and percentages. Quantitative variables like age, CSF protein, CSF sugar, CSF TLC were presented in mean and standard deviations.

Operational Definitions

Simple Febrile seizures: Patients coming with first episode of simple seizures with fever ($>102.2^{\circ}\text{F}$ (39°C)) without any evidence of central nervous infection, such as (<18 months no bulging of anterior fontanel and >18 months to 6 years=no signs of meningeal irritation) and lasting for less than 15 minutes.

Acute bacterial meningitis: It will be diagnosed on laboratory evidence of cerebrospinal fluid routine examination .Lumbar puncture in acute bacterial meningitis shows (leukocyte 100-600/mm³ with predominance polymorphonuclear PMN,

protein 100-200mg/dl).

RESULTS

There were 106 (70.7%) males and 44 (29.3%) females with male to female ratio was 2.4:1. There were 66 children (44%) in age group 6-12months ,44 children (29.3%) in age group 13-36 months and 40 (26.6%) in age group 37-60months. The mean $\pm$ SD of age was 25.60 $\pm$ 19.25 months.

Table I showed the CSF total leucocyte count (TLC), 137 children (94.4%) had TLC level between 2-100/mm³ 09 children (6%) had TLC level between 101-200/mm³, 3 children (2%) had TLC level between 201-300/mm³ and 1 child (0.6%) had TLC level between 301-500/mm³. The mean $\pm$ SD of TLC was 4.91 $\pm$ 4.37/mm³ protein level in the CSF R/E, 135 children (90%) had CSF protein 8 – 100 mg/dl, 13 children (8.7%) had protein 101-200 mg/dl and 2 children (1.3%) had protein 201-450 mg/dl. The mean $\pm$ SD of protein was 53.89 $\pm$ 51.26 mg/dl.

There were 35 children (23.3%) had CSF R/E glucose values between 21-40 mg/dl, 106 children (70.7%) had glucose values between 41-100 mg/dl and 9 children (6%) had glucose values between 101-150 mg/dl. The mean $\pm$ SD of glucose was 69.27 $\pm$ 22.51 mg/dl (Table II).Thirteen children (8.6%) had acute bacterial meningitis and 137 (91.3%) had no acute bacterial meningitis (Table III).

Six patients (4.6%) were in age group 6-12moths ,4 (30.7%)in 12-36 months and 3(23%) in 37-60 months .while 9 (6%) patients were male and 6 (2.6%)were female patients (Table IV).

TABLE I: FREQUENCY AND PERCENTAGE OF CSF TLC/mm³ (n = 150)

TLC /mm ³	Number	% age
10 -99	137	91.4
100 - 200	09	6
201 - 300	3	2
301-500	1	0.6
Mean $\pm$ SD	4.91 $\pm$ 4.37	

TABLE III: FREQUENCY AND PERCENTAGE OF ACUTE BACTERIAL MENINGITIS (n = 150)

Acute Bacterial Meningitis	Number	% age
Yes	13	8.7
No	137	91.3

TABLE II: FREQUENCY AND PERCENTAGE OF CSF GLUCOSE (mg/dl) (n = 150)

Glucose (mg/dl)	Number	% age
21 - 40	35	23.3
41 - 100	106	70.7
101 - 150	9	6.0
Mean $\pm$ SD	69.27 $\pm$ 22.51	

TABLE IV: ACUTE BACTERIAL MENINGITIS ACCORDING TO AGE AND SEX OF THE PATIENTS (n = 13)

Age (month)	Number	% age
6 to 12	6	46.1
13 to 36	4	30.8
37 to 59	3	23.1
Gender		
Male	9	69.23
Female	4	30.77

DISCUSSION

It is estimated that all over the world 7.6 million children died under 5 years of age. 64.0% (4.879 million) of them were died due to infectious causes. Half (3.754, 49.3%), millions of total global deaths in children less than 5 years of age occurred in developing countries like Pakistan, India, Nigeria, China and Congo. Most of them were due to infectious diseases like malaria, pneumonia, diarrhea etc.¹⁶

In one study the majority of acute bacterial meningitis episodes

were due to community-acquired infections (97.9%).¹¹ Bacterial meningitis incidence is quite high in infants with fever ,so it should be evaluated in the differential diagnosis of other causes of febrile seizures like pharyngitis, otitis media and viral infection.¹⁷

The importance of diagnosing acute bacterial meningitis in young pediatric patients presenting with first simple febrile seizures is paramount; the disease progresses quickly and can

cause long-term damage less than a day after symptoms arise.¹⁸ Immediate medical attention is vital to the patient's survival and long-term well-being. Lumbar puncture is effective in diagnosing acute bacterial meningitis and is therefore a standard procedure in differential diagnosis when a patient presents with febrile seizure.¹⁹

This study showed the incidence of bacterial meningitis is 8.6% in children with febrile seizures. Recent study revealed that 1-2% of acute bacterial meningitis is associated with simple febrile seizures.²⁰ Overall incidence of meningitis was 17.1% in a study done by Batajoo et al²¹. 13 cases out of 150 children in this study had meningitis. The results are comparable to the above mentioned studies.

The younger age group was at more risk to have meningitis in this study as 66(44%) of meningitis cases were up to 12 months of age while 44 (29.3%) were between 13-36 months of age and 40(26.6%) cases were between 37-60 months of age. Similarly, male had higher frequency of meningitis, as 9 (6%) of cases were male while 4 (2.6%) were from female group.

Study done by Batajoo et al²¹ showed that meningitis cases were more in children under 1 year of age. 17 (32.0%) out of 53 cases had meningitis in age group of 6-12 months with predominance of male gender. Our study revealed 6 (46%) out of 13 patients were male under 1 year of age.

Thus, results of our study in term of age and gender are quite comparable with results of Batajoo et al.²¹ Another study by Ghotbi et al¹ done in Iran showed that 7 (58.3%) out of 12 children with meningitis were less than 1 year of age. A recent local study done by Rana et al²² also showed similar results for bacterial meningitis cases in children presenting with febrile seizures. Again these findings are consistent with the present study.

A case report of first simple febrile seizures in a 12-month-old girl presented with a brief focal seizure and was found to have pneumococcal meningitis after 48 hours. Whether the patient already had infected meninges and meningitis at the time of the FS is not known, but it is possible.²³

Though acute bacterial meningitis in children is a serious disease, only little published data is available. Our study showed that children under 6 years and specially less than 1 year of age and male gender are important risk factors and this should alarm pediatricians to evaluate and screen children for acute bacterial meningitis those presenting with first simple febrile seizures under 6 years of age. Generally febrile seizures are one of the important clinical sign for an acute bacterial meningitis especially in the younger age group. Children till 6 years should be properly evaluated for bacterial meningitis and Lumbar puncture must done in this age group. A timely diagnosis and prompt management can help to reduce morbidity and mortality associated with an acute bacterial meningitis.

CONCLUSION

Significant number of children presenting with fever and seizure under 6 years of age do have meningitis. It is suggested that Lumbar puncture should be done in every case of first simple febrile seizures, so that not even a single case of acute bacterial

meningitis could be missed.

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