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## INFLUENCE OF RAINFALL ON INCIDENCE OF AES/JE CASES -A STUDY FROM LAKHIMPUR DISTRICT OF ASSAM IN 2011-12

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### ABSTRACT

Acute encephalitis syndrome (AES)/Japanese encephalitis (JE) is the leading viral cause of disability in India. Our study was carried out to comprehend the prevalence of AES/JE cases in 2011-12 at Lakhimpur district of Assam and to find out their association with environmental factors (particularly rainfall). Among the suspected AES cases, 25.92% & 24.39% cases were found JE IgM positive in 2011 and 2012 respectively. A positive correlation was observed between AES/JE cases and monthly rainfall data. In 2012, upto some extent decreasing trend of JE cases were observed due to the vaccination campaign held on February, 2012 at Lakhimpur district.

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## 1. INTRODUCTION

Acute encephalitis syndrome (AES) is characterized by inflammation of the brain [1]. Till 2005, all AES cases were being labeled as Japanese Encephalitis (JE). However after 2005, the etiological diagnosis for AES is being established and it was believed that all AES cases may not be JE positive. It is transmitted by infective bites of female mosquitoes mainly belonging to *Culex tritaeniorhynchus*, *Culex vishnui* and *Culex pseudovishnui* group. However, some other mosquito species also play a role in transmission under specific conditions [6].

An estimated 378 million population is living at the risk of JE in 12 states/ Union Territories of India [3,4]. In north east (NE) region of India, the disease was first observed in 1976 in Assam and since then the disease has appeared in endemic forms [2]. In Assam the first outbreak was in Lakhimpur district in 1978. A major outbreak of JE has been reported from Lakhimpur district of Assam between July-August, 1989. It affected more than 90 villages of the district; covering a population of approximately 36,000 and 50% case fatality rate [5].

Till now JE remains a major public health problem in this area. Keeping in view of the above fact the study was carried out to know the prevalence pattern of AES/JE cases in Lakhimpur district of Assam. This study also helps us to understand the present trend of JE cases as compared to previous year. In this study the role of environmental factors on incidence of JE cases were also studied.

## 2. STUDY AREA

Lakhimpur District covered an area-2,277 km<sup>2</sup>, 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.

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### 3. MATERIALS AND METHODS

Blood/CSF samples were collected from AES suspected patients admitted at different health centers in Lakhimpur district of Assam.

IgM Elisa (NIV Pune) test was done at North Lakhimpur Civil Hospital for detection of JE IgM antibody. The monthly rainfall data of Lakhimpur district was obtained from the website of Indian Meteorological Department ([www.imd.gov.in/section/hydro/disrainfall/webrain/assam/lakhimpur.txt](http://www.imd.gov.in/section/hydro/disrainfall/webrain/assam/lakhimpur.txt)) to evaluate the correlation between monthly rainfall and occurrence of JE cases. Monthly rainfall data was considered as an independent variable whereas numbers of JE occurrences per month were taken as a dependent variable.

### 4. RESULTS

In 2011, among eighty one (81) AES suspected cases reported/collected from different areas in North Lakhimpur District of Assam, twenty one (21) of them were found to be positive for JE IgM antibody. Twenty three (23) cases expired among AES suspected samples and five (5) cases expired among JE IgM positive cases. However in 2012, forty one (41) AES cases were reported out of which ten (10) cases were found JE IgM positive. Among the AES cases, thirteen (13) patients expired whereas three (3) cases expired due to JE infection (Figure 1). It was also found that males were highly vulnerable for carrying JE infection in comparison with the female.

The cases of AES/JE were observed in the month of April to August every year, which was peak in the month of July (Figure 2). From the above finding it was found that the climatic condition (temperature and rainfall) playing a crucial role in occurrence of AES/JE cases.

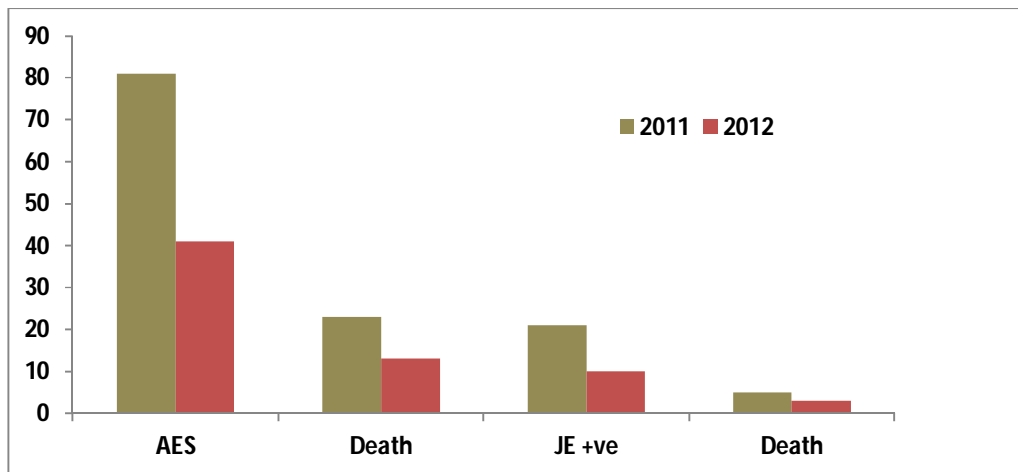


Figure 1 Comparison of AES/JE cases in 2011 and 2012

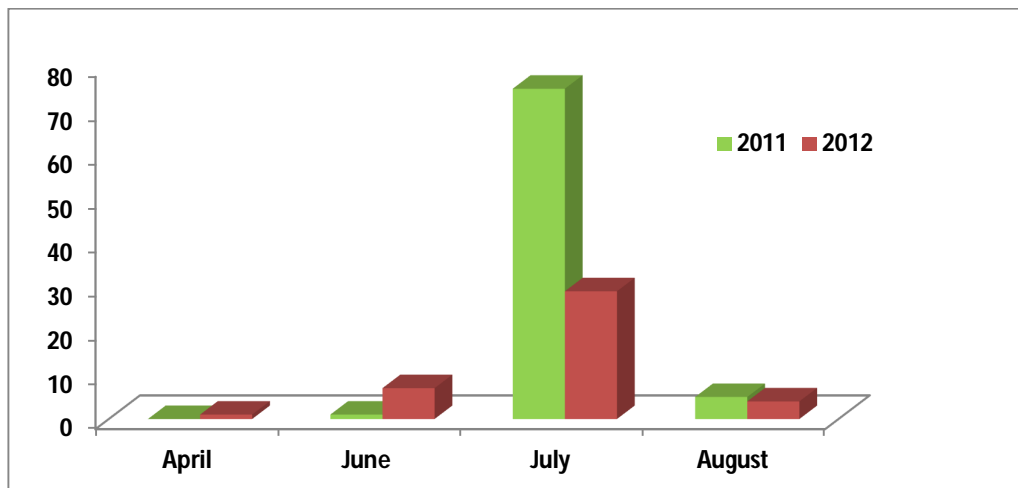
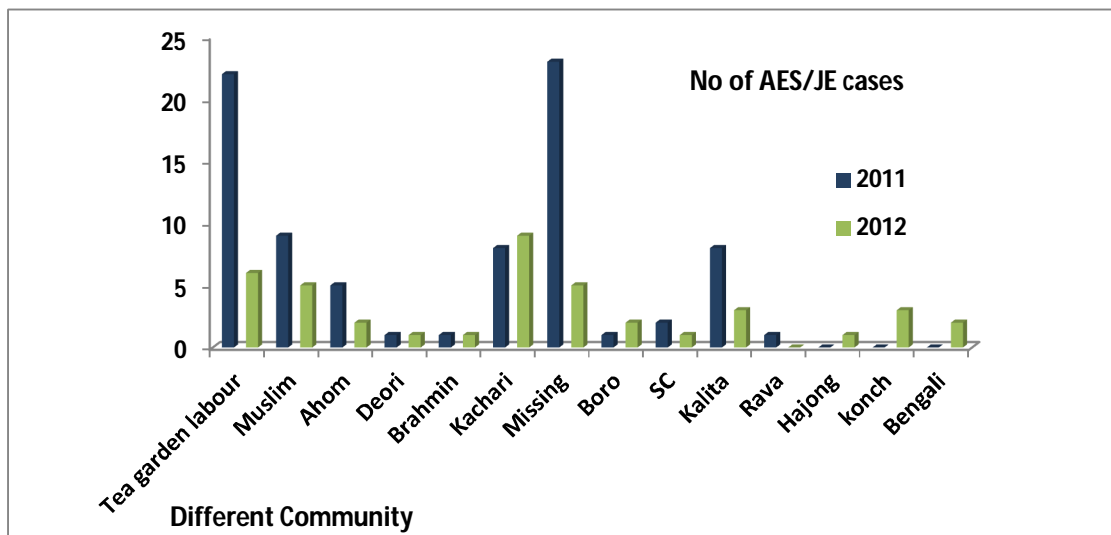


Figure 2 Graphical representation showing the month wise AES/JE cases in Lakhimpur

A simple linear regression analysis was performed on monthly data of 2011 to determine the correlation between JE cases and rainfall. The regression line described the value of slope (b) = 0.1005 with Y intercept (a) of (-) 27.906 and a standard error of 16.284. The t-statistic for the slope was not significant at the 0.05% level, with a two tailed p value of 0.0743. The correlation coefficient (r) showed a positive correlation with a value of 0.9257 and  $r^2=0.8570$ . Thus, we concluded that there was a positive co-relationship between cases of JE and rainfall. If the monthly rainfall increases by 10 mm per month there will be increase in no of AES/JE cases by 1. Furthermore, only 85.70% of the variability in JE cases could be explained by rainfall and other 14.30% could be attributed to factors other than rainfall which is an indication of satisfactory model as the independent variable become successful explaining dependent variable. The unpaired t test value was 2.709 (six degree of freedom) with a two tailed p value (0.0351) considered significant. Fisher's exact test was also performing with a two sided p value of 1.0000, considered not significant with an odds ratio of 0.9113. The month wise rainfall and JE cases analysis in 2012 also indicated the positive correlation among both the variable.



**Figure 3** Graphical representation showing community wise distribution of AES/JE cases in Lakhimpur District

## 5. DISCUSSION

Gradually increasing numbers of AES/JE cases in India causing a remarkable concern to the community, young researchers and scientist [7]. Immunizations against JE started in the state of Assam from 2006 as a campaign program in Dibrugarh, Sivasagar, Jorhat and Golaghat District [6]. In North Lakhimpur, JE vaccination was first time given in 1987, although JE has been reemerged from time to time in Lakhimpur district. It was found that suitable ecological environment leading to development of JE in epidemic proportion in Lakhimpur district [7]. However, it was observed that the cases of JE have been decreases in 2012 due to the implementation of the SA-14-14-2 vaccine among the children in February, 2012.

However in 2011, there was sufficient monsoon and rainfall in Lakhimpur district. The temperature also remain between 25-39<sup>o</sup>c from April to September. From the above finding it was observed that rainfall plays a significant role in occurrence of JE cases. There was a direct relationship between occurrence of JE cases and monthly rainfall. As the rainfall increases, cases of JE were also increased simultaneously, which support the previous result obtained by Bi P *et al.*, 2003 [8]. Community-wise data revealed that the tea garden labours and missing community were highly at risk for carrying JE virus infection (Figure 3). This is because of due to the poor hygiene and lack of awareness among the people. It has been seen that in Missing community, most of the villagers reared pigs very near to the house and they have in close contact with such animals which increasing the chance of carrying JE infections.

## 6. CONCLUSION

The ongoing JE vaccination campaigns integrated with vector control measures should be beneficial in controlling the problem. Considering the risk factors of transmission of the disease, the primary health care facility needs to be sensitized and improved.

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