

Original Research Article

Acute febrile encephalopathy and its outcome among children in a tertiary care hospital

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ABSTRACT

Background: Acute febrile encephalopathy (AFE) is a common condition leading to hospitalization of children in India. Majority of the studies revealed etiology of AFE, but very few studies emphasized on predictors of mortality. This study was conducted to observe the outcome in relation to etiology and Glasgow coma score at admission.

Methods: This prospective study was carried out on 84 children between 2 months to 14 years, with fever duration of <14 days, GCS \leq 12 at the time of admission and altered sensorium in the pediatric intensive care unit over a period of 18 months (December 2011 to June 2013). Patients were evaluated daily till discharge/death. Outcome was evaluated in terms of complete recovery, morbidity and mortality.

Results: In this study, AFE was higher among the age group of 6-14 years (54.7%) with most common cause being viral encephalitis (38%). Higher mortality rates were observed in CNS infections. Persistent seizures and hemiparesis were the most common causes of morbidity. GCS at initial presentation <7 was significantly associated with mortality, p value being 0.036.

Conclusions: CNS infections are the leading cause of febrile encephalopathy and also associated with high mortality. Persistent seizures and hemiparesis being most common causes of morbidity. Low GCS at the time of admission and longer duration of coma are associated with higher risk of mortality. Most of the morbidities were observed in CNS infections and as most of them were curable, early institution of appropriate treatment will decrease morbidity.

Keywords: Acute febrile encephalopathy, GCS, Outcome

INTRODUCTION

Acute febrile encephalopathy is a common condition leading to hospitalization of children in India. Acute febrile encephalopathy (AFE) is a term commonly used to identify the condition in which altered mental status either accompanies or follows short febrile illness.^{1,2} CNS infections are commonest cause of non-traumatic coma in children.³ Although AFE is one of the major causes of hospital admissions of children and adults in India, only a few studies have been done so far.⁴ The profile of AFE varies across different geographic regions and in different seasons in the same area. Despite much epidemiological

investigation, the presentation with acute onset fever and altered sensorium has often remained mystery, especially in Indian states of Uttar Pradesh, Bihar and West Bengal.^{3,5,6} Acute infections of Central Nervous System in hospitalized children are associated with high mortality especially in developing countries, where there is a lack of intensive care facilities. In spite of large burden of AFE in paediatric age group and high mortality associated with it, there is paucity of studies from India regarding factors predicting mortality in these patients. Most acutely ill febrile patients with encephalopathy can make complete neurological recovery once the underlying cause is identified and treated promptly and appropriately, but

considerable skill and knowledge is required to distinguish the various groups. Majority of the studies revealed etiology of AFE, but very few studies emphasized on predictors of mortality.

The aims and objectives of the study was to know the outcome of acute febrile encephalopathy in terms of mortality, morbidity and recovery among children aged 2months to 14 years and to evaluate outcome in relation to etiology and glasgow coma score at the time of presentation.

METHODS

This prospective study was conducted on 84 children aged 2 months to 14 years who were admitted with fever and altered sensorium in the pediatric intensive care unit of ASRAM (Alluri Sitarama Raju Academy of Medical Sciences) Hospital, Eluru, over a period of 18 months (December 2011 to June 2013).

Inclusion criteria

- Children in the age group between 2 months to 14 years.
- Children with fever of duration <14 days and GCS (modified score) of ≤12 at the time of admission.
- Patients of metabolic encephalopathy if precipitated by fever.

Exclusion criteria

- Patients with traumatic coma.
- Patients with febrile convulsions.
- Patients with cerebral palsy and epilepsy.

Data was collected according to the pre-structured proforma. Clinical profile was recorded at admission and patients were followed throughout the course of illness in the hospital and outcome was recorded. Immediate resuscitative measures were taken, and specific treatment was started and changed according to patient’s course in the hospital. Patients were followed daily till discharge/death to study the outcome. Depth of coma was evaluated with reference to modified Glasgow coma scale. Outcome was evaluated in terms of complete recovery, morbidity (recovery with sequelae) and mortality (death).

Statistical analysis

Descriptive statistics were expressed as number and percentages. Data was analyzed using SPSS statistical software. A p value of 0.05 or less was considered as statistical significant.

RESULTS

A total of 84 children were observed in this study. Among these 54.7% were of 6-14 years age group, which

is the commonest age group. Second largest group was 1-5 years age group which contributes to 33.3% of the total study population. Remaining 12% cases were of 2months-1year age group. Among the 84 children of study group, 60.7% (n=51) were boys and 39.3% (n=33) were girls.

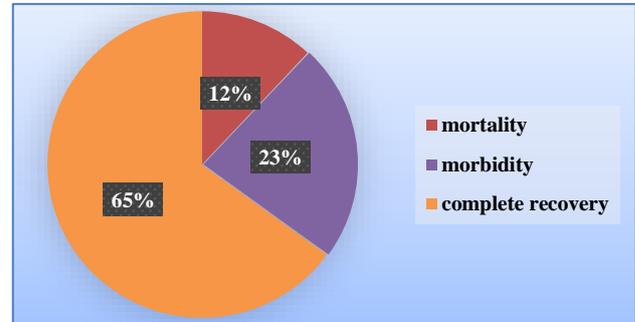


Figure 1: Outcome of acute febrile encephalopathy.

In this present study, mortality was observed in 10 (12%) cases, morbidity in 19 (22.6%) cases and complete recovery in 55 (65.4%) cases (Figure 1).

Table 1: Etiology of febrile encephalopathy in the study population.

Etiology	No. of patients	Percentage
Viral encephalitis	32	38
Pyogenic meningitis	29	34.5
Cerebral malaria	8	9.5
Tuberculous meningitis	6	7.2
Aseptic meningitis	2	2.4
Brain abscess	2	2.4
Diabetic ketoacidosis	2	2.4
Hepatic encephalopathy	1	1.2
Enteric encephalopathy	1	1.2
Septicemia with toxic encephalopathy	1	1.2
Total	84	100

CNS infections were the most common cause of acute febrile encephalopathy in our setting. Major causes of febrile encephalopathy in our setting were viral encephalitis (38%) and pyogenic meningitis (34.5%) respectively (Table 1).

Table 2: Mortality in relation to etiology.

Etiology	No. of deaths	Percentage in respective diagnosis
Viral encephalitis (N*:32)	5	15.6
Pyogenic meningitis (N*:29)	2	6.9
Cerebral malaria (N*:8)	1	12.5
TB meningitis (N*:6)	1	16.6
Brain abscess (N*: 2)	1	50
Total (N*:84)	10	12

N* - Total number of cases

Higher mortality rates were seen in CNS infections. 10 out of 84 cases with febrile encephalopathy were expired, accounting for 12% mortality of study population.

Mortality rates in their respective etiology wise were, viral encephalitis 5 out of 32 cases (15.5%), pyogenic meningitis 2 out of 29 cases (6.9%), cerebral malaria 1 out of 8 cases (12.5%), tubercular meningitis 1 out of 6 cases (16.6%) and brain abscess 1 out of 2 cases (50%) (Table 2).

Morbidity pattern in 32 cases of viral encephalitis consists of persistent seizures in 3 (9.3%) cases, bulbar palsy and hemiparesis in 2 (6.2%) each and dysarthria and cranial nerve palsy each in 1 case (3.2%). Morbidity pattern in 29 cases of pyogenic meningitis consists of persistent seizures in 3 (10.3%) cases and bulbar palsy, hemiparesis, dysarthria and cranial nerve palsy each account for 1 (3.4%) cases. Morbidity pattern in 8 cases of cerebral malaria consists of persistent seizures in 1 (12.5%) case.

Table 3: Morbidity pattern in relation to etiology.

Feature	Viral encephalitis (n=32)	Pyogenic meningitis (n=29)	Cerebral malaria (n=8)	Tuberculous meningitis (n=6)
Persistent seizures	3 (9.3%)	3 (10.3%)	1 (12.5%)	-
Hemiparesis	2 (6.2%)	1 (3.4%)	-	-
Cranial nerve palsy at discharge	1 (3.1%)	1 (3.4%)	-	1 (16.6%)
Bulbar palsy	2 (6.2%)	1 (3.4%)	-	-
Hydrocephalus	-	-	1 (16.6%)	-
Dysarthria 1(3.1%)	1 (3.4%)	-	-	-

Morbidity pattern in 6 cases of tuberculous meningitis consists of hydrocephalus and cranial nerve palsy each for 1 (16.6%) cases (Table 3).

Table 4: Complete recovery of study population in relation to etiology.

Etiology	No. of cases of complete recovery	% in respective etiology
Viral encephalitis (N:32)	18	56
Pyogenic meningitis (N:29)	20	70
Cerebral malaria (N:8)	6	75
TB meningitis (N:6)	3	50
Aseptic meningitis (N:2)	2	100
Brain abscess (N:2)	1	50
Diabetic ketoacidosis (N:2)	2	100
Hepatic encephalopathy (N:1)	1	100
Enteric encephalopathy (N:1)	1	100
Septicemia with toxic encephalopathy (N:1)	1	100
Total cases	55	65.4

Out of 84 cases, 55 cases (65.4%) showed complete recovery rate. Recovery rates etiology wise were viral encephalitis 56%, pyogenic meningitis 70%, cerebral malaria 75%, tuberculous meningitis and brain abscess accounts for 50% each, whereas aseptic meningitis, diabetic ketoacidosis, hepatic encephalopathy, enteric encephalopathy and Septicemia each showed 100% complete recovery (Table 4).

Complete recovery rates among those who presented with GCS 3-6, 7-9 and 10-12 are 37.6%, 76.4% and 94.4% respectively. Morbidity of cases who presented with GCS 3-6, 7-9 and 10-12 are 43.6%, 11.8% and 5.6% respectively. Mortality of cases who presented with GCS 3-6, 7-9 and 10-12 are 18.8%, 11.8% and no deaths respectively (Table 5).

Table 5: Outcome in relation to Glasgow Coma Score at presentation.

Glasgow Coma Score	Complete recovery	Morbidity	Mortality
3-6 (N: 32)	12 (37.6%)	14 (43.6%)	6 (18.8%)
7-9 (N: 34)	26 (76.4%)	4 (11.8%)	4 (11.8%)
10-12 (N:18)	17 (94.4%)	1 (5.6%)	0

Table 6: Relation between Glasgow Coma Score at presentation with mortality and morbidity.

GCS score	No. of deaths	No. of cases with morbidity	Total
GCS < 7	8	33	41
GCS >7	2	41	43

P value: 0.036 (Statistically significant).

In present study, low GCS at initial presentation was significantly associated with high mortality with p value of 0.036 which was statistically significant (Table 6).

In present study, coma duration >7 days was significantly associated with higher mortality with p value 0.006 (Table 7).

Table 7: Relation between Coma duration and mortality, morbidity.

Coma duration	No. of deaths	No. of cases with morbidity	Total
>7 days	6	15	21
<7 days	4	59	63

P value: 0.006 (Statistically significant).

DISCUSSION

Fever with altered mentation is a common symptom complex leading to hospital admissions in both adults and children in our country. Fever with altered mental status is commonly produced by bacterial meningitis, viral encephalitis, cerebral malaria, typhoid encephalopathy and fulminant hepatic failure due to viral hepatitis.⁷

Various studies in children with Nontraumatic coma have shown that CNS infections are commonest cause of Nontraumatic coma.¹ In the present study, we have tried to evaluate the common etiologies and their relation to outcome of acute febrile encephalopathy encountered in children in a tertiary care hospital.

In the present study, it was observed that according to age wise prevalence, majority of cases fall between 6-14 years (54.7%) of age group followed by 1-5 years (33.3%) and 2months to 1 year (12%). Similar prevalence was seen in a study done by Singhet R et al in with 66.6% of cases falling above 5 years of age and 33.3% cases were below 5 years of age.⁶

Among 84 children of this study group, 60.7% (n=51) were boys and 39.3% (n=33) were girls. Incidence was more common in boys. The ratio between male:female is 1.6:1. Similar sex prevalence ratio (M:F=1.7:1), where males were commonly involved than females in 1-5 years of age group and 6-14 years of age group, whereas males and females show equal incidence in 2 months-1year of age group was observed in a study by Karmarkar SA et al in 2008.⁸

Out of 84 patients studied, 32 cases (38%) were diagnosed as viral encephalitis which was the most common etiology for febrile encephalopathy. Similar observations were found in a study by Karmarkar SA et al in 2008 which showed 37.3% of viral encephalitis cases.⁸

Out of 84 cases of febrile encephalopathy, 10 cases expired accounting for 12% of mortality, complete recovery was seen in 65.4% of cases and morbidity of 22.6%. Viral encephalitis was the leading cause accounting to 50% of mortality.

Mortality rates in their respective etiology wise are Viral encephalitis leading to 5 out of 32 cases (15.5%), pyogenic meningitis-2 out of 29 cases (6.9%), cerebral malaria-1 out of 8 cases (12.5%), tuberculous meningitis-

1 out of 6 cases (16.6%) and brain abscess - 1 out of 2 cases (50%). The mortality rates in the present study are comparable to a study by Karmarkar SA et al where viral encephalitis accounted to 17.5% of cases, pyogenic meningitis and brain abscess accounts for 50% each, whereas aseptic meningitis, diabetic ketoacidosis, hepatic encephalopathy, enteric encephalopathy and septicemia each showed 100% complete recovery without mortality and sequelae.⁸

Morbidity in relation to etiology are, out of 32 cases of viral encephalitis-persistent seizures were seen in 3 (9.3%) cases, bulbar palsy and hemiparesis in 2 (6.2%) cases each, dysarthria and cranial nerve palsy was observed in 1 (3.2%) case. Overall morbidity was 28.1% which was similar to study by Karmarkar SA et al.⁸ Total morbidity rate was 33.3% and out of 29 cases of pyogenic meningitis, causes of morbidity are persistent seizures which was seen in 3 (10.3%) cases; bulbar palsy, hemiparesis, dysarthria and cranial nerve palsy are seen in 1 (3.4%) case. In the same study done by Karmarkar SA et al, out of 8 cases of cerebral malaria, persistent seizures are the leading cause of morbidity which was observed in 1 (12.5%) case and out of 6 cases of Tuberculous meningitis, hydrocephalus and cranial nerve palsy are the leading causes of morbidity accounting for 1 (16.6%) case each.⁸

A GCS score of less than 12 was taken as coma. Majority of children (17.8%) presented with a GCS score of 9. GCS score of >9 was found in 21.4% cases, score of 7-9 was observed in 40.5% cases, score of 4-6 was observed in 28.6% cases, 9.5% cases showed GCS score of 3.

Out of 32 cases who presented with GCS3-6, complete recovery was seen in 12 (37.6%) cases, morbidity in 14 (43.6%) cases and mortality in 6 (18.8%) cases. Out of 34 cases who presented with GCS 7-9, complete recovery was seen in 26 (76.4%) cases, morbidity in 4 (11.8%) and mortality in 4 (11.8%) cases. Out of 18cases who presented with GCS 10-12, complete recovery was seen in 17 (94.4%), morbidity in 1 (5.6%) case and there was no mortality. As the coma score increases the recovery rates are good, mortality and morbidity decreased. There was significant rise in complete recovery in children who presented with GCS 7-9 compared to 3-6.

In present study, GCS<7 at initial presentation was significantly associated with high mortality, with p value <0.05. In study done by Chaturvedi P et al, mean GCS of patients who died was <7 and the mean GCS who survived was >7.⁹ In this present study, coma duration of >7 days was significantly associated with higher mortality with p value 0.006.

CONCLUSION

In this study, we concluded that CNS infections are the most common cause of febrile encephalopathy in children and higher mortality rates were observed in CNS

infections. Persistent seizures and hemiparesis were the most common causes of morbidity. Low Glasgow Coma Score at the time of admission and longer duration of coma are associated with higher risk of mortality. So early recognition of the danger signs and immediate medical advice will combat the problem and improve the survival rate. Most of the morbidities were observed in CNS infections and as most of them were curable, early institution of appropriate treatment will decrease morbidity.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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