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ACUTE FEBRILE ENCEPHALOPATHY IN PEDIATRIC POPULATIONS: UNVEILING THE CLINICAL AND ETIOLOGICAL SPECTRUM IN HIMACHAL PRADESH

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ABSTRACT

Background: Acute Febrile Encephalopathy (AFE) is a critical condition in pediatric healthcare, characterized by an altered mental state during or following a short febrile illness. This study aims to investigate the clinical and etiological profile of AFE in children in this region, to improve diagnostic accuracy and therapeutic interventions. **Materials and Methods:** This hospital-based cross-sectional study was conducted in the Pediatric Intensive Care Unit (PICU) at Indira Gandhi Medical College and Hospital, Shimla, over a one-year period from January 2020 to December 2020. All pediatric patients aged 1 to 18 years admitted with clinical evidence of AFE were included in the study. Data were collected on demographic details, clinical symptoms, signs, and relevant investigations, including neuroimaging and laboratory tests. **Results:** Out of 550 PICU admissions, 69 patients met the inclusion criteria for AFE, reflecting an incidence rate of 12.5%. The majority of patients were aged 10 to 18 years (43%), with a slight male predominance (56.5%). Fever and altered sensorium were the most common symptoms (100%). CNS infections were the leading etiology, with scrub encephalitis being the most common cause (15.8%), followed by viral meningoencephalitis (14.4%), and tubercular meningitis (11.5%). The case fatality rate for AFE was 26%, with AFE contributing to 13.7% of the overall PICU mortality. Late presentation, low Glasgow Coma Scale scores, and the presence of multiple organ dysfunction syndrome (MODS) were identified as significant risk factors for mortality. **Conclusion:** AFE remains a major cause of pediatric morbidity and mortality, particularly in regions where infectious diseases such as scrub typhus are prevalent. Early diagnosis and timely intervention are critical in reducing mortality. The study emphasizes the need for region-specific management protocols and improved diagnostic capabilities, especially during peak seasons like the post-monsoon period when scrub typhus incidence is high.

KEYWORDS: Acute Febrile Encephalopathy, CNS Infections, Scrub Typhus, Pediatric Intensive Care Unit, Mortality, Himachal Pradesh, Viral Encephalitis.

INTRODUCTION

Acute Febrile Encephalopathy (AFE) is a critical clinical condition characterized by an altered mental state that occurs either during or after a short febrile illness. This condition is indicative of a diffuse and nonspecific brain insult, presenting a significant challenge in pediatric healthcare, particularly in emergency departments. Despite AFE being a major cause of hospital admissions among children in India, there is a surprising paucity of comprehensive studies on the subject. Globally, AFE remains a significant health concern due to its association with high morbidity and mortality rates, especially in pediatric populations.[1-4]

Infection of the central nervous system (CNS) is the most common cause of AFE in children, with viral encephalitis being the leading contributor. In developing countries like India, CNS infections, including bacterial and parasitic infections, remain a predominant cause. However, the clinical presentation of AFE is often nonspecific, complicating the early identification of the underlying etiology and delaying appropriate therapeutic interventions. Systemic complications such as hypoglycemia, hyperpyrexia, hypotension, hypoxia, or electrolyte imbalance can also lead to encephalopathy, further complicating the clinical scenario.[5-7]

The etiology of AFE varies significantly across different geographic regions and seasons. In tropical regions like India, common causes include cerebral malaria, Japanese encephalitis, and bacterial meningitis, with tuberculosis presenting as a chronic form. Despite advances in diagnostic techniques and treatment, the identification of the causative agent in AFE remains challenging, often leading to a reliance on empirical therapies.[8-11]

Given the changing epidemiology, availability of newer diagnostic and therapeutic techniques, and the regional

variability in AFE's clinical profile, there is an urgent need for region-specific studies. This study aims to investigate the clinical and etiological profile of AFE in children from Himachal Pradesh, with the goal of improving diagnostic accuracy and therapeutic interventions, thereby reducing unnecessary antibiotic use and optimizing healthcare resources.

AIMS AND OBJECTIVES

1. To study the clinical profile of Acute Febrile Encephalopathy in children aged 1 to 18 years.
2. To investigate the etiological profile of Acute Febrile Encephalopathy in children aged 1 to 18 years**.**

MATERIALS AND METHODS

Type of Study

This research is a hospital-based cross-sectional study.

Place of Study

The study was conducted in the Pediatric Intensive Care Unit (PICU) of the Department of Pediatrics, Indira Gandhi Medical College and Hospital, Shimla.

Duration of Study

The study spanned one year, from January 2020 to December 2020.

Study Population

The study population comprised all pediatric patients aged between 1 to 18 years who were admitted to the PICU with clinical evidence of Acute Febrile Encephalopathy (AFE) during the study period.

Inclusion Criteria

Pediatric patients admitted to the PICU, aged between 1 to 18 years, who presented with:

- A history of fever (axillary temperature >38˚C or >100.4˚F) of duration equal to or less than 14 days.
- Altered state of consciousness lasting for 12 hours or more, including symptoms such as confusion, disorientation, stupor, coma, and Glasgow Coma Scale (GCS) score ≤13 for children >2 years, and pediatric Glasgow Coma Scale (pGCS) score ≤13 for children <2 years.

Exclusion Criteria

- Patients with simple febrile seizures.
- Patients with neurosurgical devices.
- Patients with a recent history of neurosurgery.
- Known chronic systemic illnesses, including neurodevelopmental delay, malignancy, and those on immunosuppressive therapy.

Sample Size and Sampling Procedure

All consecutive pediatric patients who presented with clinical evidence of AFE and met the inclusion criteria were included in the study. These patients were admitted to the PICU of the Department of Pediatrics at IGMC Shimla during the study period from January 2020 to December 2020.

Ethical consideration

Informed written consent was obtained from the parents or guardians of the participants before enrollment. Ethical clearance for the study was obtained from the Institutional Ethics Committee of IGMC.

Data Collection

Data was collected using a structured proforma specifically designed for the study. This included:

- **Demographic data:** Name, age, sex, and address.
- **Detailed history:** Including vital signs at admission, symptoms of fever, altered sensorium, prodromal symptoms, and duration of illness. Additional history included recent animal bites, vaccinations, contact with infectious diseases, travel history, and similar illnesses in the neighborhood.
- **Clinical Examination:** Comprehensive physical examination, with a focus on neurological assessment using the Glasgow Coma Scale (GCS) for children above 2 years and Pediatric Glasgow Coma Scale (pGCS) for children below 2 years.

Investigations

To ascertain the etiology of AFE, the following investigations were performed:

- **Basic Investigations:** Complete blood count, blood culture, urine culture, random blood sugar, kidney function test, serum electrolytes, liver function test, urine routine and microscopic examination, chest X-ray, arterial blood gas analysis, and coagulation studies.
- **Specific Tests:** Malaria antigen test, peripheral smear for malaria, NS1 antigen and IgM antibody for dengue, serum viral panel studies (Japanese encephalitis, measles, mumps, chikungunya, West Nile virus, HSV-1, HSV-2), Mantoux test, IgM ELISA for scrub typhus, Widal test, and other relevant investigations as indicated.
- **CSF Examination:** Biochemistry (protein, sugar), cytology, Gram stain, GeneXpert for tuberculosis (TB), virological studies, culture, and other tests like anti-NMDAR antibodies and AQ-4 as required.
- **Neuroimaging:** CT scan of the brain and MRI of the brain were performed as needed.
- **Electroencephalography (EEG):** Conducted when required.

Risk Factors Assessment

Risk factors such as the presence of shock, need for ventilatory support, poor GCS, raised intracranial pressure, multiple organ dysfunction syndrome (MODS), and disseminated intravascular coagulation (DIC) were assessed for their association with mortality.

Definitions Used in the Study

1. **Acute Febrile Encephalopathy:** Defined as acute onset (≤14 days) fever (axillary temperature >38°C

or >100.4°F) with altered state of consciousness lasting for ≥12 hours, including symptoms such as confusion, disorientation, coma, or inability to talk, and/or new-onset seizures (excluding simple febrile seizures) with GCS ≤13 in children >2 years and pGCS ≤13 in children <2 years.

2. **Raised Intracranial Tension:** Considered when two or more of the following were present: hypertension, bradycardia, irregular respiration, abnormal tonic posturing, bulging, and non-pulsatile anterior fontanelle, presence of crack-pot sign, and papilledema on direct ophthalmoscopy.
3. **Multiple Organ Dysfunction Syndrome (MODS):** Characterized by a severe, systemic, uncontrolled inflammatory process leading to multiple organ dysfunctions.
   - **Cardiovascular Dysfunction:** Hypotension or the need for vasoactive drugs despite adequate fluid resuscitation.
   - **Respiratory Dysfunction:** PaO2/FiO2 ratio <300 or PaCO2 >65 torr.
   - **Neurological Dysfunction:** Acute change in mental status with a decrease in GCS ≥3 points from baseline.
   - **Hematologic Dysfunction:** Platelet count <80,000/mm³ or INR >2.
   - **Renal Dysfunction:** Serum creatinine >2 times the upper limit of normal.
   - **Hepatic Dysfunction:** Total bilirubin >4 mg/dL or ALT >2 times the upper limit of normal.
4. **Respiratory Distress:** Clinical features such as tachypnea, increased work of breathing, abnormal airway sounds, and hypoxemia.
5. **Shock:** Defined as inadequate tissue delivery of oxygen and nutrients, with clinical features of tachycardia, altered peripheral pulses, delayed capillary refill time, decreased urine output, and variable blood pressure.

Statistical Analysis

Data was analyzed using SPSS software, version 24. Descriptive statistics were presented as frequency and percentages for categorical variables, and mean ± standard deviation for continuous variables. Inferential statistics included the Student's t-test for comparing means between two groups and ANOVA for comparing means between more than two groups. The Chi-square test was used to assess the significance of study parameters on a categorical scale. A p-value of <0.05 was considered statistically significant.

RESULTS AND OBSERVATIONS

During the one-year study period from January 2020 to December 2020, a total of 2832 children were admitted to the Department of Pediatrics at Indira Gandhi Medical College and Hospital, Shimla. Out of these, 550 patients were admitted to the Pediatric Intensive Care Unit (PICU). Among the PICU admissions, 78 patients met the inclusion criteria for Acute Febrile Encephalopathy (AFE). However, 9 patients were excluded based on the exclusion criteria, resulting in 69 patients being enrolled in the study. This reflects an incidence rate of 12.5% for AFE among PICU admissions and 2.4% of the total hospital admissions.

Age Distribution: The study population comprised 69 participants. The majority, 30 patients (43%), were in the 10 to 18 years age group. The second most common age group was 5 to <10 years with 29 patients (42%), followed by the 1 to <5 years age group, which had 10 patients (15%).

Sex Distribution: Out of the 69 participants, 39 (56.5%) were males, and 30 (43.4%) were females, indicating a male predominance with a male-to-female ratio of 1.3:1.

District-wise Distribution: The highest number of participants, 27 (39.1%), were from Shimla, followed by Mandi with 14 patients (20.3%), Solan with 8 patients (11.6%), and Kullu with 7 patients (10.1%). The least number of participants, 1 (1.4%), was from Kinnaur. No patients from Una, Hamirpur, Kangra, Chamba, and Lahaul Spiti were referred during the study period.

Table 1: Sociodemographic Profile of Study Participants.

Variable	Frequency (N=69)	Percentage (%)
Age Group		
1 to <5 years	10	15.0
5 to <10 years	29	42.0
10 to 18 years	30	43.0
Sex Distribution		
Male	39	56.5
Female	30	43.4
District-wise Distribution		
Shimla	27	39.1
Mandi	14	20.3
Solan	8	11.6
Kullu	7	10.1
Sirmaur	6	8.8
Bilaspur	6	8.8

Kinnaur	1	1.4
Others	0	0.0

Clinical Symptoms: All 69 participants (100%) presented with fever and altered sensorium. The second most common symptom was vomiting (55.1%), followed by seizures (43.5%), headache (39.1%), and rash (26.1%). Other symptoms included loose stools (21.7%), respiratory symptoms (15.9%), motor weakness (7.2%), and bleeding manifestations (4.3%).

Clinical Signs: The most common clinical sign was raised intracranial tension (ICT) observed in 28 patients (40.6%). Low Glasgow Coma Scale (GCS) scores were present in 23 patients (33.3%). Meningeal signs and organomegaly were observed in 19 patients each (27.5%). Papilledema was seen in 18 patients (26.1%). Motor deficits were present in 13 patients (18.8%), cranial nerve palsy in 7 patients (10.6%), and cerebellar signs in 2 patients (2.9%).

Table 2: Clinical Profile of Study Participants.

Variable	Frequency (N=69)	Percentage (%)
Clinical Symptoms		
Fever	69	100.0
Altered sensorium	69	100.0
Vomiting	38	55.1
Seizures	30	43.5
Headache	27	39.1
Rash	18	26.1
Loose stools	15	21.7
Respiratory symptoms	11	15.9
Motor/sensory deficits	5	7.2
Bleeding manifestations	3	4.3
Others	8	11.6
Clinical Signs		
Raised ICT	28	40.6
GCS < 8	23	33.3
Meningeal signs	19	27.5
Organomegaly	19	27.5
Papilledema	18	26.1
Motor deficit	13	18.8
Cranial nerve palsy	7	10.6
Cerebellar signs	2	2.9

Meningeal Signs: Meningeal signs were present in 19 patients (27.5%), with neck rigidity observed in all 19 patients (100%). Kernig's sign was positive in 5 patients (26.3%), and Brudzinski's sign was positive in 4 patients (21%).

Table 3: Meningeal Signs in Study Participants.

Meningeal Signs	Frequency (N=19)	Percentage (%)
Neck rigidity	19	100.0
Kernig's sign	5	26.3
Brudzinski's sign	4	21.0

The most common etiology identified was CNS infections, with scrub encephalitis being the leading cause (15.8%). Viral meningoencephalitis accounted for 14.4%, tubercular meningitis for 11.5%, and pyogenic meningitis for 10.1%. Metabolic causes, sepsis-associated encephalopathy, autoimmune causes, and toxin/poisoning were less common. In 14.5% of cases, the etiology was inconclusive.

Table 4: Etiology of Acute Febrile Encephalopathy.

Etiology	Frequency (N=69)	Percentage (%)
CNS Infections		
Scrub encephalitis	11	15.8
Viral meningoencephalitis	10	14.4
Tubercular meningitis	8	11.5
Pyogenic meningitis	7	10.1

Metabolic Causes		
DKA	1	1.4
Hepatic encephalopathy	2	2.9
Hyponatremia (AGE)	3	4.3
Reye Syndrome	1	1.4
Sepsis-associated Encephalopathy		
Enteric encephalopathy	3	4.3
Staphylococcal sepsis	2	2.9
Klebsiella sepsis	1	1.4
Complicated UTI	1	1.4
Autoimmune Causes		
ADEM	1	1.4
NMDAR encephalitis	1	1.4
Post-COVID MIS-C	5	7.1
Toxin/Poisoning		
Bee sting anaphylaxis	1	1.4
Paraquat poisoning	1	1.4
Inconclusive	10	14.5

CSF culture was positive in 6 patients (8.7%), with Streptococcus pneumoniae being the most common organism (7.2%). Blood culture was also positive in 6 patients (8.7%), with Salmonella spp. in 3 cases (4.3%). Urine culture was positive in 3 patients (4.3%).

Table 5: Culture Positivity Results in AFE.

Culture Type	Frequency (N=69)	Percentage (%)
CSF Culture		
Positive	6	8.7
Negative	63	91.3
Blood Culture		
Positive	6	8.7
Negative	63	91.3
Urine Culture		
Positive	3	4.3
Negative	66	95.7

CT Brain: Out of 69 participants, 16 (22.9%) underwent CT brain, with abnormalities found in 9 patients (12.8%). The most common finding was cerebral edema (5.8%).

MRI Brain: In the study, out of the 69 participants, 23 (32.9%) underwent MRI brain imaging. Among these, 11 patients (15.5%) exhibited abnormal findings, while 12 (17.4%) had normal MRI results. The most common abnormality was meningeal enhancement, seen in 2 patients (2.9%). Other notable findings included cerebellitis, hippocampal involvement, diffuse hyperintensities, and leptomeningeal enhancement with obstructive hydrocephalus, each observed in 1.4% of cases.

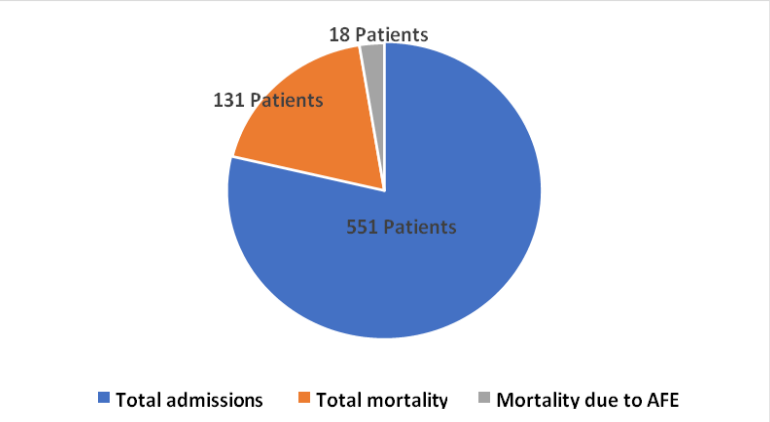
Table 6: Neuroimaging Findings in Study Participants.

Neuroimaging Findings	Frequency	Percentage (%)
CT Brain (N=16)		
Cerebral edema	4	5.8
Cerebritis	1	1.4
Granuloma	1	1.4
Leptomeningeal enhancement	2	2.9
Normal	7	10.1
Ventriculomegaly with hydrocephalus	1	1.4
MRI Brain (N=23)		
Normal	12	17.4
Cerebellitis	1	1.4
Confluent symmetric hyperintensities in bilateral hemisphere	1	1.4
Basal enhancement with enhancing exudates	1	1.4
Diffuse hyperintensity in left temporal lobe	1	1.4

Hippocampal involvement	1	1.4
Hyperintensities in bilateral temporal lobes	1	1.4
Meningeal enhancement	2	2.9
Meningeal enhancement with subacute infarct in subcortical structures	1	1.4
Leptomeningeal enhancement with obstructive hydrocephalus	1	1.4
T2 flair hyperintensities in temporal lobe	1	1.4

Out of the 69 patients with AFE, 18 patients (26%) succumbed to the illness, resulting in a case fatality rate of 26%. The overall mortality rate in the PICU was 23.8%, with AFE contributing to 13.7% of the total PICU mortality.

These results highlight the significant burden of AFE on the pediatric population, emphasizing the need for prompt diagnosis and targeted interventions to improve patient outcomes.



DISCUSSION

Acute Febrile Encephalopathy (AFE) is a critical condition contributing significantly to morbidity and mortality among children. Despite its importance, there is a paucity of comprehensive studies on AFE, especially in regions like Himachal Pradesh. This study aimed to bridge some gaps in the existing literature by analyzing the clinical features, etiological factors, and risk factors associated with mortality in AFE cases in this region.

In our one-year hospital-based cross-sectional study, 69 children met the inclusion criteria for AFE, constituting 12.5% of PICU admissions and 2.4% of total pediatric hospital admissions. This incidence aligns with findings from Gupta et al[12] in Ahmedabad, where AFE accounted for 12.6% of PICU admissions . Other studies across India report varying AFE incidence rates, from 2.1% in Upper Assam to 17.9% in West Bengal.[13,14] This variability may be attributed to differences in patient populations, regional epidemiology, and study methodologies.

Our study demonstrated a slight male predominance, with 56.5% of the participants being male, resulting in a male-to-female ratio of 1.3:1. This gender disparity is consistent with previous studies, such as those by Deepti Cha et al[15], where 60.7% of the AFE cases were male. The higher incidence among males may be due to societal biases leading to earlier presentation of male children for medical care, as well as increased exposure to infections due to greater involvement in outdoor activities.

Age-wise, the most affected group in our study was 10 to 18 years (43%), followed closely by the 5 to <10 years group (42%). The least affected group was 1 to <5 years (15%). This finding contrasts with some studies, such as those by Sharma et al[5] and Gupta et al., which found younger children (1 to 5 years) to be the most commonly affected. The higher incidence in older children in our study may be related to the school-going age group's increased exposure to infections through intermingling and overcrowding, as also noted by Deepti Cha et al.[15]

Fever and altered sensorium were universal symptoms in our study, present in all 69 participants (100%). Vomiting (55.1%), seizures (43.5%), and headache (39.1%) were also common. These findings are consistent with other studies.[14-17] Raised intracranial tension (ICT) was the most frequent clinical sign (40.6%), followed by a Glasgow Coma Scale (GCS) score of less than 8 (33.3%). Meningeal signs were present in 27.5% of cases, with neck rigidity being the most common. Similar findings were reported by Jain et al[16], where convulsions and raised ICT were also common presentations. The high incidence of severe symptoms in our study may be due to the referral nature of our hospital, which serves as a tertiary care center receiving critically ill patients from peripheral hospitals lacking in resources for early management.

CNS infections remain the most common cause of AFE globally, and our study supports this finding, with CNS infections accounting for the majority of cases. Scrub encephalitis was the leading specific etiology, observed

in 15.8% of cases. This is consistent with studies from other parts of India, such as Kar A et al[17] in southern India, where scrub typhus was a significant cause of AFE. Himachal Pradesh is known to be endemic for scrub typhus, which is commonly transmitted during agricultural activities involving grass cutting. Our study adds to the growing body of literature highlighting the importance of scrub typhus as a cause of AFE in endemic regions.

Viral meningoencephalitis was the second most common cause, seen in 14.4% of cases. Diagnosing viral encephalitis can be challenging due to the difficulty in isolating viruses compared to bacteria. In our study, we used CSF analysis, brain imaging, and viral PCR to diagnose viral meningoencephalitis. Among the 10 viral cases, microbiological confirmation was possible in 3 cases, with HSV-1 being the most common virus detected. This finding is similar to that of Bokade et al[2], who reported viral encephalitis as a leading cause of AFE.

Tubercular meningitis accounted for 11.5% of cases in our study. This aligns with findings from other studies, such as those by Gupta et al[12] and Kamble S et al[18], where tubercular meningitis was a significant contributor to AFE. In our study, the diagnosis was based on clinical features, CSF analysis, and characteristic imaging findings. However, only 4 out of 8 patients had positive CSF TB CBNAAT results, highlighting the challenges in diagnosing tuberculosis, especially in resource-limited settings.

Acute bacterial meningitis was observed in 10.1% of cases, with Streptococcus pneumoniae being the most commonly isolated organism. This finding is consistent with studies from central India and other regions[13-16], where bacterial meningitis is a significant cause of AFE.

Interestingly, no cases of malaria or dengue were reported in our study, which contrasts with studies from regions like South Rajasthan, where cerebral malaria is a leading cause of AFE. This absence of malaria and dengue in our study may be attributed to the high altitude of Himachal Pradesh, which limits the mosquito population.

Metabolic causes of AFE in our study included diabetic ketoacidosis, hepatic encephalopathy, and hyponatremia, together accounting for 8.6% of cases. Sepsis-associated encephalopathy was observed in 10.1% of cases, with enteric encephalopathy being the most common. Autoimmune causes, including ADEM, anti-NMDAR encephalitis, and post-COVID MIS-C, accounted for 10.1% of cases, highlighting the emerging importance of autoimmune conditions in the etiology of AFE. In 14.5% of cases, the etiology remained inconclusive, which is consistent with other studies where a significant proportion of AFE cases had no definitive diagnosis due to various factors, including prior antibiotic use.[12-16]

The mortality rate in our study was 26%, with AFE contributing to 13.7% of overall PICU mortality during the study period. This high mortality rate is consistent with findings from Bokade et al[2], who reported a mortality rate of 19.3% among AFE patients. Other studies, such as those from Iran and Nigeria, have reported mortality rates ranging from 16.6% to 32.5%, reflecting differences in etiology, diagnostic capabilities, and treatment availability.[19,20]

The case fatality rate (CFR) in our study (26%) aligns with findings from other Indian studies, where CFRs have ranged from 12% to 31%. For example, Deepti Cha et al[15] reported a CFR of 12% in Andhra Pradesh, while Gupta et al[12] in Ahmedabad reported a CFR of 31%. The high CFR in our study underscores the severity of AFE cases seen at our tertiary care center and highlights the need for early diagnosis and prompt, aggressive management to improve outcomes.

Limitations

This study, being hospital-based, was limited by a relatively small sample size and a geographically restricted area, which may not reflect the broader epidemiology of AFE. The reliance on referrals from peripheral hospitals introduced potential referral bias and the challenge of incomplete pre-referral treatment records, particularly regarding prior antibiotic use, which may have rendered CSF cultures sterile. Additionally, the high cost of viral markers in CSF limited the identification of the specific viruses responsible for AFE in many cases. Neuroimaging could not be performed on all patients due to early intubation, potentially impacting the accuracy of etiological diagnosis. Lastly, the study did not include long-term follow-up to assess the sequelae of AFE, which is critical for understanding the full spectrum of outcomes.

CONCLUSION

Acute Febrile Encephalopathy (AFE) remains a significant cause of pediatric morbidity and mortality, particularly in regions like Himachal Pradesh where infectious etiologies, notably scrub typhus, predominate. Our study highlights the critical need for early diagnosis, timely intervention, and region-specific management protocols to address the diverse etiologies of AFE. The findings underscore the importance of heightened awareness, especially during the post-monsoon period, and the necessity of equipping peripheral health centers with the tools and knowledge to manage and refer AFE cases promptly. Reducing delays in treatment and improving diagnostic capabilities are essential to decreasing the high mortality rates associated with AFE and improving long-term outcomes for affected children.

Recommendations

Given the substantial impact of AFE on pediatric health, it is essential to establish clinical and management protocols across all health centers in the region to ensure timely diagnosis and treatment. Special emphasis should

be placed on recognizing and managing scrub typhus encephalitis, particularly during the post-monsoon period when its incidence peaks. Additionally, protocols should be developed for early identification of AFE risk factors in peripheral health centers to facilitate timely referrals and reduce mortality. A concerted effort to improve early intervention and referral practices could significantly enhance survival rates and reduce long-term morbidity associated with AFE.

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