ORIGINAL ARTICLE

Yield of Lumbar Puncture in Children of Age Six Months to Eighteen Months Who Presented with their first Complex Febrile Seizures

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ABSTRACT

Aim: To assess the yield of lumbar puncture among children between the ages 6 months to 18 months who presented with their first complex febrile seizures.

Methods: This is a randomized prospective cohort study of patients between the ages 6 months to 18 months who were evaluated in the pediatric emergency department (ED) between 1st Oct,2014 and 31st Mar,2015 for their first complex febrile seizures (CFS). We choose this age group because signs of meningeal irritation are not reliable in this age group. Cases with ED diagnosis of CFS or Status Epilepticus who fulfill the inclusion criteria were evaluated. Patients were excluded if they had past history of seizures, any neurological abnormalities, or a preceding history of trauma, or were developmentally delayed. Data extracted included age, gender, weight, seizure type, family history of seizures, vaccination status, degree of fever, any focus of infection, findings on physical examination, laboratory study results; including blood chemistry, counts and CSF biochemistry and cytology.

Results: Lumbar puncture was done in all of the 50 patients in our study.5 out of 50 (10%) showed CSF pleocytosis. 4out of 5 had 100% neutrophils and 1 had picture suggestive of partially treated pyomeningitis.

Conclusion: In our study 10% of children between 6 months to 18 months of age, who presented with their first CFS; had bacterial meningitis. So, the rate of ABM is quite high in our study population.

Keywords: Febrile Seizures, Complex febrile seizures, Acute Bacterial Meningitis,

INTRODUCTION

Febrile seizures are defined as the seizures that occur between the age of 6 and 60 months with a temperature of 38°C or higher, are not the result of central nervous system infection or any metabolic imbalance, and occur without a history of prior afebrile seizures.(1)Febrile seizures are classified as simple or complex. Simple febrile seizures are generalized, last for less than 15 min and donot reoccur within 24 hours[1]. A complex febrile seizure is more prolonged (>15 min), is focal and/or recurs within 24 hours[1] and comprise 35% of all first time febrile seizures[2]. Most children do not experience long term effects due to simple febrile seizures[1,2]. However, complex febrile seizures (CFS) may have been suggested to increase the risk of epilepsy in some children, particularly those with previously existing neurological abnormalities[3].

AAP gives guidelines for treatment of children with simple febrile seizures. It focuses on identifying the source of fever rather than performing a standard seizure workup, and examining signs of encephalitis or meningitis by performing a lumbar puncture on children presenting with clinical signs of neurological disease.(2)No such guidelines exist for children with first CFS[4,5]. Although recent literature has shown that ABM is rarely diagnosed in the absence of other clinical signs and symptoms of serious neurological disease([6–8])but no such study has been done in our community to determine the burden of disease in this subpopulation that falls in age group in which signs of meningeal irritation are not reliable.

As no definite guideline is available for this particular age group, the rationale of our study is to determine the risk of meningitis in our setup, among children of 6 months to 18 months of age who presented with their first CFS. We also want to determine that upto what extent lumbar puncture is justified for these patients.

METHODS & MATERIALS

This was randomized prospective cohort study of patients in age group of 6 months to 18 months, who were evaluated in the pediatric emergency department (ED) of DHQ Teaching Hospital/SMC, Sargodha from1st Oct, 2014 to 31st Mar, 2015 for their first complex febrile seizures (CFS). This ED receives approximately 8000 to 10,000 patients annually. The

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study was approved by the Ethical committee, Sargodha Medical College, Sargodha.

This study prospectively reviewed the patients who met study criteria. All those patients who presented in ED from 1st Oct, 2014 to 31st Mar, 2015 with their first episode of CFS or status epilepticus and fell in the age group of 6 months to 18 months were included in study. Febrile seizures were labeled as CFS when they were of longer duration (>15min), focal seizures , reoccurred in the next 24 hours period.[1]The age group of 6 months to 18 months was selected because in this age group signs of meningeal irritation are not reliable.[1] Patients were excluded if they had prior history of simple or complex febrile seizures or afebrile seizures, did not meet the criteria for CFS, had any neurological abnormality, or a preceding history of trauma or were developmentally delayed.

Post Graduate Resident, who received the patient in ED, analyzed the patient who fulfilled the study criteria; by detailed history and examination especially for history of seizures , past history, family history, head circumference, focus of infection, detailed CNS examination. Data extracted included age, gender, weight, seizure type, a family history of seizures, temperature, any focus of infection, vaccination status, findings on physical examination, laboratory study results; including blood chemistry, counts and CSF biochemistry and cytology. We performed data analysis using SPSS Version 20, and calculated mean, median and mode using the Descriptive Statistics function. Percentages of variables were also calculated.

RESULTS

Throughout the study period, 70 patients in the age group of 6 months to 18 months presented in ED with CFS. After screening for exclusion criteria;50 patients met study criteria. Background information on eligible patients is outlined in table 1.

Features of CFS: Regarding features of CFS; seizures were focal in 25% of patients, 62.5% of patients had more than 1 episodes of seizures in 24 hrs period and 28% of them were brought in status epilepticus. Focal neurological deficit was noted in 10% of patients.

Laboratory investigations: Regarding blood chemistry, mean blood sugar in our study group was 111.2mg/dl. Hypocalcemia at the time of presentation was documented in 12.5% of patients.

Blood counts of eligible patients are summarized in the table 2.

CSF Results: Lumbar puncture was performed of all the 50 patients in our study. 45 patients had the normal CSF picture. 5 out of these 50 patients had the CSF picture of ABM. All these 5 patients had CSF pleocytosis with WBC counts of 380, 160, 410,460 and 480/ microliter. 4 patients had 100% neutrophils and 01 had 20% lymphocytes with 80% neutrophils i.e., a CSF picture suggestive of partially treated pyomeningitis. Regarding CSF biochemistry; hypoglycorrhachia with the increased protein count was found in CSF of all these 5 patients with CSF pleocytosis. CSF glucose was 22,30, 34,25 and 32 with normal concomitant blood sugar level and CSF protein in these samples was 380,160,460,480 and 310mg/dl

Table 1: Patient demographics

Number of patients	50
Median age	11.5 months
Females	46.87%
Positive family history of seizures	6.25%
Vaccination status Vaccinated according to EPI Partially Vaccinated/ Unvaccinated	 46.88% 53.12%
Weight Below 5th centile 5th to 50th centile 50th to 95th centile	 59.37% 21.87% 15.6%
Median Head Circumference	45.5 cm
Median Highest recorded temperature	101.2 °F
Common infectious diagnosis URTI(acute tonsillitis, acute pharyngitis/ ASOM) LRTI ENTERITIS Suspected UTI No focus	 10 02 03 03 32

Fig.1: Gender distribution

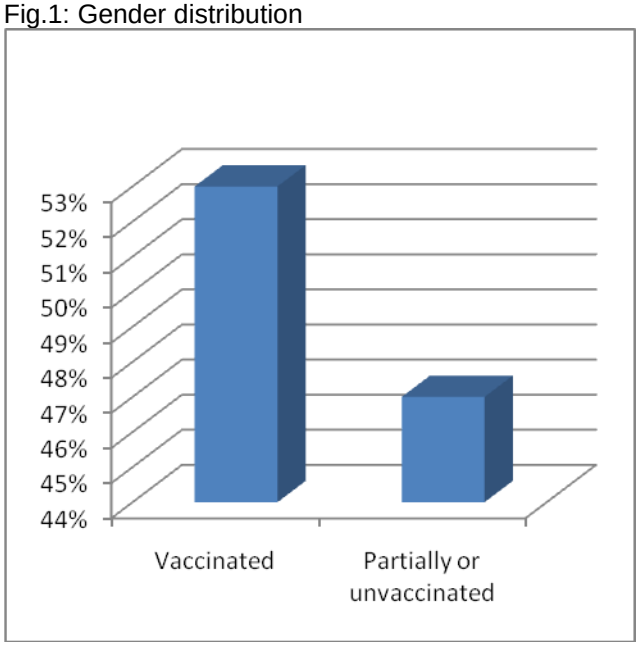


Fig.2: Vaccination status

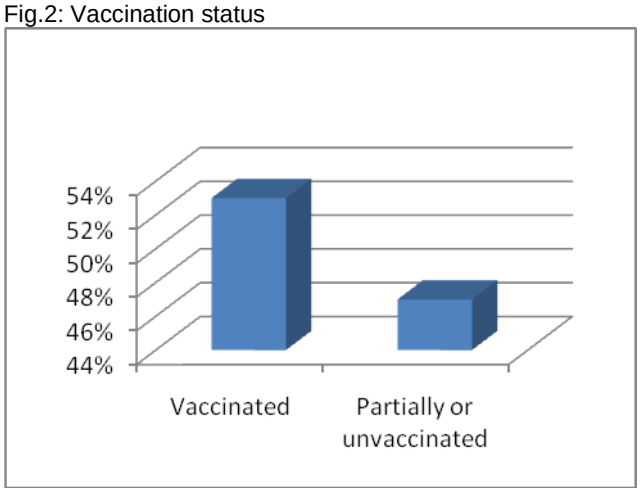


Fig.3: Features of CFS

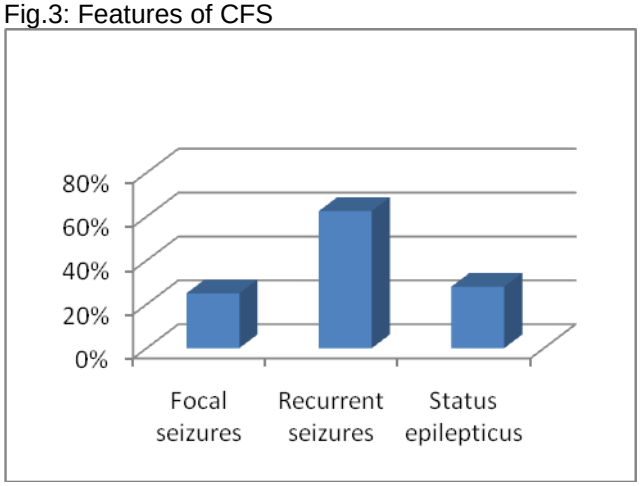
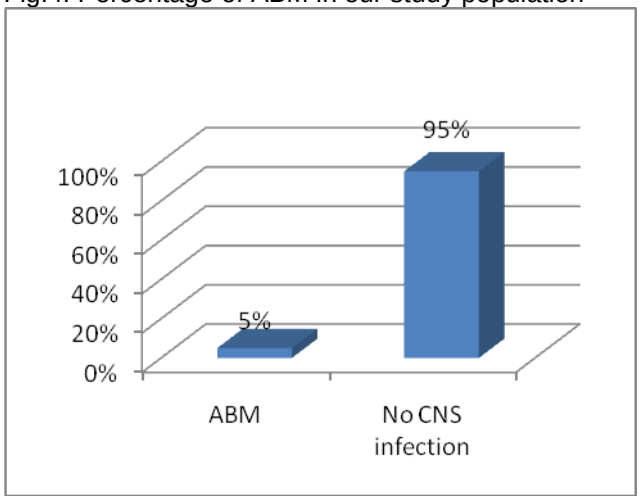


Table 2: CBC

Mean TLC	$12.02X10^3$
Mean neutrophil count	62%
Mean lymphocyte count	32%

Fig.4: Percentage of ABM in our study population



Presentations of cases with ABM: Of these 5 patients with ABM; 2 patients presented with focal neurological signs and 01 patient was brought with status epilepticus.

DISCUSSION

Meningitis progresses rapidly and can result in damage in a period of less than a day after symptoms arise. Immediate medical attention is necessary for survival and long term well-being of patient. Lumbar puncture is an effective tool for diagnosis of ABM and serves as a standard procedure to look for the etiology for a child presenting with a first CFS[10,11]. This is more significant for patients in age between 6 months to 18 months, when clinical signs of meningeal irritation are not very reliable. Lumbar puncture is an invasive process and can be traumatic[10]; therefore, it is important to establish that when and which patient may require lumbar puncture .

AAP updated its 1996 guidelines for children presenting with simple febrile seizures; that lumbar puncture be done in all children younger than 18 months who were either unvaccinated for H. influenza type b and streptococcus pnemoneaor whose vaccination status for H. influenza type b and streptococcus pnemonea is unknown and in those who have signs of meningeal irritation or other signs that show intracranial infection[12].

In a study on yield of diagnostic studies in children who presented with CFS[13] out of 71 patients only 1 had positive CSF culture. Those with CNS abnormalities, hydrocephalus and known seizure disorder were excluded. Green et al[14] reported in his study, that in a large number of patients diagnosed as bacterial meningitis, the seizure did not occur as the sole clinical indicator of meningitis. Joffe et al[15] suggested certain other high risk factors, which include; a medical visit within the previous 48 hours, seizures on arrival to ED, or focal seizures, in addition to clinically suspicious findings. In their study, Seltz et al [16]reported the incidence of ABM with a CFS by giving an internal rate of 0.3% among patients who presented primarily to their own ED. All the patients in their study who had ABM were reported to have altered mental state. In a study by Erin M. Fletcher and Ghazala Sharieff[17] on 193 patients with CFS only one was diagnosed to have ABM.

In another article by Kimia et al[6] on the yield of lumbar puncture among children between the age of 6 months to 60 months who presented with first CFS, among total of 526 patients, lumbar puncture was done for 340 patients. 14 of these had CSF pleocytosis and 3 had ABM. In this study, patients

with the previous history of fits, those with immunocompromised state and those with altered mental state were excluded. Conclusion of study was that only few patients with first CFS had ABM in the absence of other signs.

Some studies have shown higher rates of meningitis in patients with febrile fits. Owusu-Ofori et al found 10.2% rate of bacterial meningitis among children with febrile convulsions in China [18] and similarly Tinsa et al from Tunisia reported 10% bacterial meningitis in children aged less than one year with febrile seizures[19]. Joshi Batajoo et al in Nepal reported 17% meningitis and 4.5% bacterial meningitis in children with the first episode of fever and seizure [20].

In our study out of 50 patients, 5 showed significant pleocytosis with raised protein and hypoglycorrachea,giving strong suspicion of bacterial meningitis. So, in our study 10% of children who presented with the 1st episode of CFS in the age group of 6 months to 18 months had bacterial meningitis. 3 out of these 5 had age less than 13 months. The rate is quite high.

There are certain factors which are mainly responsible for this higher percentage in our study group. All the previous studies discussed above, included children aged 6 months to 60 months, but in our study we included children between the age of 6 months to 18 months only; the age in which signs of meningeal irritation are less reliable and also children are more vulnerable to febrile fits and pyomeningits in this age group. Other important factors to be considered are that our 59% of patients were malnourished and belong to low socio economic status. Also, unfortunately, our 53.12% of patients were either unvaccinated or partially vaccinated for H. influenza type b and Streptococcus pneumonea. Another noteworthy consideration is that DHQ Teaching hospital Sargodha is the only referral center for 6 districts in the periphery, from where we receive complicated cases referred from these health care facilities.

CONCLUSION

We concluded that rate of ABM is high in this subpopulation, in children of age 6 months to 18 months; who presented with their first episode of CFS. The age group, vaccination status, socioeconomic group and degree of nutrition are the factors that are responsible for this high rate of ABM in patients with first complex febrile seizures in our study population. So, in our setup lumbar puncture should be performed in patients with the first episode of CFS, especially in the age group of up to 18 months.

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