

A Study of Socio-Demographic and Clinical Profile of Children With Acute Encephalitis Syndrome Presenting To Gauhati Medical College And Hospital, Guwahati

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Abstract: Acute Encephalitis Syndrome (AES) is defined as a person of any age, at any time of the year, with 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) [WHO]. Japanese Encephalitis (JE) is one of the leading causes of AES affecting children and adolescents in the tropical countries. The present study aims to study the socio-demographic and clinical profile of children with AES. The study was conducted in the Department of Pediatrics, Gauhati Medical College and Hospital, Guwahati from 1st July 2016 to 30th June 2017. Male gender, 5-12 years age group, rural and farmer background, poor socio economic status were found to be associated. Most of the cases presented between June to September.

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I. Introduction

Acute Encephalitis Syndrome (AES) is defined as a person of any age, at any time of the year, with 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) [WHO]. Acute Encephalitis Syndrome constitutes a group of clinical and neurological manifestations caused by a wide range of viruses, bacteria, fungi, parasites, spirochetes, chemicals and toxins. The common causes of acute viral encephalitis worldwide are Japanese Encephalitis Virus, West Nile Virus, Eastern Equine Encephalitis Virus, Western Equine Encephalitis Virus, Venezuelan Equine Encephalitis Virus, Handra Virus, Enterovirus, Chandipura Virus, Nipah Virus, Dengue Virus, Kyasanur Forest Disease Virus, St. Louis Encephalitis virus, Herpes Simplex Virus, Polio Virus and Measles Virus¹. Japanese Encephalitis (JE) is one of the leading causes of AES affecting children and adolescents in the tropical countries². Keeping in mind, the wide range of causal agents and the rapid rate of neurological impairment due to pathogenesis, clinicians face the challenge of a small window period between diagnosis and treatment. A confirmed etiology is generally not required for clinical assessment of Acute Encephalitis Syndrome

II. Material And Methods

PLACE OF STUDY-- The study was conducted in the Department of Pediatrics, Gauhati Medical College and Hospital, Guwahati.

PERIOD OF STUDY- Duration of study was 1 year, starting from 1st July 2016 to 30th June 2017.

STUDY DESIGN- Cross sectional hospital based study

CASE DEFINITION USED (WHO) -- Clinically, a case of Acute Encephalitis Syndrome is defined as “*a person of any age, at any time of year with the acute onset of fever and a change in mental status (including symptoms such as confusion, disorientation, coma, or inability to talk) AND/OR new onset of seizures (excluding simple febrile seizures)*”.

STUDY POPULATION--Patients admitted in the Pediatrics Department of Gauhati Medical College and Hospital, Guwahati with diagnosis of Acute Encephalitis Syndrome during the study period.

INCLUSION CRITERIA

- Children from 1month to 12 years of age admitted in Pediatrics Ward of GMCH with AES were included
- WHO definition of AES was used

EXCLUSION CRITERIA

- Children having other severe infections other than in the CNS

- Malignancy, brain infarction or cerebral hemorrhage
- Diagnosis of delirium or encephalopathy secondary to sepsis, toxins or metabolic causes.
- Patients with pre-existing neurological deficit prior to the onset of the disease(AES)
- Neonates.

INFORMED CONSENT – was taken from all parents/guardians in a specially designed form for the purpose.

METHOD OF STUDY: All patients admitted to the Department of Pediatrics who fulfill the inclusion criteria were selected and their profile was evaluated. The various socio demographic and clinical data were gathered and were entered in the specially designed proforma. Detailed history and clinical examination were done. The socio economic status was calculated using Modified BG Prasad Socioeconomic Classification scale, 2016. The main clinical features like fever, seizure, altered sensorium; headache, neck rigidity etc. were recorded. CSF samples of the patients were tested for Japanese Encephalitis by IgM ELISA. These were also recorded in the proforma. The Pediatric Glasgow Coma Scale was calculated for each patient at the time of admission. The data obtained was tabulated and analyzed statistically using the software IBM PASW 21.0 version.

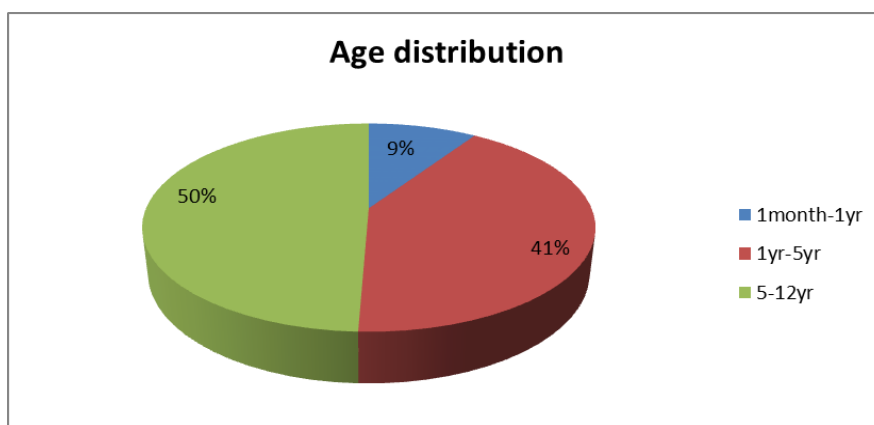
III. Result

A total of 5119 cases were admitted in the Department of Pediatrics, Gauhati Medical College and Hospital (GMCH), for the period from 1st of July 2016 to 30th June 2017. Out of these, 162 cases were of Acute Encephalitis Syndrome (AES). This constituted 3.1% of the total admission.

The age distribution of the AES patients is shown in Table I

Table I: Showing age distribution of AES cases

Age group in years	Male	Female	Total	Percentage (%)
1month - < 1 year	13	2	15	9.26
1year - <5 years	41	26	67	41.36
More than 5years up to 12 years	53	27	80	49.38
Total	107	55	162	100

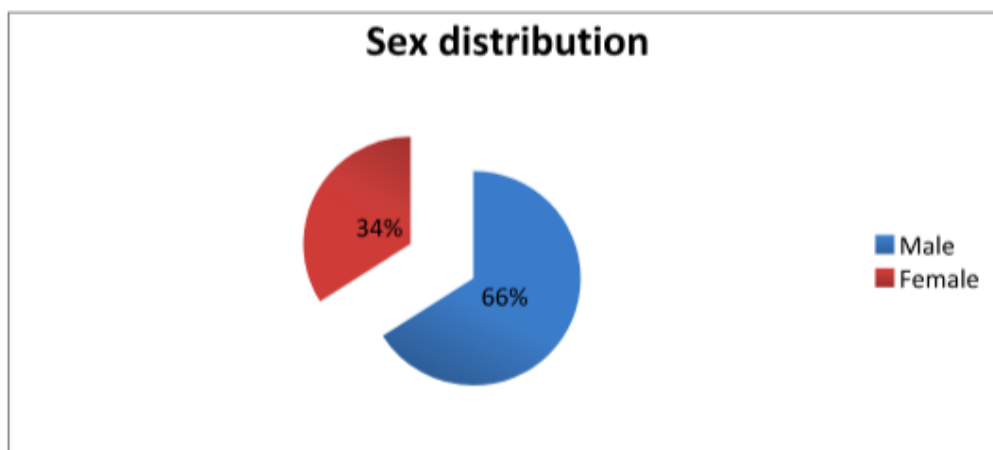


From Table I, it is observed that most of the cases belonged to the 5 to 12 years age group, that is, 80 which constituted 49.38 % of AES cases. This is followed by the 1 to 5 years age group which constituted 67(41.36 %). Least number of cases belonged to the 1 month to less than 1 year age group that is 15 (9.26 %). The youngest patient was 5 months old and the oldest being 12 years old. The mean age of the patients was 5.20 years with standard deviation of 3.252.

The majority of the patients were male comprising of 107 cases. This constituted 66 % of the total. 55 numbers of patients were female that is 34 % of the cases. The male: female ratio is 1.94:1. This is shown in Table II.

Table II: Showing the sex distribution of AES cases

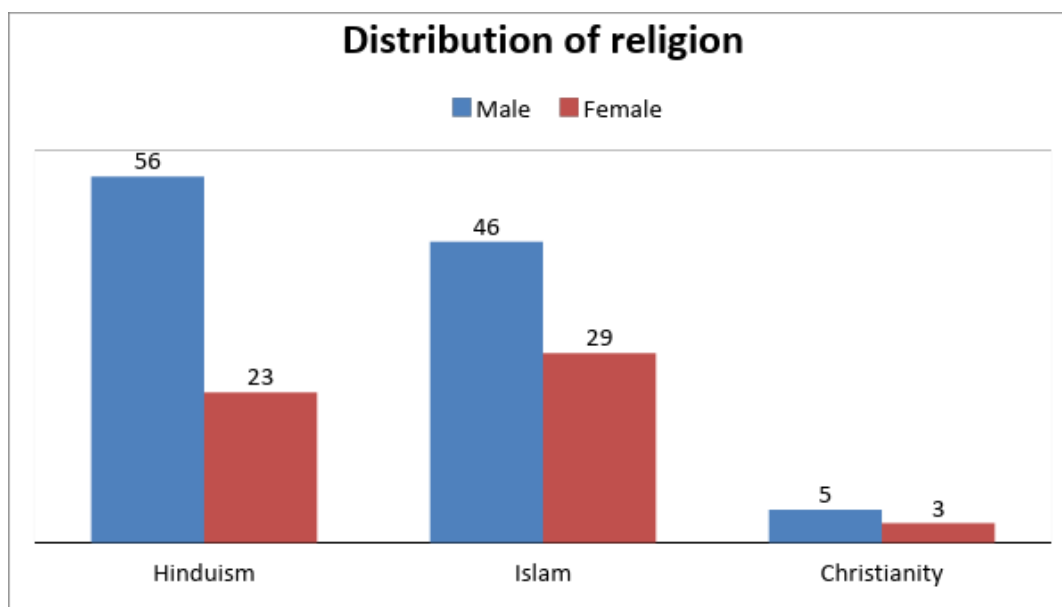
Sex of the patients	Number	Percentage (%)
Male	107	66
Female	55	34
Total	162	100



The majority of the patients belonged to Hinduism, 79 which constituted 48.8% of the total AES cases. This is followed by 75(46.3 %) of patients of Islam religion. 8 (4.9%) patients belonged to Christianity. The ratio in this order is 9.9: 9.3: 1.

Table III: Showing the religion of AES patients (1 decimal considered for convenience)

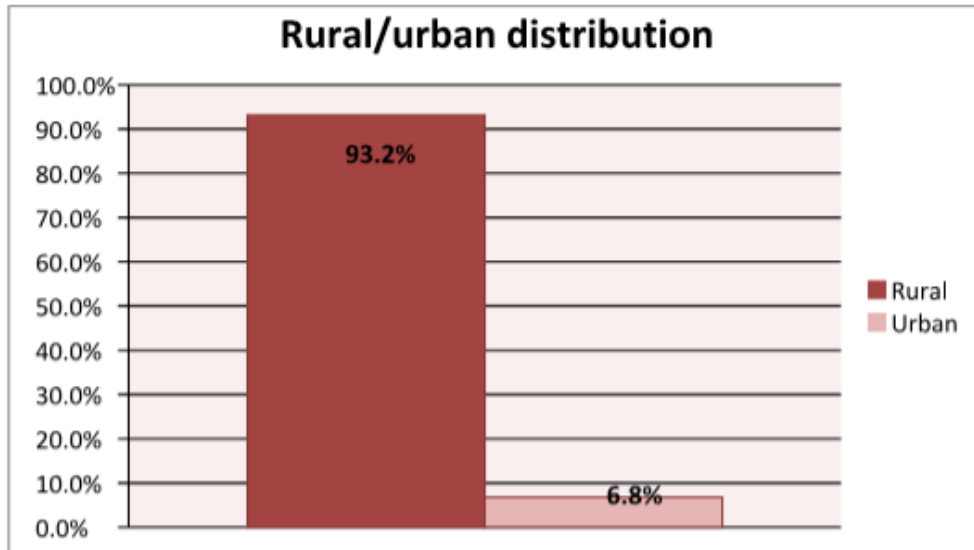
Religion	Male		Female		Total	
	No	%	No	%	No	%
Hinduism	56	34.6	23	14.2	79	48.8
Islam	46	28.4	29	17.9	75	46.3
Christianity	5	3.0	3	1.9	8	4.9
Others	0	0	0	0	0	0
Total	107	66	55	34	162	100



From the present study, it has been observed that 151 patients hailed from rural area. This constituted 93.2% of the cases. Only 11 patients belonged to the urban areas constituting 6.8 %. The rural -urban ratio is 13.7: 1. Table IV depicts the habitat of the patients.

Table IV: Showing the rural/urban distribution of AES patients

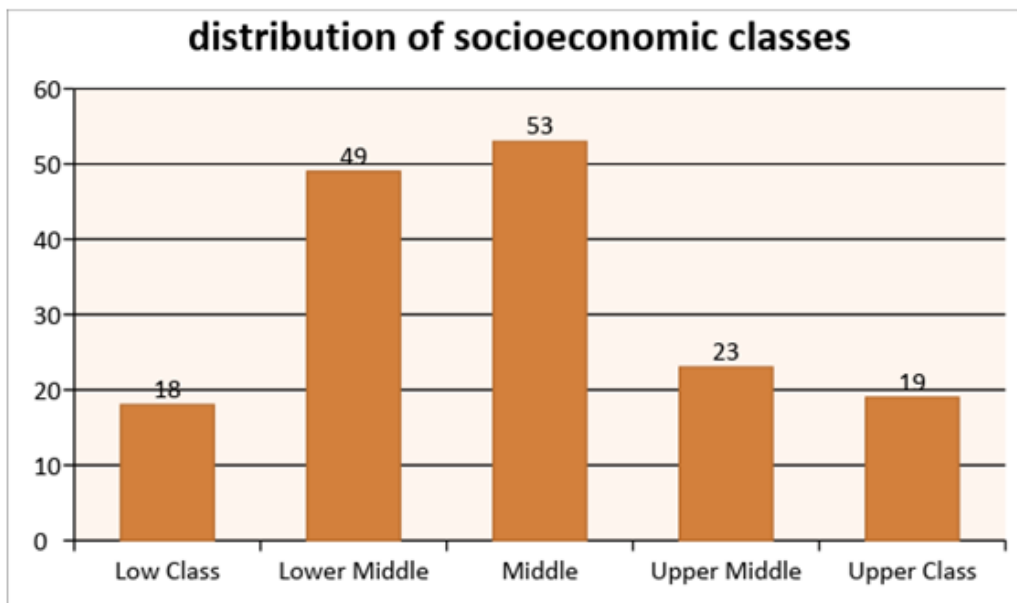
Setting	Number	Percentage (%)
Rural	151	93.2
Urban	11	6.8
Total	162	100



The socio economic status of the patients (that is of the parents/guardians) has been evaluated as per modified B.G.Prasad scale (2016) into low, lower-middle, middle, upper-middle and upper classes. Highest number of patients belonged to the middle category numbering 53 (32.7%), followed by lower middle 49 in number constituting 30.2%. 23(14.2%) patients belonged to the upper middle class. Upper and the lower classes constituted 19(11.7%) and 18(11.1%) respectively.

Table V: Showing the socio economic status of AES patients

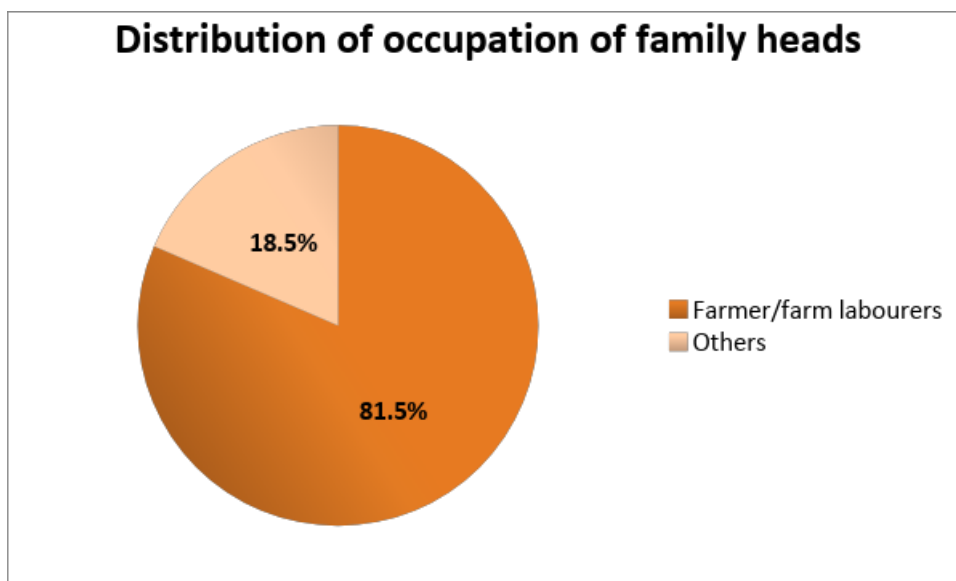
Socioeconomic status	Number	Percentage (%)
Low Class	18	11.1
Lower Middle	49	30.2
Middle	53	32.7
Upper Middle	23	14.2
Upper Class	19	11.7
Total	162	100



The occupation of the head of the patient’s family is grouped into two categories as per relevance to the present study, viz, farmer/farm laborers and others. It has been observed that most of the family heads belonged to the first group,132 (81.5 %). And the second group constituted 30, that is, 18.5%.

Table VI: Showing the family head's occupation of AES patients

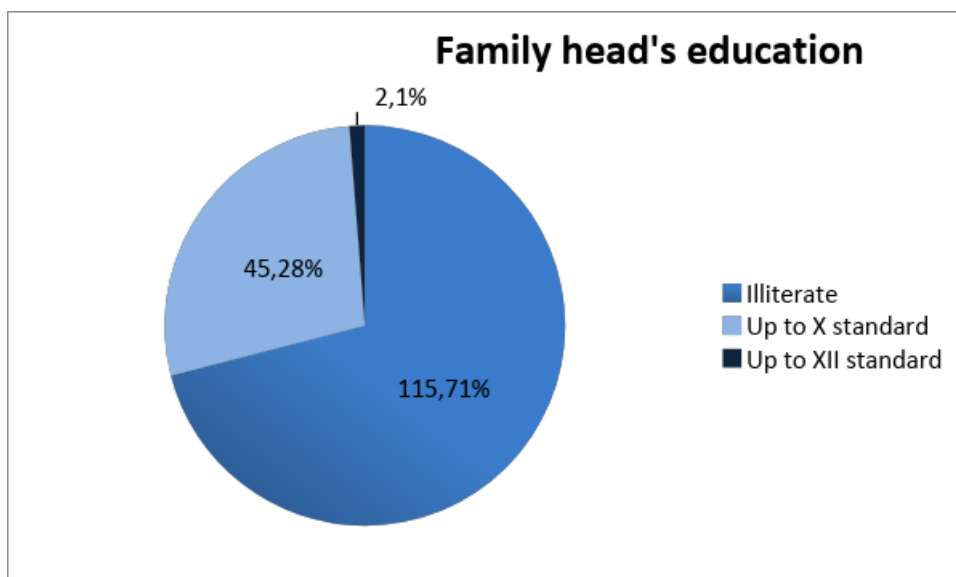
Occupation	Number	Percentage (%)
Farmer/farm laborers	132	81.5
Others	30	18.5
Total	162	100



For the purpose of convenience of the present study, the educational level of the family head of the patient is divided into four categories: illiterate, up to X standard, up to XII standard, graduates and above. 115 belonged to illiterate group comprising 71% cases, 45(27.8%) belonged to the second category and 2(1.2%) belonged to the third category. None of the family head's education level was graduate and above.

Table VII: Showing the family head's education level of AES patients

Education level	Number	Percentage (%)
Illiterate	115	71
Up to X standard	45	27.8
Up to XII standard	02	1.2
Graduates and above	00	00
Total	162	100



For better understanding and analysis of the cases, the months in which the cases presented have been divided into three groups:

Group 1 (G1) - June, July, August and September.

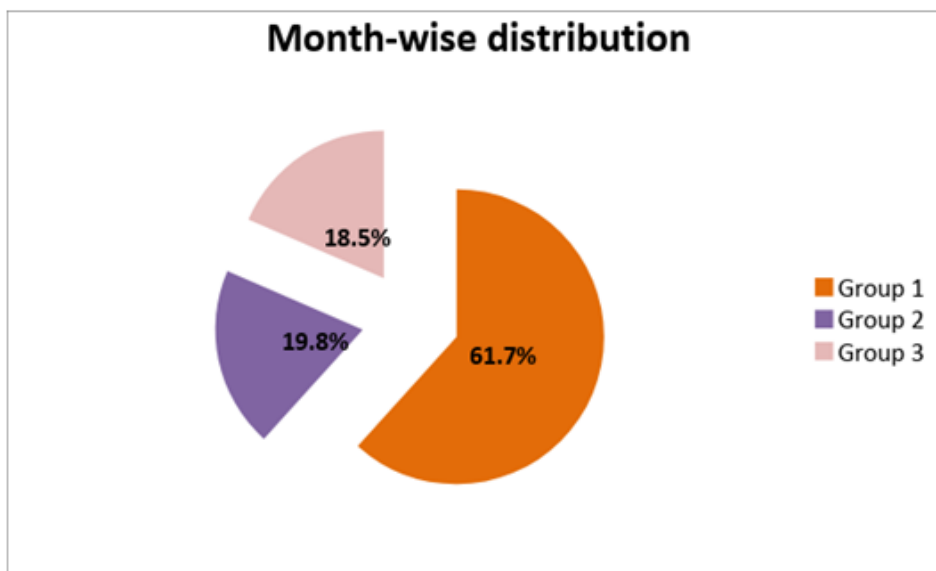
Group 2(G2) - October, November, December and January.

Group 3 (G3) – February, March, April and May.

Majority of the cases were found in group 1, that is 100, comprising 61.7% of the cases, followed by group 2, 32(19.8 %) and group 3, 30(18.5%).

Table VIII: Showing the month wise distribution of AES patients

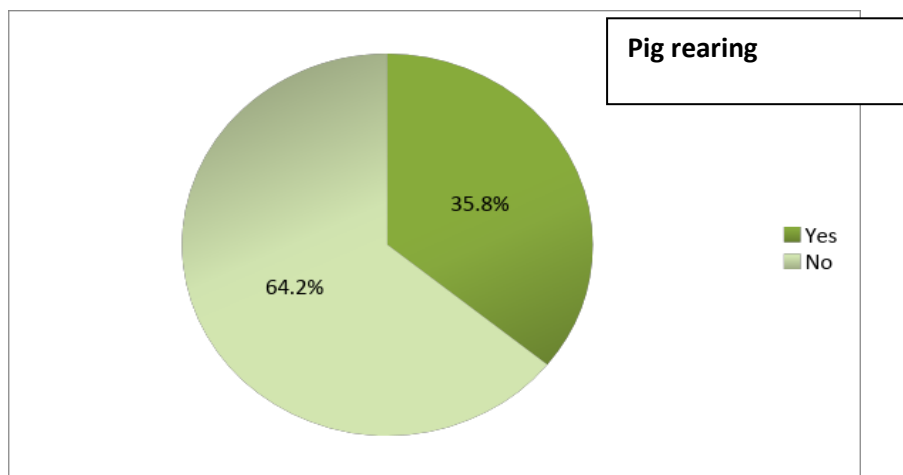
Months in Groups	Number	Percentage (%)
Group 1	100	61.7
Group 2	32	19.8
Group 3	30	18.5
Total	162	100



The pig rearing practice in the family and neighborhood has also been incorporated in the present study as pig acts as an amplifier host in Japanese Encephalitis (JE). 58 number of AES patients had pig rearing in the family or neighborhood constituting 35.8% of cases and 104(64.2%) did not have pig rearing practice (shown in Table IX).

Table IX: Showing the presence of pig rearing in family or neighborhood of AES patients

Pig rearing	Number	Percentage (%)
Yes	58	35.8
No	104	64.2
Total	162	100

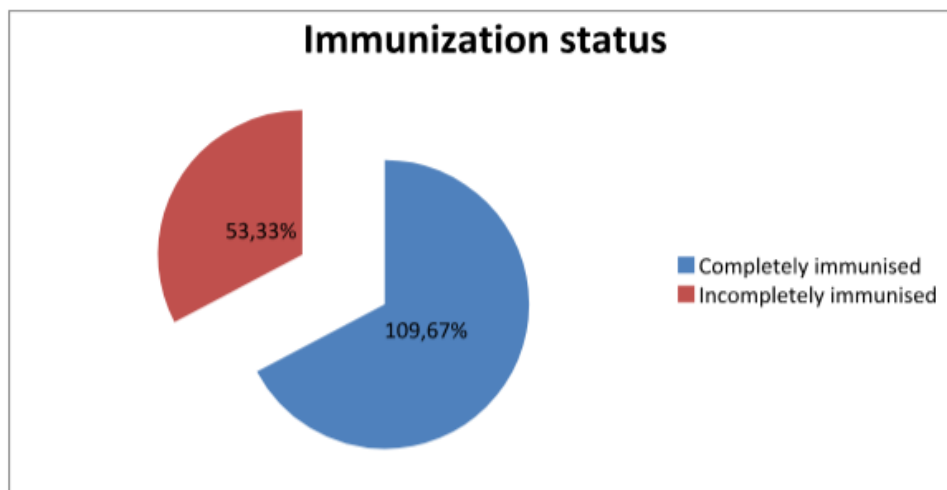


For better evaluation, the immunisation history of the patients have been carefully recorded in two categories :

- a. Completely immunized for age
 - b. Incomplete immunization for age (JE vaccine not received or not known) or no immunization at all
- A total number of 109 patients were completely immunized for age. This constituted 67.3% of cases. The second group constituted 53 numbers (32.7%).

Table X: Showing the immunization history AES patients

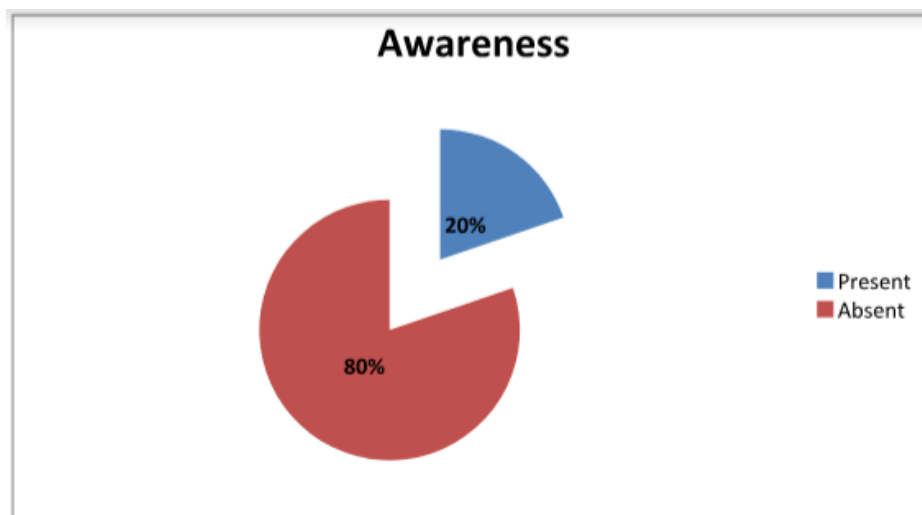
Immunization group	Number	Percentage (%)
Completely immunized	109	67.3
Incompletely immunized/not immunized	53	32.7
Total	162	100



A detailed history regarding the awareness of the disease from the parents and guardians was recorded. They were asked regarding encephalitis especially Japanese encephalitis, malaria etc. They were enquired of their awareness regarding the endemicity of JE and malaria in Assam, JE vaccine, relation of pig rearing and anti-mosquito measures. Majority of the parents were unaware of these facts comprising of 130(80.2 %). Only 32 (19.8%) had awareness of this disease entity (shown in table XI).

Table XI: Showing the awareness of the disease among parents/guardians of AES patients

Awareness	Number	Percentage (%)
Present	32	19.8
Absent	130	80.2
Total	162	100

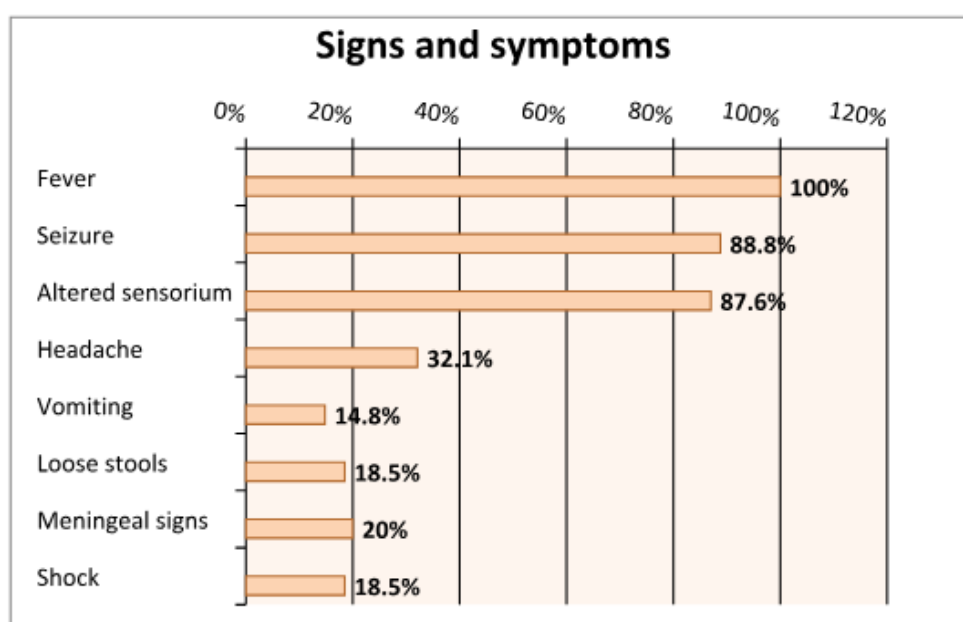


The signs and symptoms with which the patients were admitted in the department were carefully recorded and monitored. The important signs and symptoms related to AES were noted in the specially designed proforma. The various features like fever, seizures, altered sensorium, headache etc. were monitored and recorded.

The important features which were recorded are shown in the following table (Table XII). The table also shows the number and percentage of patients presenting with each symptom/sign:

Table XII:- Showing the signs and symptoms of AES patients

Signs and symptoms	Number (n=162)	Percentage (%)
Fever	162	100.0
Seizure	144	88.8
Altered sensorium	142	87.6
Headache	52	32.1
Vomiting	24	14.8
Loose stools	30	18.5
Meningeal signs	33	20.0
Shock	30	18.5

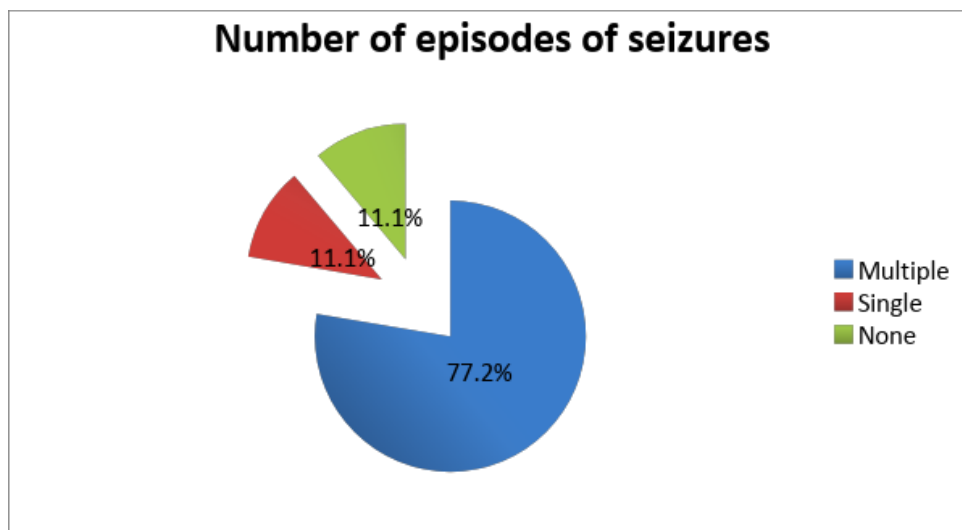


Fever was present in all the 162 patients comprising 100% of the cases. Seizure was present in 144 (88.8%) cases, altered sensorium in 142 (87.6%) cases, headache in 52 (32.1%), vomiting in 24 (14.8%) cases, loose stools in 30 (18.5%), meningeal signs in 33 (20.0%) cases and shock in 30 (18.5%) of the cases.

Out of the 144 patients who had seizure, 125 had multiple episodes (77.2% of the total cases), 19 patients (11.1%) had single episode of seizure. 18 patients (11.1%) did have seizure (Shown in table XIII)

Table XIII- Showing the episodes of seizure of AES patients

Episodes of Seizure	Number	Percentage (%)
Multiple	125	77.2
Single	19	11.1
None	18	11.1



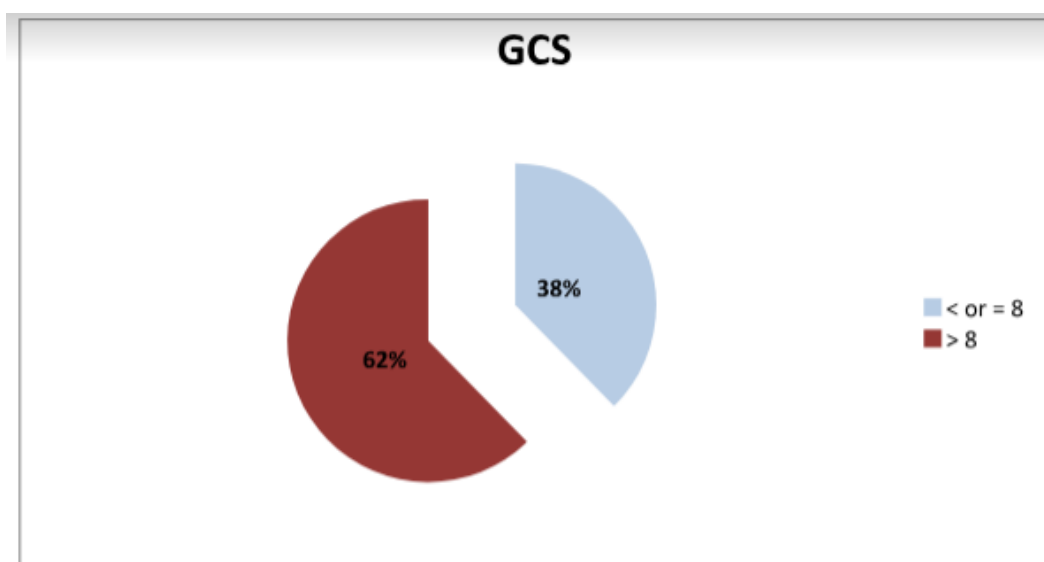
The Glasgow Coma Scale (GCS) has been separately calculated and recorded in every patient. For the purpose of convenience and better understanding, the GCS scores of the patients are grouped into two categories:

- a. GCS less than or equal to 8
- b. GCS more than 8

61 patients had GCS less than or equal to 8 that is 37.7% and 101 patients had GCS more than 8 that is 62.3%. The findings are shown in table XIV.

Table XIV: Showing the GCS of AES patients

GCS	Number	Percentage (%)
< or equal to 8	61	37.7
>8	101	62.3
Total	162	100



In the present study, the Japanese Encephalitis (JE) positivity was also evaluated. A total number of 30 cases were JE positive comprising 18.5% of cases. 132 cases did not show positivity constituting 81.5% of the cases (shown in Table XV). Ratio of JE positive and negative cases is 1:4.4.

Table XV: Showing the JE positivity of AES patients

Cases	Number	Percentage (%)
JE positive	30	18.5
JE negative	132	81.5
Total	162	100

IV. Discussion

It has been observed that most of the cases belonged to 5 to 12 years of age constituting 49.38% of the AES cases. This finding tallies with the findings of Verma et al³ (92.85%), Yashodhara P et al⁴ (73.3%), Kakoti G et al⁵ (65.66%) Khinchi et al⁶(50.8%). This may be attributed to older children being more exposed to mosquito bites during outdoor activities like playing, attending school, and working in fields. Majority of the patients were male, 107 (66%) of the cases. The finding resembles the finding of Verma et al³ who found 64.3% of the patients to be male and Karmakar et al⁷ who found 62.9% of the patients to be male. The finding also closely resembles the findings of De et al⁸ (56.5%), Khinchi et al⁶ (50%), Sambasivam et al⁹ (53.3%). The male predilection for AES may be explained by an increased amount of outdoor activities in male children that includes playing outside and also working in rice fields which is the main crop in this region as rice is the staple food and hence having a higher chance of being bitten by mosquito. The intermediate hosts, i.e. pigs and cattle egrets are found in abundance in rural areas near paddy fields in Assam, which play an undeniably important role in the transmission of JE. The majority of the patients belonged to Hinduism, constituting 48.8% of the cases, followed by Islam, constituting 46.6%. This is due to the fact that the rural areas in the periphery of Guwahati city have a mixed population of Hindu and Muslim inhabitants. 151 patients hailed from the rural areas, constituting 93.2% of the cases. Only 11(6.8%) belonged to the urban areas. This finding of rural population tallies with the findings of Kumar R, Tripathi P et al¹⁰ (98.7%), Kakoti G et al⁵ (89.56%) and Yashodhara P et al⁴ (86.66%), most of the patients belonged to classes towards the lower side. Potula R et al¹¹ in their study found that 100% of the patients belonged to low socioeconomic class. Kakoti G et al⁵ in 2012 in their study found that 63% of the AES cases were from low socio economic strata. In the study by De S et al⁸ 72% patients were from low socio economic group. Most of the family heads were farmers or farm laborers, that is 132 (81.5%). The finding is closely related to the findings of Kumar R, Tripathi P et al¹⁰ (79.2%) and Potula R et al¹¹ (100%). Only 18.5% of the family heads had other occupation. This may be due to favorable epidemiological factors like presence of water logged paddy fields supporting profuse breeding of vector mosquitoes, piggeries in close proximity to residence, non-use of bed nets and outdoor playing habits of children.

115 number of cases belonged to illiterate group comprising 71% cases, 45(27.8%) belonged to the second category and 2(1.2%) belonged to the third category. None of the family head's education level was graduate and above. The finding does not conform to the findings of Kumar R, Tripathi P et al¹⁰ who found that 49.4% of the family heads were either illiterate or had attended only primary school.

In the present study, it has been observed that, 100 (61.7%) of the cases, occurred from the month of June to September. Kumar R, Tripathi P et al¹⁰ found that the maximum number of cases occurred in the second half of August and first half of September. Yashodhara P et al⁴ found that the peak incidence was from September to December. 32 patients (19.8%) presented themselves from the month of October to January. Only 30 cases, that is 18.5% cases presented from the month of February to May.

The pig rearing practice in the family and neighborhood has also been incorporated in the present study as pig acts as an amplifier host in Japanese Encephalitis (JE). 58 AES patients had pig rearing in the family or neighborhood constituting 35.8% of cases and 104(64.2%) did not have pig rearing practice. Kumar R et al² in their study found that 44.2% of the patients family had the same practice.

For better evaluation, the immunisation history of the patients have been carefully recorded in two categories :- a) Completely immunised for age b) Incomplete immunisation as per age(JE vaccine not received or not known). A total number of 109 patients were completely immunised for age. This constituted 67.3% of cases. The second group constituted 53 numbers (32.7%). Kakoti G et al⁵ in their study observed that most of the children with JE (80.5%) were not vaccinated against JE and vaccination status of 7.5% children was not known; however, only (11.9%) of the care giver could confirm that their children were vaccinated against JE during 2006–2010 mass vaccination campaign in Assam.

The study recorded that, majority of the parents / guardians of the AES patients, that is, 130 (80.2%) did not have any awareness of the disease. Only 32 numbers (19.8%) were aware of the disease. None of the studies reviewed in the literature showed the awareness of the disease among the caregivers.

Relative to the signs and symptoms of Acute Encephalitis Syndrome cases in the sample study, it was observed that all the 162 patients had fever which constituted 100 % of the cases. The finding is in conformity with the findings of Lincoln and Siverstone¹² (1952), Webb and Perriere¹³(1956), Sengupta et al¹⁴ (1979), Kakoti G et al⁵ (2013), Yashodhara P et al⁴ (2015), Verma et al³ (2017), Samsasivam et al⁹ (2017) who had found fever in 100 % of their cases studied. The finding is slightly at variance with the findings of Gourie Devi¹⁵ (1984) who found fever in 94.7% of the cases and Kumar et al² in 1990 who found fever in 94.5% of the cases.

Seizure was found in 144 cases, comprising 88.8% of the total. The finding is almost similar to the findings of Verma et al³ (85.7%), Kumar et al² (84.7%) and Webb and Perriere¹³ (87.5%). The present finding is inconsistent with the findings of Mohan Rao et al¹⁶ who found convulsion in 27.3% of the cases only, Sengupta et al¹⁴ (50.3%) and De et al⁸ (60%).

In the present study, altered sensorium was recorded in 142 patients, comprising 87.6% of the cases. This finding is in close proximity to the findings of Mohan Rao et al¹⁶ (84.6%), Gourie Devi¹⁵ (85%) and Kakoti G et al⁵ (83.58%) and Yashodhara P et al⁴ (93.33). The finding is inconsistent with the findings of Webb and Perriere¹⁴, Sengupta et al¹⁴ and Kumar et al¹⁰ who found altered sensorium in 100 % of their cases studied. The present finding is also highly inconsistent with the findings of De S et al⁸ who found altered sensorium in 20% of the cases only. In the study by Verma et al⁴, altered sensorium was present in 64.3% of the cases only.

In this study, headache was found to be present in 52 patients, constituting 32.1 % of the cases. The finding is in conformity with the findings of Mohan Rao et al¹⁶ who found headache in 37.3% of the cases, Kakoti G et al⁵ 41.79% , Sengupta et al¹⁴ 42.3% and De S et al⁸ 43%. The finding is inconsistent with the findings of Yashodhara et al⁴ who found headache in 68.57% cases and Desai et al¹⁷ 62.7% of the cases.

In the present study, 33 cases presented with meningeal signs, that is 20 % of the cases. The finding is in close proximity to the findings of Kumar et al² who found meningeal signs in 13% of the cases. The finding is at variance with the findings of Sengupta et al¹⁴, Webb and Perriere¹³ and Mohan Rao et al¹⁶ who found 80%, 75% and 70% of the cases with meningeal signs respectively.

In the present study, loose stool was found in 18.5% of the cases, shock in 18.5% of the cases and vomiting in 14.8% of the cases.

Glasgow Coma Scale (GCS) has been separately calculated and carefully recorded in every patient on admission. 61 patients (37.7%) had GCS less than or equal to 8. This finding is closely related to the findings of Kakoti G et al⁵ (40.29%), Kumar et al¹⁰ (44.1%) and De S et al⁸ (45.8%). This finding is not in accordance with the findings of Khinchi et al⁶, that is, 29.5%. The present study had 101 cases (62.3%) of the cases having GCS more than 8. In the present study, 30 cases, that is, 18.5%, were found to be positive for Japanese Encephalitis. The cerebrospinal fluid of the patients were analyzed for JE by IgM ELISA. This is closely related to the findings of Khinchi et al⁶ (18%) and De S et al⁸ (25%).Kumar R, Tripathi P et al¹⁰, however, have found a slightly higher level of JE positivity at 27.7%.It may be due to the fact that the study by Kumar R, Tripathi P et al¹⁰ was conducted during the 2005 epidemic of JE in Uttar Pradesh. Kakoti G et al⁵ also found a higher rate of JE positive cases at 30 %. In the study by Karmakar S A et al⁷, JE was found in a much lower percentage of cases, that is, 8.7%. In sharp contrast to the present finding, Yashodhara P et al⁴ found JE positivity in only 1.9% of the cases.

V. Conclusion

It has been seen that children more than 5 years age and male children are more affected probably due to more outdoor activities. Majority of the cases were from rural and farmer background and lower socioeconomic groups. There was lack of education and awareness among the guardians. Most cases presented between June to September. Children presented mainly with fever, altered sensorium, seizures and headache. Japanese Encephalitis is an important cause of AES in this region. Education, awareness, vector control measures, vaccination may help to decrease the load of this disease entity.

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