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INCIDENCE OF JAPANESE ENCEPHALITIS AMONGST ACUTE ENCEPHALITIS SYNDROME.: A REPORT FROM A TERTIARY CARE HOSPITAL .

Microbiology

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ABSTRACT

Background & objectives: Japanese Encephalitis, an endemic mosquito borne viral disease, have regular outbreaks in Assam every year during the hot and humid summer monsoon seasons. Japanese encephalitis (JE) is a major public health problem in India because of high mortality rate and residual neuropsychiatric damage in the survivors. The present study was undertaken to investigate JE positivity amongst patients admitted with acute encephalitis syndrome (AES) in southern part of Assam and adjoining states and different parameters like demographic profile of JE amongst the population, seasonal and geographical distribution of JE cases from a tertiary care hospital in South Assam with their changing trends related to it.

Methods: It was a hospital-based prospective cross-sectional study conducted from the month of july'2013 to the month of September'2015 in the department of Microbiology, Silchar Medical College, Assam. CerebroSpinalFluid and serum samples were collected from clinically suspected AES cases and tested for IgM antibody against JE by JE MAC ELISA.

Result: Out of total 341 AES cases ,77 (22.5 %) were positive for JE. Detection rate of JE was 35.5%, 12.7%, and 22.6% in the years 2013, 2014, and 2015 respectively. The JE positivity was much higher(26.27%) in adult, than in paediatric population(14.27%).Significant numbers of JE cases were found to be clustered around the monsoon season.

KEYWORDS

Introduction:

Encephalitis is defined as the inflammation of brain parenchyma and is usually a result of viral infection [1] .Acute Encephalitis Syndrome (AES) 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). Other early clinical findings may include an increase in irritability, somnolence or abnormal behaviour greater than that seen with usual febrile illness.[2]

Acute Encephalitis Syndrome (AES) has several etiologies with Japanese Encephalitis (JE) and Dengue being the prominent factor in South East Asia. [3]

It is a mosquito-borne viral encephalitis that occurs in temperate and tropical regions of Asia and is maintained in a cycle of virus transmission between vertebrate-amplifying hosts (e.g., pigs, herons and egrets) and several Culex mosquito species. JE is the leading form of viral encephalitis in Asia where about 50,000 cases and 10,000 deaths are reported each year, mostly among children. However, officially reported cases of JE greatly under-represent the true impact, due to incomplete surveillance in many affected areas.[4] Japanese encephalitis (JE) virus is a member of the Family Flaviviridae which contains more than 60 members of animal viruses. JE virus belonged to one of the 8 subgroups or complexes of flaviviruses, together with West Nile, Murray Valley encephalitis and St. Louis encephalitis viruses . Although JE virus was named by its first isolation in Japan in 1935, the virus and its disease are known to present in wider Asia monsoon area. Recent JE epidemics in developing Asian countries have become a great public health problem requring proper control measures.[5] JE was first recognized based on serological surveys in 1955, in Tamil Nadu, India. Approximately 597,542,000 people in India live in JE-endemic regions and 1,500 to 4,000 cases are reported every year.[6] In the year 1978, first case of Japanese encephalitis was reported from the Lakhimpur district of Assam.[7]

Sentinal Surveillance on JE started from the month of April 2013 at Sentinal Surveillance laboratory at Department of Microbiology, Silchar Medical College, Silchar. The present study was undertaken to investigate the JE positivity amongst AES cases in southern part of Assam and adjoining state from the month of July 2013 to the month of September 2015. Different parameters with the changing trend related to JE in terms of age, sex, geographical location and seasonal variation were also studied.

Material & Methods:

This cross-sectional study was conducted in the department of Microbiology, Silchar Medical College and Hospital (SMCH),Silchar ,Assam, India, for a period of July 2013 to September 2015. The study included all consecutive AES patients of different age groups and both sexes admitted to the Medicine and Pediatrics departments of SMCH as well as to the private hospitals of Silchar and also the referred cases from civil hospitals of karimganj and Hailakandi districts and from adjoining states .Cases were reported using standard Case Investigation Form for documentation of clinical and demographic characteristics and Laboratory Request Form as per guidelines set by National Vector Borne Disease Control Programme (NVBDCP), Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India. Patients were enrolled after obtaining informed /written consent from themselves /parents or guardians (in case of minors).[2]

Sample collection: 1 ml of CSF and 2 ml blood, both collected in sterile vials under strict aseptic precautions and immediately transported to the laboratory of the Department of Microbiology, Silchar Medical College & Hospital. Blood samples were left at room temperature for 30 mins for clot formation, then serum was separated by centrifugation. Both serum and CSF samples were kept at 4-8°C if testing is done within 48 h .Both blood and CSF samples were stored at 4˚C to be tested within 3days or at - 80˚C if longer period of storage was required.

Sample testing: IgMcapture (MAC) ELISA was performed on all the samples by the NIV JE IgM Capture ELISA Kit supplied by NVBDCP as per the standard protocol provided by the National Institute of Virology.

Results :

Year wise distribution of AES and JE cases:

Table 1. Shows that out of the total of 341 AES cases , 77 (22.5 %) were positive for JE. Year wise distribution of AES and JE cases shows increase in the number of AES cases but a decline in the percentage of JE cases from the year 2013 (35.5 %) to 2014 (12.7%) and 2015 (22.6%) .

Total AES cases	No. of JE positive cases	No. of JE negative cases	JE positive percentage
76	27	49	35.5
102	13	89	12.7
163	37	126	22.6
341	77	264	22.5

Table 1: Year wise distribution of AES and JE cases

Sex-wise distribution : Out of 341 cases of AES, 200 cases are male and 141 cases are females. Male to female ratio of AES was found to be 1.4. JE was found to be positive in 46 males (21.1%) and 31 females (21.9%).

Seasonal variation: As shown in Fig 1. the prevalence of AES cases was found to be highest during the month of July followed by August and September . JE positivity was highest during July followed by August and June.

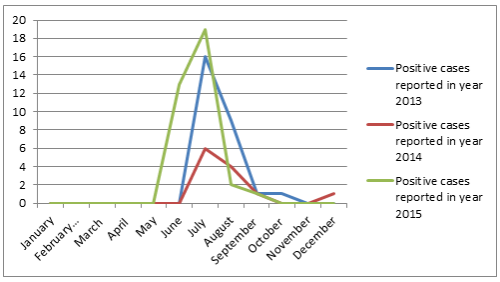

Fig 1: Seasonal variation of JE Positive cases.

Geographical variation :
The largest number of AES cases were hailing from Cachar district followed by Karimganj and Hailakandi district of SouthAssam. Few cases were also reported from adjoining states of Tripura, Meghalaya and Manipur. JE positivity was found highest in Cachar followed by Karimganj and Hailakandi.

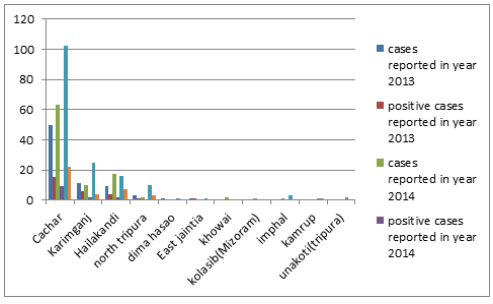

Fig 2: Geographical variation of cases

Age specific distribution of Japanese encephalitis cases : As shown in Table 2, the prevalence of JE positive cases was found to vary significantly in different age groups. The association of JE with age was tested in the adult (>15 years) and paediatric age (<15 years) groups. The occurrence of JE in persons aged >15 years was found to be higher than the pediatric age group. Out of 341 no of total AES cases, the JE positivity is much higher, 62 cases (26.27%) in adult, than in paediatric population, 15 cases (14.23%).

Table 2: Age specific distribution of Japanese encephalitis cases.

year	Age (<15 years)			Age(> 15 years)		
	AES	JE positive	% positive	AES	JE positive	% positive
2013(from July)	22	8	36.4	54	19	35.2
2014	28	3	10.7	74	10	13.5
2015(till September)	55	4	7.2	108	33	30.5
Total	105	15	14.23	236	62	26.27

Discussion : The aetiology of AES is multifactorial. Viruses, Bacteria, Mycobacteria, Rickettsia, Toxoplasma and malaria (due to Plasmodium falciparum) may cause acute encephalitis .Viruses are the most common and important aetiological causes of acute encephalitis. JE and dengue are prevalent in South East Asia [8].

Our study found increase in the number of AES cases in the year of 2015 in comparison to 2013 and 2014. A similar finding was also recorded in West Bengal by Bandopadhyay et al [9] and in Upper Assam by Uttara et al [10]This increase may be due to the establishment of sentinel surveillance and increased awareness about the disease among the healthcare workers and the availability of testing facility to support the clinical diagnosis. Decrease of JE positive cases among the AES patients in the years 2014 and 2015, when compared with 2013. This decline in JE positive cases among the AES patients could be attributed to the extensive mass vaccination drives and intensive awareness programmes and/or simply due to natural epidemiological niche periodicity due to herd immunity. A changing epidemiological trend of flavivirus mediated diseases from JE to dengue has also been noted in recent years possibly due to increased urbanisation of the remote villages . Cross-protection by other flaviviral diseases, namely, dengue, could be a reason for decline of the JE cases to some extent [9].

Although JE has been known as a paediatric disease and the same has been reported by others like Chaudhuri et al [11]and Phukan et al[12]. However, the present study found the occurrence of JE in adults to be higher than the paediatric age group. As many as (26.27%) of the cases belonging to the > 15 years age group turned out to JE positive as compared to (14.23%)in the paediatric age group. This trend was similar to other studies done by Borthaur et al[13]and Uttara et al[10].

This shift of JE cases from children less than 15 years to adults is significant and can be explained by high coverage of vaccination in children or more exposure of adults to vector mosquitoes during their outdoor activities such as cultivation.[8]Assam started Children vaccination for JE since 2006 in Sivasagar and Dibrugarh district and in 2007 it included Golaghat & Jorhat district. Again adult vaccination was started from Sivasagar district in the year 2011 with the vaccine SA14-14-2 strain. After that it includes for Kamrup (M), Golaghat, Jorhat, Dibrugarh, Tinsukia, Dhemaji and Lakhimpur district for adult vaccination. As per the manufacturer the vaccine SA14-14-2 strain having 99 % efficacy among children and Nepal has also successfully carried out the vaccination drive among adults [7].

The male adult population were mostly affected in our study. The reason may be they worked outdoors and were more exposed to the vector C. tritaeniorhynchus that breed abundantly in the rice fields. Similar findings were depicted by Borthakur et al.[13]

Our study showed clustering of cases in monsoon i.e., starting from June, the peak was in July-August similar to other studies from Assam done by Phukan et al [12],Borthakur et al[13]. With the onset of winter, number of JE cases declined substantially, except for a few scattered cases. Culex tritaeniorhynchus mosquito is the vector for Japanese Encephalitis virus. There is an increase in mosquito population as rainfall starts from the month of June in Assam. One study from Thailand has shown similar results [14] .Occurrence of JE cases are highest in the month of July, i.e about one month from the onset of monsoon rains. One study was carried out in Taiwan which suggested one month time lag from onset of rains, increase in temperature and humidity to effect JE occurrence in humans.[15]

In summary, Assam is still an endemic area and JE affects the adult male population mostly.JE also shows a seasonal variation with maximum cases in the month of July and August.

Conclusion : Earlier, JE was prevalent in few places of Assam like Tinsukia, Dhemaji, Dibrugarh, Lakhimpur, Golaghat, Sivasagar, Jorhat, parts of lower Assam. Now an emerging trend is seen in Barak valley and nearby areas. There is no specific treatment for the disease. In this regard early symptomatic management is an effective mean in controlling the problem .So, now we need high vaccine coverage along with a strong and active surveillance system which helps in prevention of disease occurrence by the detection of early warning signals for any potential JE outbreak and thus helping to initiate timely control measures. Mass scale effective vaccination campaigns covering the entire population is essential for prevention and control of Japanese Encephalitis. Intensive vector control measures and public awareness programmes are the other two important factors to be considered as vital issues for JE eradication. Isolation of the porcine population, the reservoir host for JE virus may also be taken into serious consideration to achieve the desired goal of total irradiation of Japanese encephalitis.

Conflict of interest-none
Source of support-none

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