Section: Miscellaneous

Original Research Article

CLINICAL SYMPTOMATOLOGY AND THEIR RELATION TO OUTCOME IN ACUTE FEBRILE ENCEPHALOPATHY IN ADULT PATIENTS IN TERTIARY CARE HOSPITAL

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ABSTRACT

Background: This study aims to analyze prognostic factors and etiological patterns to improve clinical outcomes. **Materials and Methods:** A prospective observational study was conducted on 126 hospitalized AFE patients at BRD Medical College, Gorakhpur, over one year. Ethical approval was obtained, and informed consent was taken. Clinical history, neuroimaging, CSF analysis, metabolic profile, and serological tests were performed. Patient outcomes were classified as survived or expired. Data were analyzed using SPSS, with statistical significance set at $p < 0.05$. **Result:** This study of 134 patients with acute febrile encephalopathy found that Tuberculous Meningitis was the most common diagnosis (42.5%), with a mean age of 36.61 years and a nearly equal gender distribution. Mortality was significantly higher in patients aged >50 years, males, those with fever >7 days, seizures, nuchal rigidity, low GCS (<8), and elevated creatinine (>1.5 mg/dL). Blood pressure, hematological, liver function, and most CSF parameters showed no significant association with mortality. Seizures and low GCS emerged as the strongest predictors of poor outcomes. **Conclusion:** The study highlights that mortality in febrile encephalopathy was significantly higher in patients over 50 years, especially males, and those with prolonged fever, seizures, neck rigidity, low GCS (<8), or raised serum creatinine (>1.5 mg/dL). Varicella-zoster virus (VZV) meningitis had a poorer prognosis, while acute bacterial meningitis (ABM) showed lower mortality. Favorable outcomes were linked to younger age, female gender, shorter fever duration, and stable neurological and renal parameters. Headache, vomiting, blood pressure, hematological, and liver function tests were not significantly associated with mortality.

INTRODUCTION

"Imagine an acute onset fever followed by confusion, seizures, or even coma – this is the terrifying reality of acute febrile encephalopathy, a medical emergency that can strike without warning"

Acute febrile encephalopathy (AFE) is a short febrile illness accompanied by an altered mental state, ranging from confusion to impaired wakefulness, stupor, and coma.[1] according to WHO, acute febrile encephalopathy is defined as acute onset fever (typically lasting < 14 days) accompanied by altered mental status such as confusion or even coma and/or emergence of new seizures excluding simple febrile seizures.[2] Other significant viral encephalitis causes include enterovirus, herpes simplex virus (HSV), varicella-zoster virus, and mumps.[3,4] Early recognition and treatment of HSV are crucial for patient survival.[5,6] Diagnostic and treatment plans should be based on clinical evaluation and symptom assessment. Identifying the most probable etiology and formulating an optimal treatment strategy promptly is imperative. AFE remains a significant challenge due to its diverse etiologies, geographical variations, and seasonal influences. In tropical countries, diseases such as tuberculosis, malaria, leptospirosis, and typhoid fever must be considered in the differential diagnosis of AFE. Mortality is high

in untreated cases, and survivors often suffer from debilitating neurological deficits.[7]

Despite extensive research on acute febrile encephalopathy (AFE) in children, its occurrence and progression in adults remain poorly understood. Most studies focus on pediatric populations, where infectious etiologies like viral encephalitis are well-documented. However, in adults, the underlying causes, disease patterns, and long-term outcomes are less explored. The lack of comprehensive research limits effective diagnostic and treatment strategies, leading to potential underdiagnosis and mismanagement. Further studies are needed to investigate AFE in adults, including its epidemiology, risk factors, and optimal management, to improve clinical outcomes and reduce mortality in this age group.

MATERIALS AND METHODS

A prospective observational study was conducted on 134 hospitalized AFE patients at BRD Medical College, Gorakhpur, over one year. Ethical approval was obtained, and informed consent was taken. Clinical history, neuroimaging, CSF analysis, metabolic profile, and serological tests were performed.

Sample Size: The sample size was calculated based on a previous study that reported the prevalence of AFE in India as 9%, with a 95% confidence level and an error rate of 0.05, totaling 126 patients.

$n=Z2P(1-P)/d2$

- n = sample size,
- Z = Z statistic for a confidence level of 95% (Z = 1.96),
- P = expected prevalence (9% or 0.09),
- d = precision (5% or 0.05).

Using this formula, *n* was calculated as **125.85** (rounded to 126).

Inclusion Criteria

1. Patients who provided written consent for participation in the study.
2. Patients aged more than 16 years.
3. Hospitalized patients diagnosed with AFE based on the following criteria:
4. (A) Body temperature above 38.5°C with a duration of less than two weeks.
5. (B) Deterioration of consciousness and/or cognitive function, with or without neurological manifestations such as seizures, sensory, and motor deficits lasting more than 12 hours from onset until hospital admission.

Exclusion Criteria

- Non-infectious causes, including trauma, thromboembolic, and hemorrhagic cerebral accidents.
- Metabolic encephalopathy causes such as hyperglycemia, hypoglycemia, and electrolyte disturbances (hyponatremia, hypernatremia, etc.).
- Patients who refused to give consent.

Statistical Analysis

- Microsoft Excel was used for tabulation of data. IBM Statistical Package for Social Sciences (SPSS) was used for statistical analysis.
- Continuous variables were summarized as mean ± standard deviation.
- Comparison of means was conducted using Student's t-test and Mann- Whitney U test with a 95% confidence interval.
- Cut-off values were analyzed using ROC analysis.
- A *p*-value of <0.05 was considered statistically significant.

RESULTS

Table 1: Age Distribution of Patients

Age Distribution (in years)	No. of Patients	Percentage
17-30	65	48.51%
31-45	35	26.12%
46-60	18	13.43%
61-75	15	11.19%
>75	1	0.75%
Total	134	100.00%
Mean±SD	36.61±16.47	

He ages distribution of the study population is presented in the table. The majority of patients (48.51%) were aged between 17 and 30 years, followed by 26.12% in the 31–45 years' age group. Patients aged 46–60 years accounted for 13.43%, while 11.19% were between 61 and 75 years. Only 0.75% of patients were older than 75 years. The mean age of the study population was 36.61 ± 16.47 years.

Table 2: Gender Distribution of Patients.

Gender	No. of Patients	Percentage
Female	69	51.49%
Male	65	48.51%
Total	134	100.00%

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The gender distribution of the study population shows a nearly equal representation of males and females. Female patients comprised 51.49% of the total, while male patients accounted for 48.51%.

Table 3: Duration of Fever Among Patients.

Duration of Fever	No. of Patients	Percentage
1-7	64	47.76%
8-14	70	52.23%
Total	134	100.00%
Mean±SD	7.74±3.86	

The table presents the distribution of patients based on the duration of fever. Among 134 patients, 47.76% experienced fever for 1–7 days, while 52.23% had fever for 8–14 days. The mean duration of fever was 7.74±3.86 days.

Table 4: Symptom Distribution Among Patients.

Symptoms	No. of Patients	Percentage
Headache	103	76.87%
Vomiting	83	61.94%
Seizures	58	43.28%
Rash	3	2.24%
Dystonia	0	0

The symptom distribution among patients shows that headache was the most common symptom, reported by 76.87% of patients, followed by vomiting in 61.94%. Seizures were present in 43.28% of cases. Rash was seen in only 2.24% of cases, and no patients exhibited dystonia.

Table 5: Distribution of Diagnoses Among Patients.

Diagnosis	No. of Patients	Percentage
TBM	57	42.54%
Scrub Meningitis	43	32.09%
Leptospirosis	19	14.18%
ABM	4	2.99%
VZV Meningitis	4	2.99%
HSV Meningitis	3	2.24%
Lepto/Scrub	3	0.75%
Scrub/ EBV Meningitis	1	0.75%
Total	134	100%

The table summarizes the diagnoses of patients in the study. Tuberculous Meningitis (TBM) was the most common diagnosis, affecting 42.54% of patients, followed by Scrub Meningitis (32.09%) and Leptospirosis (14.18%). Other diagnoses included Acute Bacterial Meningitis (ABM) and Varicella-Zoster Virus (VZV) Meningitis, each accounting for 2.99% of cases, while Herpes Simplex Virus (HSV) Meningitis was observed in 2.24% of patients. A small proportion had co-infections, including Leptospirosis with Scrub Typhus (0.75%) and Scrub with Epstein-Barr Virus (EBV) Meningitis (0.75%).

Table 6: Association Between Age Groups and Survival Outcomes.

Age (in years)	Total		Survived (n=96)		Expired (n=38)		P-Value
	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage	
≤50	106	79.10%	86	81.13%	20	18.86%	<0.0001
>50	28	20.90%	10	35.7%	18	64.2%	
Total	134	100.00%	96		38		

The table presents the distribution of patients based on age groups (≤50 years and >50 years) and their survival outcomes. Among the total 134 patients, 106 (79.10%) were aged ≤50 years, while 28 (20.90%) were older than 50 years. In the ≤50 age group, 86 (81.13%) patients survived, whereas 20 (18.86%) expired. In contrast, in the >50 age group, only 10 (35.72%) patients survived, while 18 (64.2%) expired. The observed difference in survival between age groups is statistically significant ($P < 0.0001$), indicating that older age is associated with a higher mortality rate.

Table 7: Gender-wise Survival and Mortality Distribution.

Gender	Total		Survived (n=96)		Expired (n=38)		P-Value
	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage	
Female	69	51.49%	55	79.7%	14	20.29%	0.03
Male	65	48.51%	41	63.07%	24	36.93%	
Total	134						

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The table presents the gender distribution among patients in relation to survival outcomes. Of the 134 patients, 69 (51.49%) were female and 65 (48.51%) were male. Among Females, 55 (79.7%) survived and 14 (20.29%) expired. In contrast, among Males, 41 (63.07%) survived while 24 (36.93%) expired. The difference in mortality between genders was statistically significant, with a p-value of 0.03 suggesting male gender is associated with higher mortality rate.

Table 8: Association of Fever Duration with Survival Outcomes.

Duration of Fever	Total		Survived (n=96)		Expired (n=38)		P-Value
	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage	
≤7	64	47.76%	52	81.25%	12	18.75%	0.01
>7	70	52.24%	44	62.85%	26	37.14%	
Total	134	100.00%					

The table illustrates the relationship between fever duration and patient outcomes. Among the 134 patients, 64 (47.76%) had a fever lasting ≤7 days, while 70 (52.24%) experienced fever for more than 7 days. Among group of people having fever ≤7 days (n= 64), 52 (81.25%) survived and 12 (18.75%) expired. While in people experienced fever for more than 7 days (n=70), 44 (62.85%) survived and 26 (37.14%) expired. The observed difference was statistically significant, with a p-value of 0.01, suggesting that prolonged fever duration is associated with higher mortality.

Table 9: Clinical Parameters and Their Association with Survival Outcomes.

Parameters		Total		Survived (n=96)		Expired (n=38)		P-Value
		No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage	
Headache	Present	103	76.87%	77	74.75%	26	25.25%	0.16
	Absent	31	23.13%	19	61.2%	12	38.7%	
Seizure s	Present	58	43.28%	27	46.5%	31	53.4%	<0.0001
	Absent	76	56.72%	69	90.7%	7	10.1%	
Nuchal Rigidity	Present	43	32.09%	24	55.8%	19	44.2%	0.005
	Absent	91	67.91%	72	79.12%	19	20.2%	
Vomiting	Present	83	61.94%	60	72.2%	23	27.7%	0.83
	Absent	51	38.06%	36	70.58%	15	29.4%	
GCS <8	Present	38	28.36%	6	15.78%	32	84.21%	<0.0001
	Absent	96	71.64%	90	93.75%	6	6.25%	

The table presents an analysis of various clinical parameters and their association with survival outcomes among patients. The parameters evaluated include headache, seizures, nuchal rigidity, vomiting, and Glasgow Coma Scale (GCS) score below 8.

1. Seizures: Seizures were observed in 43.28% of the total patients. The survival rate among patients without seizures was significantly higher (90.7%) compared to those who had seizures (46.5%). The P-value (<0.0001) suggests a strong statistical significance, indicating that the presence of seizures is associated with a higher mortality rate.
2. Nuchal Rigidity: Nuchal rigidity was present in 32.09% of patients. Among those who survived, 55.8% had nuchal rigidity, while 44.2% of expired patients had this symptom. The P-value (0.005) indicates a statistically significant association, implying that nuchal rigidity may have some impact on survival outcomes.
3. Vomiting: Vomiting was reported in 61.94% of patients. The survival rate among those who had vomiting (72.2%) was approximately equal compared to those who did not (70.58%). The P-value (0.83) shows no significant statistical association between vomiting and survival outcomes.
4. Glasgow Coma Scale (GCS) <8: A GCS score below 8 was observed in 28.36% of patients. Among those who survived, only 15.78% had GCS <8, whereas 84.21% of expired patients had a low GCS score. The P-value (<0.0001) indicates a strong statistical significance, suggesting that a lower GCS score is highly associated with increased mortality.
5. Headache: Headache was present in 76.87% of the patients. Among those who survived, 74.75% had a headache, while 25.25% of expired patients reported headache. The P-value (0.16) indicates that headache had no statistically significant association with survival outcomes.

Among the clinical parameters analyzed, seizures and a GCS score below 8 showed the strongest statistical association with mortality, both having highly significant P-values (<0.0001). Nuchal rigidity also exhibited a notable association with survival outcomes (P=0.005). In contrast, headache and vomiting did not show significant associations with survival. These findings suggest that seizures, nuchal rigidity, and a low GCS score could serve as critical prognostic indicators in predicting patient outcomes.

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Table 10: Blood Pressure Comparison Between Expired and Survived Patients.

Blood Pressure	Expired (n=38)		Survived (n=96)		P-Value
	Mean	SD	Mean	SD	
Systolic BP	107.1	20.12	109.58	18.0009	0.48
Diastolic BP	70.54	11.29	70.96	10.53	0.83

The comparison of blood pressure between expired and survived patients shows no significant difference. The mean systolic blood pressure was 107.1 ± 20.12 mmHg in the expired group and 109.58 ± 18.00 mmHg in the survived group (p= 0.48). Similarly, the mean diastolic blood pressure was 70.54 ± 11.29 mmHg in the expired group and 70.96 ± 10.53 mmHg in the survived group (p = 0.83). These findings suggest that blood pressure did not have a statistically significant impact on patient outcomes.

Table 11: Comparison of Haematological Parameters Between Expired and Survived Patients.

Haematological Parameters	Expired (n=38)		Survived (n=96)		P-Value
	Mean	SD	Mean	SD	
Haemoglobin	10.51	2.1	10.51	2.14	0.8
TLC	10450	4807.69	10782.3	4760.47	0.23
Platelet Count	123526.3	69493.04	139802.1	89888.77	0.31

The comparison of hematological parameters between expired and survived patients shows no significant difference in hemoglobin levels, with both groups having a mean of 10.51 g/dL (p = 0.8). However, total leukocyte count (TLC) was lower in the expired group (10450 ± 4807.69) than in the survived group (10782.3± 4760.47) but the difference wa not statistically significant (p = 0.23). Platelet count was lower in the expired group (123,526.3 ± 69,493.04) than in the survived group (139,802.1 ± 89,888.77), but this difference was not statistically significant (p = 0.31).

Table 12: Comparison of LFT/RFT Parameters Between Expired and Survived Patients.

LFT/RFT Parameters	Expired (n=38)		Survived (n=96)		P-Value
	Mean	SD	Mean	SD	
AST	261.39	728.47	164.72	139.27	0.21
ALP	159.97	411.97	119.76	92.37	0.36

The comparison of liver function parameters between expired and survived patients shows no significant differences in AST and ALP levels. The mean AST was higher in the expired group (261.39 ± 728.47) compared to the survived group (164.72 ± 139.27), but this difference was not statistically significant (p = 0.21). Similarly, ALP levels were elevated in the expired group (159.97 ± 411.97) compared to the survived group (119.76 ± 92.37), with no significant difference (p = 0.36).

Table 13: Association of Creatinine Levels with Survival Outcomes.

Creatinine	Total		Expire d (n=38)		Survived (n=96)	
	No. of Patients	Percentage	No. of Patients	Percentage	No. of Patients	Percentage
≤1.5	109	65.79%	25	22.9%	84	77.06%
>1.5	25	34.21%	13	52%	12	48%
Total	134	100.00	38	28.35	86	64.17
P value	0.005					

This table examines the association between creatinine levels and survival outcomes in 134 patients, divided into survived (n=96) and expired (n=38) groups. Of the total, 109 patients (65.79%) had creatinine ≤1.5 mg/dL, with 84 (77.06%) surviving and 25 (22.9%) expiring. Conversely, 25 patients (34.21%) had creatinine >1.5 mg/dL, with 12 (48%) surviving and 13 (52%) expiring. The data shows a higher survival rate in the lower creatinine group and a higher mortality rate in the elevated group. A p-value of 0.0005 indicates a statistically significant association, suggesting creatinine levels as a prognostic marker for survival.

Table 14: Comparison of CSF Biochemical Parameters Between Expired and Survived Patients.

CSF Biochemical Parameters	Expired (n=38)		Survived (n=96)		P-Value
	Mean	SD	Mean	SD	
CSF Glucose	61.07	36.74	68.17	18.86	0.33
CSF Protein	116.62	55.18	124.49	60.10	0.48

The comparison of cerebrospinal fluid (CSF) biochemical parameters between expired and survived patients shows a non-significant difference in CSF glucose levels. The mean CSF glucose was lower in the expired group (61.07 ± 36.74 mg/dL) compared to the survived group (68.17.17 ± 18.86 mg/dL), with a p-value of 0.33, indicating statistical non-significant. However, CSF protein levels were

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similar between the two groups (116.62 ± 55.18 mg/dL in expired patients vs. 124.49 ± 60.10 mg/dL in survived patients, p = 0.48), suggesting no significant association with mortality.

Table 15: Comparison of CSF Cellular Analysis Between Expired and Survived Patients.

CSF Cellular Analysis	Expired (n=38)		Survived (n=96)		P-Value
	Mean	SD	Mean	SD	
CSF TCC	31.44	46.10	44.21	119.38	0.52
CSF LYMPHOCYTE	80	16.56	77.71	19.62	0.52
CSF NEUTROPHILS	20	16.56	22.28	19.62	0.52

The cerebrospinal fluid (CSF) cellular analysis shows no statistically significant differences between expired and survived patients. The mean CSF total cell count (TCC) was 31.44 ± 46.10 in the expired group and 44.21 ± 119.38 in the survived group (p = 0.52). The proportion of CSF lymphocytes was similar in both groups (80 ± 16.56% in expired patients vs. 77.71 ± 19.62% in survived patients, p = 0.52). Likewise, CSF neutrophils showed no significant difference, with 20 ± 16.56% in the expired group and 22.28 ± 19.62% in the survived group (p = 0.52). These findings suggest that CSF cellular composition was not significantly associated with patient outcomes.

Table 16: Comparison of Diagnoses Between Expired and Survived Patients.

Diagnosis	Total (n= 134)	Expired (n=38)		Survived (n=96)		P-Value
		No. of Patients	Percentage	No. of Patients	Percentage	
TBM	57	17	29.8%	40	70.2%	0.74
ABM	04	0	0.00%	4	100%	0.2
HSV Meningitis	3	2	66.66%	1	33.33%	0.13
Lepto/Scrub	3	1	33.33%	2	66.66%	0.52
Leptospirosis	19	3	15.78%	16	84.2%	0.19
Scrub/ EBV Meningitis	1	1	100%	0	0.00	0.11
Scrub Meningitis	43	11	25.58%	32	74.4%	0.62
VZV Meningitis	4	3	75%	1	25%	0.03
Total	134	38	28.4%	96	71.6%	

The table presents a comparison of diagnoses between expired and survived patients, with a total sample size of 134 patients. Among them, 38 patients (28.4%) expired, while 96 patients (71.6%) survived. The diagnoses and their respective mortality and survival rates are analyzed below.

1. Tuberculous Meningitis (TBM): TBM was the most common diagnosis, affecting 57 patients (42.5%). Among TBM patients, 17 (29.8%) expired, while 40 (70.2%) survived. The p-value of 0.74 suggests no statistically significant difference in mortality for TBM patients.
2. Acute Bacterial Meningitis (ABM): Only 4 patients (3%) had ABM, and all survived. No mortality was recorded in this group. The p-value of 0.2 indicates no significant association with mortality.
3. Herpes Simplex Virus (HSV) Meningitis: Three patients (2.2%) were diagnosed with HSV meningitis. The mortality rate was high at 66.66% (2 expired, 1 survived). A p-value of 0.13 suggests no strong statistical significance.
4. Leptospirosis and Scrub Typhus Co-infection (Lepto/Scrub): Three patients (2.2%) were diagnosed with Lepto/Scrub. One patient (33.33%) expired, while two (66.66%) survived. The p-value of 0.52 indicates no significant correlation.
5. Leptospirosis: Nineteen patients (14.2%) had leptospirosis. Mortality was 15.78% (3 expired, 16 survived). A p-value of 0.19 suggests no significant difference.
6. Scrub Typhus and Epstein-Barr Virus (Scrub/EBV) Meningitis: Only one patient (0.7%) had Scrub/EBV meningitis and did not survive. The p-value of 0.11 suggests a potential correlation but is not statistically significant.
7. Scrub Meningitis: This diagnosis was recorded in 43 patients (32%).Eleven (25.58%) expired, while 32 (74.4%) survived. The p-value of 0.62 indicates no significant difference in survival outcomes.
8. Varicella-Zoster Virus (VZV) Meningitis: Four patients (3%) were diagnosed with VZV meningitis. The mortality rate was high at 75% (3 expired, 1 survived). The p-value of 0.03 suggests a statistically significant correlation between VZV meningitis and mortality.

Overall Interpretation The highest mortality rates were observed in Scrub/EBV meningitis (100%), VZV meningitis (75%), and HSV meningitis (66.66%). Among these, VZV meningitis had a statistically significant association with mortality (p = 0.03). In contrast, ABM had a 100% survival rate. Other conditions, such as TBM and Scrub Meningitis, showed relatively moderate mortality rates but without statistical significance. The findings suggest that VZV meningitis might be a critical risk factor for mortality, warranting further investigation and targeted intervention strategies.

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DISCUSSION

Fever accompanied by altered sensorium is a frequently observed clinical presentation leading to hospital admissions among both pediatric and adult populations in our country. This condition, commonly referred to as acute febrile encephalopathy (AFE), has been extensively studied in children, with central nervous system (CNS) infections identified as the predominant etiology. However, there remains a significant gap in research regarding the etiological spectrum of AFE in adults within our region.

The present study aims to systematically evaluate the underlying causes of AFE in adult patients admitted to a tertiary care center, with a particular emphasis on infectious etiologies. Furthermore, this research seeks to analyze the correlation between specific clinical manifestations and patient prognosis, thereby contributing to a more comprehensive understanding of disease outcomes in this population. The etiological spectrum of febrile encephalopathy exhibits significant variability across geographic regions, influenced by diverse epidemiological factors, population demographics, and age-specific predispositions within the studied cohorts.[2] Several studies have investigated the etiological spectrum of febrile encephalopathy and the appropriate threshold for urgent diagnostic evaluation to either verify or rule out CNS infection in the pediatric age group. However, there are few similar studies in the case of adults.

Age Distribution: The age distribution of the study population, as shown in this study, indicates that most of patients were aged 17–30 years (48.51%), with fewer in older groups. The mean age was 36.61 ± 16.47 years. Similarly, survival was higher in ≤50 years (81.13% vs. 18.86% mortality) than in >50 years (35.72% vs. 64.2%mortality). The difference was significant (P< 0.0001), indicating higher mortality with age.

In a similar study, Dar M A et al,[8] observed a mean age of 32.54 ± 5.23 years, with most patients clustered between 27 and 38 years, reflecting a narrower age distribution.

Gender Distribution: The gender distribution in our study reveals an almost balanced ratio, with females 51.49% and males 48.51%. Similarly, survival was higher in females 79.7% vs. 20.29% mortality than males 63.07% vs. 36.93% mortality. The difference was significant (P= 0.03), indicating higher male mortality. In contrast, Bhalla A et al1 reported a pronounced male predominance, with 78.1% of the participants (113 out of 145) being male and only 21.9% (32 patients) being female.

Similarly, Peidaee et al,[9] observed that 60.8% of the study population (178 individuals) were male, while 39.2% (115 individuals) were female, resulting in a male-to-female ratio of 1.54:1, indicating a clear gender imbalance.

Our study also illustrates the gender distribution of patients in relation to survival outcomes. Out of 134 patients, 51.49% were females, and 48.51% were males.

Among females only 20.29% expired, conversely in the males 36.93% expired suggesting male gender is associated with higher mortality rate.

Likewise, Dar M A et al,[8] documented a male predominance, with 74 males (60.7%) and 48 females (39.3%), demonstrating a higher proportion of males in their study. Also,

Duration of Fever and Its Association with Survival Outcomes: Our study presents patient distribution based on fever duration. Among 134 patients, 47.76% had fever for 1–7 days, while 52.23% experienced it for 8–14 days, with an average duration of 7.74±3.86 days. Similarly, fever duration correlated with outcomes: among those with fever ≤7 days n=64, 52 (81.25%) survived, whereas 12 (18.75%) expired. In contrast, for fever >7 days n=70, survival was lower at 44 (62.85%), with 26 (37.14%) fatalities. The difference was statistically significant p=0.01, suggesting prolonged fever increases mortality risk.

Similarly, Bhalla A et al,[1] observed that prolonged fever duration was more common in non-survivors, reflecting its potential link with worse outcomes. Likewise, Peidaee et al,[9] noted that shorter fever duration was associated with less severe cases, while patients with extended fever had more complications. The statistically significant difference (p=0.01) in our study underscores the association between prolonged fever and increased mortality risk, further supporting findings from related research.

Similarly, Modi A et al,[10] found that headache was present in all cases (100%), and seizures were most common in acute viral encephalitis (AVE, 67.64%), followed by cerebral malaria (CM, 46.15%), pyogenic meningitis (PM, 38.63%), and least frequent in SAE (18.18%), while TBM cases had no seizures. Severe neurological impairment (GCS < 7) was highest in SAE (36.4%) and PM (20.5%), whereas most AVE (85.3%), CM (88.5%), and all TBM cases (100%) had GCS> 7, indicating better neurological outcomes.

Kashinkunti M D et al,[11] also reported that headache was nearly universal (83.3%–100%), and seizures were most frequent in cerebral malaria (83.3%) and pyogenic meningitis (77.2%). Severe GCS impairment (GCS < 7) was primarily seen in SAE (16 cases) and pyogenic meningitis (14 cases). Likewise, Hirekerur V L et al,[12] observed that fever was present in all patients (100%), followed by altered sensorium in 77%, seizures in 74.3%, vomiting in 60%, and headache in 22.9%. These studies collectively emphasize the prevalence of key symptoms like headache, vomiting, seizures, and altered sensorium in acute febrile encephalopathy cases, with variations depending on underlying etiologies.

In a similar study, Deepthi A et al,[13] also demonstrated that higher GCS scores were associated

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with improved survival outcomes. Among patients with GCS 3–6 (N=32), 37.6% recovered, 43.6% experienced morbidity, and 18.8% succumbed to the illness. Likewise, for GCS 7–9 (N=34), 76.4% recovered, 11.8% had morbidity, and 11.8% died. Notably, for those with GCS 10–12 (N=18), 94.4% recovered, 5.6% had morbidity, and no deaths were recorded, further reinforcing the relationship between higher GCS scores and better survival rates. This comparison highlights the consistent prognostic value of GCS in both studies.

CONCLUSION

1. **Age Distribution:** Most patients were aged 17–30 years 48.51%**,** with a mean age of 36.61 ± 16.47 years**.** Similarly, survival was higher in ≤50 years 81.13% than >50 years 35.72%**,** with significantly higher mortality in older patients (P< 0.0001).
2. **Gender Distribution:** Gender distribution was nearly equal (females 51.49%, males 48.51%). Similarly, survival was higher in females (79.7%) than males (63.07%), with significantly higher male mortality (P= 0.03).
3. **Duration of Fever and Its Association with Survival:** Among 134 patients, 47.76% had fever for 1–7 days, while 52.23% had it for 8–14 days mean 7.74±3.86 days. Similarly, survival was higher with fever ≤7 days (81.25%) than >7 days (62.85%), with significantly higher mortality in prolonged fever cases (P= 0.01).
4. **Symptom Distribution and Clinical Parameters Associated with Survival:** Headache (76.87%) was most common, followed by vomiting (61.94%) and seizures (43.28%), while rash (2.24%) was rare, and dystonia was absent. Similarly, seizures, GCS <8 (P< 0.0001), and nuchal rigidity (P= [0.005) predicted mortality, while headache (P= [0.89) and vomiting (P= [0.83) showed no impact.
5. **Distribution of Diagnoses:** TBM (42.54%) was most common, followed by Scrub Meningitis (32.09%) and Leptospirosis (14.18%). While VZV (75%, P= 0.03) had the highest significant mortality, Scrub/EBV (100%) and HSV (66.66%) showed high but non-significant mortality. ABM had 100% survival.
6. **Blood Pressure Comparison:** Blood pressure showed no significant impact on survival, with similar systolic (expired: 107.1 ± 20.12, survived: 109.58 ± 18.00 mmHg, p = 0.48) and diastolic values (expired: 70.54 ± 11.29, survived: 70.96 ± 10.53 mmHg, p = 0.83).
7. **Comparison of Hematological, Biochemical, And Creatinine Parameters:** Hematological parameters showed no significant differences, including hemoglobin (10.51 g/dL, p = 0.8), TLC (p = 0.23), and platelets (p= 0.31). However, creatinine >1.5 mg/dL was linked to higher mortality (52%, p = 0.0005). CSF glucose and protein levels were lower in expired patients but not statistically significant.

To summarize, this study has identified several factors influencing mortality in patients with acute febrile encephalopathy.

Increased mortality was observed in individuals above 50 years of age, particularly among males, and in those with a fever duration exceeding seven days. Clinical indicators such as the presence of seizures, neck rigidity, a Glasgow Coma Scale (GCS) score below 8, and elevated serum creatinine levels above 1.5 mg/dL were also significantly associated with higher mortality rates. Additionally, patients diagnosed with varicella-zoster virus (VZV) meningitis exhibited a worse prognosis.

Conversely, factors associated with lower mortality included age below 50 years, female gender, and a fever duration of less than seven days. The absence of seizures and neck rigidity, along with a GCS score above 8 and serum creatinine levels below 1.5 mg/dL, were indicative of better outcomes. Patients diagnosed with acute bacterial meningitis (ABM) demonstrated comparatively lower mortality rates. Certain clinical and laboratory parameters, such as the presence of headache and vomiting, blood pressure at the time of presentation, hematological parameters, and liver function test (LFT) values, were not found to have a significant association with mortality.

These findings provide important prognostic insights, aiding in early risk stratification and guiding clinical management in patients with febrile encephalopathy.

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