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Comparative study of clinical features, severity of manifestations and outcome in patients with acute encephalitis syndrome with shock and without shock

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ABSTRACT

Background: Acute Encephalitis Syndrome (AES) poses a significant public health challenge globally due to its high morbidity and mortality rates. The incidence of AES varies, with viruses being the predominant causative agents. Shock is a severe complication in AES patients, necessitating prompt recognition and management to improve outcomes.
Methods: A prospective study was conducted from August 2018 to November 2020 at two medical centers in Cuttack, focusing on AES patients aged 6 months to 14 years. Clinical features, laboratory parameters, and outcomes were compared between AES patients with (N=30) and without shock (N=70).
Results: AES patients with shock presented with more severe clinical features, including lower Glasgow Coma Scale scores, unstable vital signs, and significant abnormalities in laboratory parameters such as hemoglobin levels, blood glucose, liver and renal function, and coagulation studies. Shock patients required more aggressive therapeutic interventions, including vasopressors and mechanical ventilation. Mortality was significantly higher in the shock group (50%) compared to the non-shock group (7%), with refractory shock associated with a 100% mortality rate. However, complete recovery rates were lower in the shock group (40% vs. 81.4%).
Conclusion: Shock in AES patients is associated with a more severe clinical course and poorer outcomes, highlighting the importance of early recognition and aggressive management strategies.

Keywords*: Acute Encephalitis Syndrome, Shock, Pediatric Patients, Outcome Assessment.*

INTRODUCTION:

Acute encephalitis syndrome (AES) is defined as acute onset of fever and a change in mental status (including symptoms such as confusion, disorientation, coma, inability to talk) and/ or new onset of seizures (excluding simple febrile seizures) in a person of any age at any time of the year. Other clinical findings may include irritability, somnolence, or abnormal behaviour greater than that seen with usual febrile illness . AES is also known as 'Acute febrile Encephalopathy', 'Viral Encephalitis', 'Infectious Encephalitis' or 'Brain Fever'. The concept of AES was introduced to facilitate surveillance for Japanese Encephalitis – arthropod borne viral encephalitis.[1] Worldwide, AES has been a major health problem because of associated high morbidity and mortality. Incidence of AES varies in different studies but average global incidence is between 3.5 - 7.4 per 1,00,000 patient year, the incidence being higher in children.[2] The etiology of AES can be broadly classified under infective (bacteria / virus) OR non-infective category, which can vary widely depending on geographical location and host factors. In most of the cases, the etiologic agent is not identified and in diagnosed cases, viruses are the major pathogens.[2] In India, actual contribution of viruses to AES is not entirely known because of problems associated with laboratory, diagnosis and many disorders of Central Nervous System mimicking AES. Dengue encephalitis should be considered in differential diagnosis of AES especially in countries like India where dengue has assumed epidemic proportion.[3] JEV is the pre-dominant cause of AES from North and North-eastern India and Columbia.[4-6] In a study on

clinico-epidemiological profile on viral AES from Eastern India , most common cause of AES was found to be HSV.[7] AES patients present with fever along with altered mental status , new onset seizure or behavioral abnormalities. According to a study on association of AES with multiorgan dysfunction - 34.5% of AES patients present with hypotension at the time of admission or develop hypotension in due course of hospital stay.[8] The time lapse between the onset of shock and time of initiation of resuscitative measures is a great determining factor in outcome of AES patients. AES patients either recover completely OR have neurological sequalae OR die. The present research work was an attempt to conduct a thorough investigation into the incidence and categorization of shock in patients with AES, and to perform a comparative analysis of clinical features, severity of manifestations, laboratory parameters, and outcomes in terms of mortality and morbidity among AES patients with and without shock.

Material and Methods:

This research was conducted at S.C.B. Medical College and S.V.P.P.G.I.P in Cuttack during the period of August 2018 to November 2020, focusing on patients aged 6 months to 14 years presenting with acute onset fever of less than 14 days duration, accompanied by a change in mental status (confusion, disorientation, coma, inability to talk), and/or new onset seizures, along with other clinical findings such as irritability, somnolence, or abnormal behavior exceeding that observed in usual febrile illnesses. Exclusion criteria comprised cases below 6 months and above 14 years, a history of head injury, known febrile seizures, and cases leaving against medical advice. Suspected Acute Encephalitis Syndrome (AES) cases meeting the inclusion criteria were initially assessed for Airway-Breathing-Circulation and stabilized, followed by shock evaluation based on defined criteria. Subsequent examinations encompassed a sequential assessment starting from CNS examination, followed by CVS and other systemic evaluations. Demographic history and detailed clinical features were recorded systematically. All enrolled cases received empirical antibiotics and antiviral treatment, coupled with supportive care including intravenous fluids, oxygen administration, and mechanical ventilation if required. Comprehensive investigations, including CBC with peripheral smear, biochemical parameters, blood culture, arterial blood gas analysis, chest X-ray, CSF study, neuroimaging, IgG & IgM levels, PCR for RNA/DNA of suspected pathogens, and coagulation studies, were conducted. Blood specimens for virus isolation were collected within four days of illness onset, and for IgM antibody detection, at least five days post-onset, with a second convalescent sample obtained 10-14 days after the first. Serum samples were kept at room temperature until complete clot retraction, after which they were separated and stored in a refrigerator at 2-8°C for up to a week. In cases where testing delays were expected, sera were frozen at -20°C or preferably at -80°C. CSF specimens were crucial for confirming the diagnosis of AES and were collected in sterile, screw-capped containers, stored at 2-8°C until testing, and frozen at -20°C or -80°C if delays were anticipated. Bacterial pathogen workup of CSF involved immediate processing for staining and culture, avoiding refrigeration. Depending on clinical presentation and suspected etiology, additional specimens like nasopharyngeal/throat swabs, vesicle swabs, rectal swabs/stool specimens, urine, and brain biopsy were collected. Hematological analysis was performed using the ABX MICROS OT 18 Automated Hematology Analyzer. CSF protein estimation was conducted using a semi-auto-analyzer and a commercial kit from Chemilex S.A. CSF specimens were prepared for microscopic examination after centrifugation, while CSF was cultured on specific media. Plates were incubated at 37°C in 5%CO2 and examined daily for seven days, with growth identified and subjected to standard techniques for bacterial identification. Antibiotic sensitivity testing was conducted using the Kirby-Bauer method, and PCR was employed for the detection of HSV 1&2 and VZV DNA during the acute phase of the disease. Statistical Analysis: Data entry was done using MS Excel 2016 and data analysis was carried out using IBM SPSS version 26.0 (Armonk, NY). Differences in proportions were tested for statistical significance using chi square test. A p value <0.05 was considered statistically significant.

Results:

Parameters including age, gender, address, referral, socioeconomic status (SES), and symptoms are compared between patients with shock (N=30) and those without shock (N=70). Significant differences in symptom presentation, such as vomiting (p=0.002), are highlighted. Other notable findings include differences in address distribution and referral patterns between the two groups. (Table 1)

Parameters such as Glasgow Coma Scale (GCS), respiratory rate, heart rate, peripheral pulse volume, capillary refilling time, blood pressure, motor/sensory deficits, deep tendon reflexes, Babinski reflex, cerebellar signs, meningeal signs, papilledema, and abnormalities detected in respiratory and abdominal examinations are compared between patients with shock and those without shock. Significant differences in GCS, respiratory rate, heart rate, capillary refilling time, blood pressure, motor/sensory deficits, papilledema, and respiratory system abnormalities are noticed. Among patients with shock, 16 out of 30 (53.33%) had a GCS score less than 7, whereas among those without shock, 9 out of 70 (12.86%) had a GCS score less than 7. All patients in the shock group had capillary refilling times exceeding 3 seconds, compared to none in the non-shock group. (Table 2)

Parameters including hemoglobin levels, total leukocyte count, platelet count, differential count, random blood sugar, serum electrolyte levels, peripheral smear abnormalities, serum bilirubin levels, liver function tests (LFTs), renal function tests (RFTs), coagulation parameters, fibrinogen levels, fibrin degradation products (FDP), and blood culture results are compared between patients with shock and those without shock. Significant differences are observed in hemoglobin levels, random blood sugar, peripheral smear abnormalities, abnormal LFTs, abnormal RFTs, abnormal PT/INR/aPTT, and positive blood cultures. Among patients with shock, most had hemoglobin levels in the 7-9 g% range (40%) or 9-11 g%

range (43.33%), while in the non-shock group, the majority had hemoglobin levels greater than 11 g% (75.73%). A higher proportion of patients with shock had total leukocyte counts exceeding 11,000/mm3 (73.34%) compared to those without shock (68.58%). A significantly higher proportion of patients with shock had random blood sugar levels below 50mg/dL (3.33%) compared to those without shock (0%). (Table 3)

Parameters such as antibiotics (specifically ceftriaxone, vancomycin, and doxycycline), antiviral therapy (acyclovir), normal saline (NS) bolus, vasopressors, anticonvulsants, mannitol or 3% saline (NS), and mechanical ventilation (MV) or continuous positive airway pressure (CPAP) are compared between patients with shock and those without shock. Nearly all patients in the shock group required vasopressors, with 50.0% needing three or more vasopressors. All patients in the shock group received 3% normal saline, while a significant majority of patients without shock received mannitol (82.9%). A significantly higher proportion of patients in the shock group required mechanical ventilation (76.7%) compared to the non-shock group (17.1%). Significant differences are observed in the administration of NS bolus, vasopressors, anticonvulsants, mannitol or 3% NS, and MV/CPAP therapy between the two groups. (Table 4)

Among patients with shock, 12 out of 30 (40.0%) achieved complete recovery, while among those without shock, 57 out of 70 (81.4%) achieved complete recovery. In the shock group, 12 out of 30 (40.0%) patients had no neurological sequelae, whereas in the non-shock group, 57 out of 70 (81.4%) had no neurological sequelae. Among patients with shock, 19 out of 30 (63.3%) had a hospital stay exceeding 5 days, compared to 58 out of 70 (82.9%) patients without shock. (Table 5)

Table 1: Demographic and Clinical Characteristics of AES Patients with and without Shock

Parameter	Patients in Shock (n=30)	Patients without Shock (n=70)	Total	P value
Age				
<1 year	5 (16.7%)	7 (10.0%)	12	0.568
1-5 years	12 (40.0%)	34 (48.6%)	46	
6-14 years	13 (43.3%)	29 (41.4%)	42	
Gender				
Male	18 (60.0%)	40 (57.1%)	58	0.791
Female	12 (40.0%)	30 (42.9%)	42	
Address				
East Odisha	19 (63.3%)	45 (64.3%)	64	0.053
West Odisha	2 (6.7%)	14 (20.0%)	16	
North Odisha	7 (23.3%)	11 (15.7%)	18	
South Odisha	2 (6.7%)	0	2	
Referral				
No	0 (0%)	7 (10.0%)	7	0.099
Yes	30 (100.0%)	63 (90.0%)	93	
SES				
Class I	1 (3.3%)	3 (4.3%)	4	0.961
Class II	17 (56.7%)	40 (57.1%)	57	
Class III	11 (36.7%)	23 (32.9%)	34	
Class IV	1 (3.3%)	3 (4.3%)	4	
Class V	0	1 (1.4%)	1	
Symptoms				
Fever	30 (100.0%)	68 (97.1%)	98	1.0
Altered Sensorium	27 (90.0%)	53 (75.7%)	80	0.102
Convulsion Nil	4 (13.3%)	18 (25.7%)	22	0.373
GTCS One episode	4 (13.3%)	13 (18.6%)	17	
GTCS Multiple episodes	21 (70.0%)	36 (51.4%)	57	
GTCS Focal Multiple episodes	1 (3.3%)	3 (4.3%)	4	
Vomiting	21 (70.0%)	25 (35.7%)	46	0.002
Headache	3 (10.0%)	11 (15.7%)	14	0.544
Focal Neurological Deficit Nil	27 (90.0%)	56 (80.0%)	83	0.222
Focal Neurological Deficit Motor	3 (10.0%)	14 (20.0%)	17	
Focal Neurological Deficit Sensory	0 (0%)	0 (0%)	0	
CNS Involvement	1 (3.3%)	0 (0%)	1	0.300
K/C/O CP or Seizure Disorder Nil	28 (93.3%)	69 (98.6%)	97	0.250
K/C/O CP	1 (3.3%)	1 (1.4%)	2	
K/C/O Seizure Disorder	1 (3.3%)	0 (0%)	1	
Bladder & Bowel Involvement	1 (3.3%)	2 (2.9%)	3	1.0

Table 2: Clinical Symptoms and Signs of AES Patients with and without Shock

Symptoms	Patients in Shock (n=30)	Patients without Shock (n=70)	Total	P value
GCS <7	16 (53.33%)	9 (12.86%)	25	0.001
GCS 7-11	14 (46.67%)	46 (65.71%)	60	
GCS >11	0 (0.0%)	15 (21.43%)	15	
Respiratory Rate Low	4 (13.33%)	4 (5.72%)	8	0.001
Respiratory Rate Normal	5 (16.67%)	61 (87.14%)	66	
Respiratory Rate High	21 (70.0%)	5 (7.14%)	26	
Heart Rate Low	1 (3.33%)	15 (21.42%)	16	0.001
Heart Rate Normal	0 (0%)	35 (50%)	35	
Heart Rate High	29 (96.67%)	20 (28.58%)	49	
Central Pulse / Peripheral Pulse Low volume	29 (96.67%)	0 (0%)	29	0.001
Central Pulse / Peripheral Pulse Well felt	0 (0%)	70 (100%)	70	
Central Pulse / Peripheral Pulse Bounding	1 (3.33%)	0 (0%)	1	
Capillary Refilling Time <3 sec	0 (0%)	70 (100%)	70	0.001
Capillary Refilling Time >3 sec	29 (96.67%)	0 (0%)	29	
Capillary Refilling Time Flush	1 (3.33%)	0 (0%)	1	
Blood Pressure Low	30 (100%)	0 (0%)	30	0.001
Blood Pressure Normal	0 (0%)	50 (71.42%)	50	
Blood Pressure High	0 (0%)	20 (28.58%)	20	
Motor / sensory deficit				
Nil/Could not be assessed	28 (93.3%)	52 (74.3%)	80	0.029
Motor/sensory	2 (6.7%)	18 (25.7%)	20	
Deep tendon reflex				
Absent	2 (6.67%)	5 (7.15%)	7	0.482
Normal	8 (26.67%)	22 (31.42%)	30	
Brisk	17 (56.66%)	29 (41.42%)	46	
Exaggerated	3 (10%)	14 (20%)	17	
Babinski reflex				
UR	5 (16.67%)	8 (11.42%)	13	0.740
Flexor	3 (10%)	9 (12.86%)	12	
Extensor	22 (73.33%)	53 (75.72%)	75	
Cerebellar signs Present	0	1 (1.43%)	1	0.511
Meningeal signs Present	10 (33.33%)	21 (30%)	31	0.741
Papilledema - Present	20 (66.67%)	23 (32.85%)	43	0.002
Abnormality detected in Respiratory System examination	6 (20%)	5 (7.15%)	11	0.082
Hepato-Spleenomegaly in Per abdomen examination	1 (3.33%)	4 (5.71%)	5	1.0

Table 3: Laboratory Findings in AES Patients with and without Shock

Parameter	Patients in Shock (n=30)	Patients without Shock (n=70)	Total	P value
Haemoglobin (g%)				
<7	0 (0%)	0 (0%)	0	0.001
7-9	12 (40%)	15 (21.42%)	27	
9-11	13 (43.33%)	2 (2.85%)	15	
>11	5 (16.67%)	53 (75.73%)	58	
Total leukocyte count (per mm3)				
<4000	1 (3.33%)	0 (0%)	1	0.237
4000-11000	7 (23.33%)	22 (31.42%)	29	
>11000	22 (73.34%)	48 (68.58%)	70	
Differential count				
Lymphocyte Predominant	2 (6.67%)	4 (5.71%)	6	0.754
N/L 1:1	4 (13.33%)	6 (8.57%)	10	
Neutrophil predominant	24 (80%)	60 (85.72%)	84	
Platelet (per mm3)				
<50000	0 (0%)	0 (0%)	0	0.407
50000-1 lakh	1 (3.33%)	1 (1.42%)	2	
1-2 lakh	16 (53.33%)	29 (41.42%)	45	

>2 lakh	13 (43.34%)	40 (57.14%)	53	
Abnormal peripheral smear	5 (16.67%)	2 (2.86%)	7	0.024
Random blood sugar				
<50mg/dL	1 (3.33%)	0 (0%)	1	0.004
50-150mg/dL	24 (80%)	69 (98.57%)	93	
>150mg/dL	5 (16.67%)	1 (1.42%)	6	
Serum electrolytes				
Normal level	24 (80%)	63 (90.1%)	87	0.323
Na+ abnormality	4 (13.33%)	5 (7.15%)	9	
K+ abnormality	0 (0%)	1 (1.42%)	1	
Na+/K+ abnormality	2 (6.67%)	1 (1.42%)	3	
Abnormal Serum Bilirubin	1 (3.33%)	0 (0%)	1	0.30
Abnormal LFT	6 (20%)	3 (4.19%)	9	0.02
Abnormal RFT	5 (16.67%)	2 (2.86%)	7	0.024
Abnormal PT/INR/APTT	2 (6.67%)	0 (0%)	2	0.029
Abnormal Serum Fibrinogen	1 (3.33%)	0 (0%)	1	0.125
Abnormal FDP	1 (3.33%)	0 (0%)	1	0.300
Positive Blood C/S	1 (3.33%)	0 (0%)	1	0.125

Table 4: Treatment Interventions in AES Patients with and without Shock

Parameter	Patients in Shock (n=30)	Patients without Shock (n=70)	Total	P value
Antibiotics				
Ceftriaxone	16 (53.3%)	53 (76.7%)	69	0.166
Ceftriaxone + Vancomycin	4 (13.3%)	4 (5.7%)	8	
Ceftriaxone + Doxycycline	5 (16.7%)	7 (10.0%)	12	
Multiple	5 (16.7%)	6 (8.6%)	11	
Antiviral Acyclovir	30 (100%)	70 (100%)	100	-
NS Bolus				
Nil	0 (0%)	70 (100%)	70	0.001
1	4 (13.3%)	0 (0%)	4	
2	11 (36.7%)	0 (0%)	11	
Multiple	15 (50.0%)	0 (0%)	15	
Vasopressor				
Nil	3 (10.0%)	70 (100%)	73	0.001
1	10 (33.3%)	0 (0%)	10	
2	2 (6.7%)	0 (0%)	2	
≥3	15 (50.0%)	0 (0%)	15	
Anticonvulsant				
Nil	0 (0%)	6 (8.6%)	6	0.001
1	8 (26.7%)	47 (67.1%)	55	
2	20 (66.7%)	8 (11.4%)	28	
Multiple	2 (6.7%)	9 (12.9%)	11	
Mannitol / 3% NS				
Nil	0 (0%)	4 (5.7%)	4	0.001
Mannitol	0 (0%)	58 (82.9%)	58	
3%NS	30 (100%)	2 (2.9%)	32	
Both	0 (0%)	6 (8.6%)	6	
MV / CPAP	23 (76.7%)	12 (17.1%)	35	0.001

Table 5: Clinical Outcomes in AES Patients with and without Shock

Parameter	Patients in Shock (n=30)	Patients without Shock (n=70)	Total	P value
Complete recovery				
Yes	12 (40.0%)	57 (81.4%)	69	0.001
No	3 (10.0%)	8 (11.4%)	11	
Death	15 (50.0%)	5 (7.0%)	20	
Neurologic Sequelae				
Nil	12 (40.0%)	57 (81.4%)	69	0.001
Motor deficit	3 (10.0%)	7 (10.0%)	10	

Sensory Deficit	0 (0%)	0 (0%)	0	
Others	0 (0%)	1 (1.4%)	1	
Death	15 (50.0%)	5 (7.0%)	20	
Discharge/Death				
Discharge	15 (50.0%)	65 (93.0%)	80	0.001
Death	15 (50.0%)	5 (7.0%)	20	
Duration of Stay				
≤5 days	11 (36.7%)	12 (17.1%)	23	0.001
>5 days	19 (63.3%)	58 (82.9%)	77	

Discussion:

The present study examined the clinical features, severity, laboratory findings, and outcomes of AES cases with and without shock. The study hospital is one of the largest tertiary care hospital in eastern India , which caters to people from not only Odisha but also from neighbouring eastern states of India. This study represents percentage of AES cases admitted to our hospital with shock at the time of admission or during hospital stay and its association with clinical features , severity of manifestations and outcome compared to AES cases without shock. Our findings illuminate several critical aspects of AES management and prognosis. Infants comprised 12%, while 1-5-year-olds constituted 46%, and 6-14-year-olds comprised 42% of cases, with the highest incidence observed among the 1-5-year age group, followed by the 6-14-year age group. Males represented 58% of cases, indicating a higher incidence compared to females. Comparisons with other studies, including Mittal et al[8] (2017), Thappa et al[9] (2013), Khinchi et al[10] (2010), and Fattah et al[11] (2010), showed similar age and gender distributions, highlighting the influence of specific pathogens, host immunity, and environmental factors on the spectrum of AES cases. Geographically, 64% of cases originated from East Odisha, with smaller percentages from other regions. Clinical presentations of AES cases revealed that fever was present in all cases, followed by altered sensorium in 90%, convulsions in 86.7%, vomiting in 70%, and headache in 10% of cases. Comparisons with other studies by Tripathy et al[12] (2019), Mittal et al[8] and Mustafa et al[13] (2009) showed similar trends in fever incidence. However, altered sensorium was more prevalent in our study compared to others, while convulsions were also higher. Vomiting was reported less frequently in our study compared to others, and headache incidence varied across studies. These findings highlight the consistency of fever as a prominent symptom across AES cases while indicating variations in other clinical presentations. Our study revealed that 10% of AES cases with shock and 20% without shock presented with focal neurological deficits, while cranial nerve involvement was observed in 3.3% and bowel and bladder involvement in another 3.3%. Additionally, 6.6% of cases had a history of cerebral palsy or seizure disorder. Comparing these findings with Tripathy et al[12] (2019), Mittal et al[8] and Mustafa et al[13] our study exhibited similar rates of focal neurological deficits. However, cranial nerve involvement was more common in Mittal et al[8] and Mustafa et al[13] studies, while our study showed higher rates of bowel and bladder involvement. Furthermore, a history of cerebral palsy or seizure disorder was more prevalent in our study compared to others, indicating potential differences in associated CNS presentations across studies. In our study, 53.33% of AES cases with shock and 12.86% without shock presented with a GCS score less than 7, indicating severe impairment of consciousness. Elevated temperature (>100.4°F) was observed in 36.67% of shock-positive cases. Tachypnea was noted in 70% of shock-positive cases, while tachycardia was present in 96.67% of shock-positive cases. Moreover, cerebral perfusion pressure (CP/PP) was low in 96.67% of shock-positive cases, with CFT exceeding 3 seconds in the same proportion. Additionally, all shock-positive cases exhibited low blood pressure. Comparatively, Tripathy et al[12] reported lower percentages of GCS < 7 and tachypnea, while Mittal et al[8] showed similar rates of tachycardia and elevated temperature. However, Mittal et al[8] demonstrated a higher proportion of cases with low CP/PP and CFT. In our study, 93.3% of shock-positive cases did not exhibit focal neurological deficits or assessment was not possible. Motor deficits were observed in 6.7% of shock-positive cases. Brisk or exaggerated deep tendon reflexes were present in 66.66% of shock-positive cases, with the Babinski reflex being positive in 73.33% of cases. Meningeal signs were positive in 33.33% of shock-positive cases, while papilledema was present in 66.67% of cases. Comparatively, Tripathy et al[12] reported a higher percentage of cases with motor deficits and a lower proportion with brisk or exaggerated deep tendon reflexes. Mittal et al[8] demonstrated similar rates of brisk or exaggerated deep tendon reflexes and Babinski reflex positivity but reported a higher prevalence of meningeal signs. Temporal trends in disease epidemiology, changes in pathogen prevalence, and regional variations in environmental factors (e.g., climate, vector habitats) can influence the spectrum of AES presentations and outcomes over time and across different geographic regions. Regarding other systemic examination findings, in our study, gallop rhythm in the cardiovascular system was noted in 3.33% of shock-positive cases. Respiratory system abnormalities such as pneumonia or ARDS were observed in 20.0% of shock-positive cases. Hepatosplenomegaly was present in 3.33% of shock-positive cases. Tripathy et al[12] and Mittal et al[8] reported lower percentages of respiratory system abnormalities compared to our findings. However, Mittal et al[8] showed a higher prevalence of hepatosplenomegaly. In our study, CBC findings revealed that 83.33% of shock-positive cases had haemoglobin levels ranging from 7 to 11g/dL, with elevated total leukocyte count (>11,000/mm3) observed in 73.34% of cases. Thrombocytopenia (platelet count >2 lakhs/mm3) was noted in 43.34% of shock-positive cases. Regarding laboratory findings, 3.3% of shock-positive cases had a random blood sugar level below 50mg/dL, while 80% exhibited normal serum electrolyte levels, and abnormalities were seen in 20% of cases. Comparatively, Tripathy et al[12] reported lower proportions of shock-positive cases with abnormal haemoglobin levels and total leukocyte counts but a higher prevalence of thrombocytopenia. Mittal et al[8] demonstrated higher percentages of shock-positive cases with deranged LFTs and RFTs compared to our findings. Additionally,

abnormalities in coagulation parameters such as PT, INR, and a PTT were more prevalent in the study by Mittal et al.[8] These disparities highlight variations in CBC and laboratory findings among different studies, possibly reflecting differences in patient populations, disease severity, or diagnostic criteria. In our study, CSF analysis revealed that 96.67% of shock-positive cases had CSF protein levels exceeding 45mg/dL, while 86.67% had CSF sugar levels below 40mg/dL. Additionally, elevated CSF cell counts (>50/mm3) were observed in 66.67% of shock-positive cases. Comparatively, Tripathy et al[12] reported lower percentages of shock-positive cases with elevated CSF protein and sugar levels but a higher prevalence of elevated CSF cell counts. Similar trends were observed in the studies by Das et al[14] (2018) and Erum et al[15] (1999), albeit with variations in the exact proportions. Regarding other laboratory findings. ABG analysis was abnormal in 90% of shock-positive cases in our study, while ECG abnormalities were noted in 20% of cases. Imaging modalities such as CT or MRI revealed abnormalities in 3.33% of shock-positive cases. Chest X-rays showed abnormalities in 23.33% of shock-positive cases. In terms of outcomes, our study found that 40% of shock-positive cases achieved complete recovery, while 50% succumbed to the illness. Additionally, 10% experienced neurological sequelae. The duration of hospital stay exceeding 5 days was observed in 63.3% of shock-positive cases. Comparatively, Mittal et al[8] reported a higher rate of complete recovery among shock-positive cases, whereas Das et al[14] and Erum et al[15] demonstrated higher mortality rates and a higher prevalence of neurological sequelae. Moreover, Mittal et al[8] and Das et al[14] reported longer hospital stays compared to our findings, suggesting variations in outcomes across different studies. Some of the possible limitations of this study are research at only one medical college and hospital may limit the generalizability of the findings, and excluding cases leaving against medical advice, could introduce selection bias, as these cases might have different characteristics or outcomes compared to those who remained in the study.

Conclusion:

This study identified shock in 30% of AES cases, with similar demographics and presenting complaints between shock and non-shock groups. However, AES cases with shock displayed more severe clinical features, including lower Glasgow Coma Scale scores and unstable vital signs. Laboratory analyses revealed significant abnormalities in hemoglobin, liver and renal function, coagulation parameters, and cerebrospinal fluid. Hypotensive shock predominated, with a high mortality rate of 50%, while morbidity was comparable between groups. These findings underscore the critical nature of shock in AES, highlighting the need for early recognition and aggressive management to improve outcomes in this patient population.

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