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# Surveillance of acute Encephalitis Syndromein Lakhimpur District Of Assam: January 2008-October 2012

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**Abstract:**Japanese encephalitis (JE) is an important cause of morbidity, mortality, and disability in the countries of Asia. Prospective, hospital-based study for AES/JE in all the age group was undertaken for 5 years (January 2008–October 2012) in lakhimpur district of Assam. A total of 217 (Two hundred and Seventeen) nos of AES suspected cases were found from different areas of North Lakhimpur District of Assam out of which 54 (fifty four) nos of patients expired. Serological diagnostic test revealed that 66 (Sixty six) nos of cases were found to be positive for JE IgM antibodies. 12 (Twelve) no of JE positive patients expired during last five years. Most of the AES cases were observed between the age ranges of 6-30 years. Males were highly affected with AES as compared to females. A positive correlation was found between the nos of occurrence of AES/JE cases and monthly rainfall. The prevalence trends of AES/JE cases were found to an unsteady pattern.

**Keywords:**Acute encephalitis syndrome, Japanese Encephalitis, Rainfall, Assam etc.

## INTRODUCTION

Japanese encephalitis (JE), commonly known as 'brain fever', is a mosquito borne viral diseases. JE is numerically the most important global cause of encephalitis and so far confirmed to have caused major epidemics inIndia. During the last 3 decades JEV is responsible for the major outbreaks of the disease in India.However, in India, JE virus activity wasfirst detected in 1952 through sero-epidemiological surveys in Nagpur district of Maharashtra and Chingleput district of Tamil Nadu[1]. Japanese encephalitis as a disease was first reported in 1955 when cases of JE occurred in Vellore and Pondicherry in southern India[1]. In Assam the incidence of JE has been reported from early seventies. However, the first outbreak was reported in lakhimpur District in 1978. Since then major outbreak occurred during 1985 to 1988(nvbdcp.gov.in).Now a days the incidence has spread nearly almost all the upper Assam districts.

Most of the reported studies have been in children. Japanese encephalitis (JE) has traditionally been regarded as a disease of children. The age shift in JE patients in Assam, India in last few years has become a cause of concern. Japanese encephalitis is also one of the major public health problems in Assam, northeast India. Acute Encephalitis affects peoples of all ages and both sex.

Our study was aimed to elucidate the trend of AES/JE in lakhimpur District of Assam in last five consecutive years as well as to find out the role of environmental factors (specially rainfall) on their transmission.

## MATERIALS AND METHODS:

The district is bounded on the north by Siang and Papumpare District ofArunachal Pradesh and on the east by Dhemaji District and Subansiri River. Majuli Sub Division of Jorhat District stands on the southern side and Gahpur sub division of Sonitpur District is on the West. Lakhimpur District covered an area - 2,277 km2, with a total population - 1,040,644 (according to 2011 census) which is located on the north eastern corner of Assam. Lakhimpur district lies between 26°48′ and 27 °53′ northern latitude and 93 °42′ and 94°20′ eastern longitude approximately.

The study embraces on the patients of any age and sex having the complaint with acute onset of fever and any of change in mental status (confusion, disorientation, coma, inability to talk) /new onset of seizures (excluding simple febrile seizures)/Other early clinical findings like an increase in irritability,somnolence or abnormal behaviour greater than that seen with usual febrile illness.Those patients admitted at different health centres in Lakhimpur district of Assam having above clinical sign and symptoms were suspected as AES and 5 ml of Blood/CSF samples were collected.Immediately Serum/CSF will be separated and stored at -200c until processed.The test was carried out at North Lakhimpur Civil Hospital. The same sample was sent to Regional Medical Research Centre, Dibrugarh for cross check study.Presence of IgM antibodies against JEV from acute serum samples of patients were detected by using a

commercially available IgMantibody kits procured from National Institute of Virology (NIV), Pune, India.IgM Antibody Capture ELISA (MAC ELISA) is the method of choice to demonstrate virus specific antibodies in both in Blood and Cerebrospinal fluid samples [2, 3].

Principle: Solid phase support (microtitre plate wells) were coated with Anti – Human IgM antibodies which were capable of binding all IgM isotype antibodies which were present in the specimen. Specific Antigen was then added, followed by enzyme labeled antigen – specific antibodies. If IgM antibodies which were specific for the antigen in question were existing, the sandwich complex would result in an enzymatic colour change which was proportional to the concentration of the IgM specific antibody which was present. This method is highly specific and more sensitive [4, 5]. To ensure the specificity of the assay, known positive and negative controls were obtained from NIV Pune.

The patient's clinical as well as demographic characteristics were taken in a predesigned proforma. The fill up questionnaire during follow up of the patients will be directly entered into an electronic database Statistical Package for Social Science (SPSS).The data obtained was analysed for the sex, age group.Relationship of morbidity with socio-demographic and health status will be assessed. Pattern of morbidity with age, sex, educational status, religion, household income, employment status will be recorded and analysed. Factors associated with mortality and morbidity in positive patients will be recorded in a predesigned proforma and further analysed.

The monthly rainfall data of Lakhimpur district was obtained from Indian Meteorological Department (www.imd.gov.in/section/hydro/disrainfall/webrain/assam/lakhimpur.txt) to compare the significant relationship between monthly rainfall and occurrence of AES/JE cases.

**RESULTS:**

During the last five years, a total of 217 (Two hundred and Seventeen) nos of AES suspected cases were found from different areas of North Lakhimpur District of Assam out of which 24.88% cases expired. Results of serological diagnostic revealed that 66 (Sixty six) nos of cases were found to be positive for JE IgM antibodies.18.18% of JE positive patients expired during last five years.From the analysis of data in last consecutive five years it was found that no of occurrence of AES cases had reached at peak level during the month of July in each year(Fig: 1).Monthly rainfall data also collected which revealedthat there was a positive correlation between nos of AES/JE cases and monthly rainfall data

From the clinical history of the AES patients it was found that all the subjects were having high fever. 89% of them were having the history of vomiting and unconsciousness. Males were highly affected with AES/JE as compared to female ones. But in 2010, it was found somewhat different where females were highly afflicted with AES cases in comparison to males.

Community wise distribution of AES cases revealed that the Tea garden labour and Mishing community were highly affected with this syndrome (Table: 1). Whereas the figure also showed those Kachari, Muslim and Ahom communities were also found to be affected with AES above the limit.

During the year 2011, highest no of AES cases (25.93% JE) were observed followed by 2008 (Table: 2).Whereas in 2010 lowest no of AES cases were observed. Although the five years data indicated that the trend of AES cases were havingzig-zag pattern.

Highest AES cases were observed between the age ranges of 6 to 30 years followed by 0 to5 years (Table: 3). From the study it was establishedthat there was an age shifting of AES cases might have taken place.

A simple linear regression was performed on five years of data to determine if there was a significant relationship between month wiseAES cases and rainfall. The regression line describes the value of slope (b) = 0.02337 with Y intercept (a) (-) of 2.266 and a standard error of 3.136. The correlation coefficient (r) shows a positive correlation with a value of 0.4542 and r2=0.2063. The two tailed p value is 0.0032 considered very significant.Thus, we conclude that there was a positive significant relationship between each year cases of AES and rainfall. Furthermore, only 20.63% of the variability in AES could be explained by rainfall. On the other hand 79.37% of variability of occurrence of AES cases was attributed to factors other than rainfall. From the above analysis it was observed that environmental factor (rainfall) play a crucial role in transmission of AES/JE cases.

The unpaired t-statistic was considered extremely significant at the 0.05% level, with a two tailed p value of <0.0001.

The Fisher's exact test was also done to analyze the relationship between AES and JE cases with a two sided p value of 0.7755 with a relative risk of 1.111 and odds ratio of 1.250 at 95% confidence interval.

**DISCUSSION:**

The diagnostic criteria for Japanese Encephalitis which was adopted in this study was the demonstration of the IgM antibodies by MAC ELISA in Serum/CSF samples, as reported by others, which is the Gold standard for the diagnosis of Japanese Encephalitis.In this study, it was observed that out of 217 (Two hundred and seventeen) patients with acute encephalopathy examined,66 (Sixty six)had one ormore indicator of JEV infection to suggest that thiswas the probable cause of the illness in these cases.This high number indicates that JEV is animportant cause of acute encephalopathy illness in this area. The cause of the illness in theremaining 151 cases is still undefined which may be due to other arboviral agent rather than JEV[6]. From the study it was observed that most of AES cases were found in the month of July every year which support the previous data [7,8,9]. Age wise distribution of data indicated that age shift (0-5 to 6-15 may be due to the invasion of the disease into new demography or some change in the virus strain over time[10].

Among the clinical manifestations, reported fever was present in 100 % of the cases and altered sensorium and headache accounted for 85 % - 100 % and 50 % of the cases respectively, Male preponderance and incidence in children younger than 15 years of age which were noticed in our study

is also well documented by several earlier reports [11,12, 13].

**CONCLUSION:**

From the study it was concluded that JEV strain is still circulating in this part of Assam due to many factors like existence of piggery firm, increase n nos of domestic pigs, frequent migration of people, environmental condition, rice field near to house, unhygienic living condition and some other factors. Significant progress has been made in the effort to controlJE and the incidence has declined.However, it was observed that nos of AES/ JE cases have been decreasing in this year due to the implementation of the SA-14-14-2 vaccine among the children in February, 2012 in Lakhimpur district of Assam. Vaccine schedules, surveillance of adverse events, and setting up effective vaccination programmes are important issues that need addressing to maximize the impact of the available vaccines.

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**Figures& Tables:**

**Fig 1: Month wise distribution of AES cases in last five year**

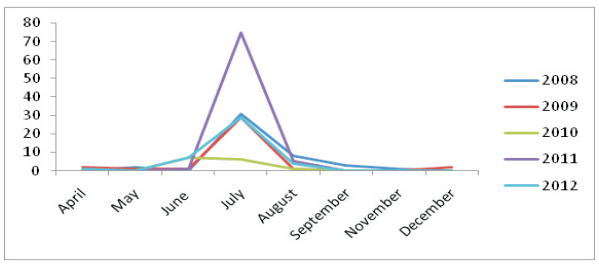


**Table1: Total cases in five years in different community**

| | AES cases | | | | |
|---|---|---|---|---|---|
| Community | 20082009 | 2010 | 2011 | 2012 | |
| Tea garden | 6 | 8 | 3 | 22 | 6 |
| Muslim | 6 | 5 | 2 | 9 | 5 |
| Ahom | 9 | 6 | 0 | 5 | 2 |
| Deori | 1 | 0 | 0 | 1 | 1 |
| Brahmin | 0 | 0 | 0 | 1 | 1 |
| Kachari | 6 | 5 | 1 | 8 | 9 |
| Mishing | 12 | 5 | 7 | 23 | 5 |
| Bodo | 0 | 1 | 0 | 1 | 2 |
| SC | 3 | 5 | 1 | 2 | 1 |
| Kalita | 0 | 1 | 0 | 8 | 3 |
| Rabha | 0 | 0 | 0 | 1 | 0 |
| Hajong | 0 | 0 | 0 | 0 | 1 |
| Konch | 0 | 0 | 0 | 0 | 3 |
| Bengali | 1 | 0 | 0 | 0 | 2 |
| Nepali | 1 | 0 | 0 | 0 | 0 |
| Total | 45 | 36 | 14 | 81 | 41 |

**Table 2: Graph showing year wise distribution of AES/JE cases as well as death**

| Year | AES cases | AES death | JE positive | JE death |
|---|---|---|---|---|
| 2008 | 45 | 7 | 23 | 2 |
| 2009 | 36 | 7 | 7 | 2 |
| 2010 | 14 | 4 | 5 | 0 |
| 2011 | 81 | 23 | 21 | 5 |
| 2012 | 41 | 13 | 10 | 3 |
| Total | 217 | 54 | 66 | 12 |

**Table 3:Age & Sex wise distribution of AES cases in Lakhimpur district**

| Age wise distribution of AES/JE cases in Lakhimpur district | | | | | |
|---|---|---|---|---|---|
| **Age group (Years)** | 2008 | 2009 | 2010 | 2011 | 2012 |
| 0-5 | 11 | 8 | 6 | 27 | 9 |
| 6-15 | 19 | 7 | 6 | 32 | 8 |
| 16-30 | 10 | 13 | 2 | 6 | 15 |
| 31-50 | 4 | 4 | 0 | 6 | 5 |
| ≥1 | 1 | 4 | 0 | 10 | 4 |
| **Sex** Male | 26 | 21 | 8 | 45 | 23 |
| Female | 19 | 15 | 6 | 36 | 18 |
| **Total** | 45 | 36 | 14 | 81 | 41 |