

A study of clinical profile and laboratory-radiological findings in acute encephalitis syndrome in children at a tertiary care hospital.

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Abstract

Acute Encephalitis Syndrome (AES) is a major cause of morbidity and mortality in children. Although viruses have traditionally been identified as the main causative agents of AES in India, more recently, reports of bacteria and toxins have also been made. The purpose of this study was to identify the clinical characteristics, radiographic, and laboratory parameters, and outcome of AES in children. Over the course of six months, this prospective observational study was carried out in the pediatric department of SMIMER medical college and hospital of Surat. 14 diagnosed cases of AES in children ranging in age from one month to eighteen years were included in the study. Every patient's clinical characteristics, lab results, radiological results, and outcomes (discharge, DAMA, or death) were documented.

The study found that fever (85.7%) and seizure (71.4%) were the most common clinical presentations followed by vomiting (64.3%), altered sensorium (50%), headache and diarrhea being 14.3% each. MRI findings were abnormal in 75% of the patients. Parenchymal hyperintensity (66.66%) and diffuse cerebral edema (33.33%) being the most common findings. The laboratory parameters include neutrophilia (78.6%) as the most common findings along with anaemia (64.3%), leucocytosis (50%) and thrombocytopenia (35.7%). Increased CSF protein (>60 mg/100 ml) was found in 54.5% and CSF pleocytosis (>5 cells) in 36.4%. The research emphasizes how crucial it is to manage AES patients using evidence-based practices. Improved diagnosis and management of AES may result from a greater grasp of the potential and constraints associated with the administration and application of common laboratory and diagnostic techniques.

Keywords: Acute encephalitis syndrome, Neurology, CSF, Seizure.

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Introduction

Acute Encephalitis Syndrome (AES), which primarily affects children in developing nations, is a significant public health concern in many of these nations. AES can cause severe neurological consequences and a high death rate. It is typified by an abrupt onset of fever and encephalitis, either with or without seizures. Season and geographic region play a role in the etiology of AES; in India, viruses are most frequently identified as the cause. Toxins and other microorganisms, however, have also been implicated in AES cases [1,2].

Assessing AES cases as soon as possible is essential to lowering mortality and morbidity. Admitted to critical care units frequently, children with AES require specific care that includes nourishment, hydration, seizure control, and vital sign monitoring. Nonetheless, AES has no particular treatment; instead, supportive care is the mainstay of care [3-9].

The purpose of this study is to look at the symptoms, laboratory parameters, radiological findings and consequences of AES in

pediatric patients in a hospital environment. The results of this study can aid in the creation of efficient management and treatment plans that will lessen the burden of AES disease. The study, which comprised 14 identified cases of AES, was carried out over the course of 6 months at the pediatric department of SMIMER medical college and hospital in Surat. These individuals' clinical characteristics, research findings and prognosis were documented, and the study's findings should offer crucial new understandings into the treatment of AES in young patients.

Case Presentation

Study sites

SMIMER medical college and hospital, is a tertiary care hospital in Surat, Gujarat.

Study design

This was a hospital-based observational study.

Timeline of the study

The study was conducted from September 1st, 2023 to February 29th, 2024.

Sample size

All children admitted to the pediatric department of SMIMER medical college and hospital during the study period and diagnosed with AES, who fulfilled the inclusion and exclusion criteria, were included in the study.

Inclusion criteria

The following criteria were used to include patients in the study:

- Children diagnosed with AES according to the WHO case definition.
- Children aged between 1 month and 18 years whose parents provided written informed consent.

Exclusion criteria

The following criteria were used to exclude patients from the study:

- Children with a history of simple febrile seizure.
- Patients with pre-existing neurological deficits prior to the onset of AES.
- Neonates (aged from birth to 28 days).

Method of study

This study was conducted in the pediatric department of SMIMER medical college and hospital in Surat, Gujarat over a period of 6 months. Every patient was systematically examined with the help of a structural proforma that was pre-designed, and their parents or legal guardians provided written informed consent. Clinical signs and symptoms of the patient at the time of presentation to the hospital were recorded in form of fever, seizure, altered sensorium, vomiting or diarrhea, headache, GCS of the patient at time of presentation and if any meningeal signs or cranial nerve involvement is there or not.

After admission to hospital, relevant laboratory investigations were sent after stabilization of the patient and also MRI was done in whichever patient it was possible. Under all the aseptic precautions, 5 ml of blood and 2 ml of CSF were collected and immediately sent to the central laboratory of SMIMER hospital for evaluation. The parameters studied were anemia, leukocytosis, neutrophilia, thrombocytopenia, CSF pleocytosis (>5 cells) and CSF protein (>60 mg/dl).

Results

Demographic profile

In total, the hospital admitted 14 patients with Acute Encephalitis Syndrome (AES). There were 9 (64%) males and 5 (36%) females among them 4 (28.5%) of the cases involved children between the ages of one month and one year, 3

(21.5%) involved children between the ages of one year and less than five years, and 7 (50%), children between the ages of five and eighteen years.

Clinical profile

Fever was present in 12 cases (85.7%) and Seizures were reported in 10 cases (71.4%), being the two most common symptoms. Vomiting was seen in 9 (64.3%), altered sensorium in 7 (50%), headache in 2 (14.3%) and diarrhea was seen in 2 (14.3%) cases. Complications in form of low GCS (<8) was seen in 7 (50%) cases and meningeal signs were observed in 3 (21.4%) cases. None of the patient had any cranial nerve involvement.

Laboratory and radiological findings

Anemia was seen in 9 (64.3%) and leukocytosis in 7 (50%) cases, and among that neutrophilia was observed in 11(78.6%) cases. Thrombocytopenia was observed in 5 (35.7%) cases. CSF study showed the increased count or pleocytosis (>5) in 4 (36.4%) and increased CSF protein (>60 mg/dl) was seen in 6(54.5%) patients.

MRI was normal in 2 (25%) patients and abnormal in 6 (75%). Among the abnormal findings diffuse cerebral edema was observed in 2 (33.33%), parenchymal hyperintensity in 4 (66.66%), diffuse meningeal enhancement in 1 (16.66%) and cerebral atrophy in 1 (16.66%) patients.

Outcome of AES patients

Among the 14 cases of AES patients, 5 (35.7%) patients took DAMA and 1(7.1%) was discharged home, while 8 (57.2%) patients expired during hospitalization (Tables 1-6).

Age	AES	%
1-1 year	4	28.5
1-5 year	3	21.5
5-18 year	7	50

Table 1. Shows the age distribution of AES patients (n=14).

Sex	AES	%
Male	9	64.28
Female	5	35.72

Table 2. Shows the sex distribution of AES patients (n=14).

Clinical profile	AES	%
Fever	12	85.7
Altered sensorium	7	50
Seizure	10	71.4
Headache	2	14.3
Vomiting	9	64.3
Diarrhoea	2	14.3

GCS<8	7	50
Meningeal signs	3	21.4
Cranial nerve involvement	0	0

Table 3. Shows the clinical profile of children with AES.

Laboratory features	AES	%
Anaemia	9	64.3
Leucocytosis	7	50
Neutrophilia	11	78.6
Thrombocytopenia	5	35.7
CSF pleocytosis >5	4	36.4
CSF protein >60	6	54.5

Table 4. Shows laboratory findings of children with AES.

MRI findings	AES	%
Normal	2	25
Abnormal	6	75
Diffuse cerebral edema	2	33.33
Parenchymal hyperintensity	4	66.66
Diffuse meningeal enhancement	1	16.66
Cerebral atrophy	1	16.66

Table 5. Shows MRI findings in AES patients.

Outcome	AES	%
DAMA	5	35.7
Discharge	1	7.1
Expired	8	57.2

Table 6. Shows the outcome of children with AES.

Discussion

Demographic details of AES patients

The majority of AES cases in the current investigation, with a mean age of 6.02 years, were found in the age range of 5 to 18 years. These results are in line with previous research by Kakoti et al., [1], Sarkar et al., [5] and Khound M et al., [6], which similarly discovered that the age range most frequently impacted by AES was 5-18 years old. This finding underscores the necessity of focused preventive actions and draws attention to how susceptible young children and adolescents are to AES.

In terms of gender distribution, our research revealed that males had a higher frequency of AES cases (64.28%) compared to females (35.72%). This finding is in line with

previous research conducted by Khound et al., [6], Sarkar et al., and Kakoti et al., [1]. More research is necessary because it is unclear why there is a gender difference in AES.

Clinical profile and complications of AES patients

According to the current study, fever (85.7%) and seizures (71.4%) were the most frequent clinical symptoms of AES, followed by altered sensorium (50%), vomiting (64.3%), headache (14.3%), and diarrhea (14.3%). These results are in line with previous research by Basu et al., [8] and Khinchi et al., [7], which similarly found that fever and altered sensorium were the most typical signs of AES in children. These non-specific clinical characteristics can have many different etiologies. Therefore, proper care and prognosis depend on a thorough diagnosis of the underlying cause of AES. The complications which were found in our study, low GCS (<8) was found in 50% of AES patients and meningeal signs in 21.4% cases. These findings were consistent the findings of research by Tripathy et al., [10] and Suma et al., [11].

Laboratory and radiological findings in AES patients

Very less studies are available for the laboratory findings in AES patients. The findings in our study being anemia (64.3%), leukocytosis (50%) and thrombocytopenia (35.7%) are in line with the previous study by Tripathy et al., [10]. Furthermore studies are required in this category for confirmation. The CSF study shows pleocytosis in 36.4% and increased CSF protein is seen in 54.5%. These findings are consistent with the study Tripathy et al., [10], Suma et al., [11] and Vasanthapuram et al., [12]. The abnormal MRI findings found in our study were parenchymal hyperintensity (66.66%) and diffuse cerebral edema (33.33%). The findings are similar to the study Tripathy et al., [10].

Conclusion

In conclusion, this study holds significant implications for the management and treatment of AES in tertiary care settings based on evidence. Reducing AES mortality and morbidity at tertiary care centers can be achieved through standardizing laboratory and diagnostic criteria and by being aware of the opportunities and constraints associated with handling AES cases. To effectively manage AES patients in India, a consistent model of care package across health care levels needs to be devised and put into practice. Furthermore, similar studies are required to gather more data for more evidence based practices.

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