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Clinico-Sociodemographic Profile of Japanese Encephalitis in Children- A Cross Sectional Study

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ABSTRACT
Acute Encephalitis Syndrome (AES) in children is a common health problem in India, contributes considerable morbidity and mortality in children. The Japanese Encephalitis (JE) is the most prevalent and significant mosquito borne viral encephalitis of man. This study was conducted to determine the clinical, socio-demographical characteristics and outcome of Japanese encephalitis in children admitted in our hospital. This cross sectional study was carried out in Gandhi Memorial Hospital Rewa; India. All diagnosed AES children as per WHO case definition were enrolled and analysed. Socio-demographic data and clinical data were collected. All suspected serum samples were tested for IgM antibodies by ELISA for diagnosis of Japanese encephalitis. Out of total 110 AES cases, 28 (25.5%) were diagnosed as Japanese encephalitis. Majority of the patients (46.4%) were 1-5 years of age group, predominantly male children (71.5%). Most (71.5%) of patients were from rural setting and 89.3% belongs to lower socio-economic class. Majority of the cases was seen in monsoon seasons. Fever, altered sensorium, seizure and nausea/vomiting were the common clinical manifestation. Mortality rate was higher in AES children among JE positive cases. AES is a major threat to public health, particularly in children. Japanese encephalitis was a leading cause of mortality in children among AES patients.

INTRODUCTION

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 (disorientation, confusion, coma, inability to talk and/or new onset of seizures[1]. AES is a major public health problem in developing country like: India. It may lead to significant morbidity and mortality if not treated properly[2]. The incidence rate of AES continues to rise despite of best investment to improve child health varies according to different studies[3]. The first major AES outbreak was reported in Bankura, West Bengal (India) in 1973 and sporadic outbreaks or epidemic forms in Assam, since 1976[4]. JE is major encephalitis in the world, mostly caused by neurotrophic Arboviruses, JE virus (JEV), is a leading etiological agent in India[5]. The main target of JEV was central nervous system, the common clinical presentation were fever, vomiting, headache, signs of meningeal irritation and altered consciousness[6].The aetiology of AES was included a wide range of bacteria and viruses, they can vary according to the host factors, climate variation and geographical location[7]. Other than JEV, common aetiological agents of the AES were: enteroviruses, NiV, CHPV, varicella zoster virus, dengue virus, measles, mumps and HSV[8-9]. Japanese encephalitis is mosquito-borne disease. The common vectors of JE were Culex vishnui and Culex tritaeniorhynchus. Pigs, birds such as herons and sparrows were the common reservoir host; man is accidental dead end hosts[10]. Isolation of the JE virus from the clinical specimens was difficult because of rapid development of neutralizing antibodies and low levels of viremia[11]. The gold standard technique for the diagnosis of Japanese encephalitis is the detection of virus specific IgM antibody by captive-enzyme linked immunosorbent assay (IgM-Captive ELISA)[12].

Therefore, the proper diagnosis and treatment of JE is crucial in AES children for minimizing the morbidity and mortality.

Present study aimed to evaluate the socio-demographic and clinical profile of Japanese encephalitis in AES children.

MATERIALS AND METHODS

This was a cross-sectional observational study, carried out in the department of Paediatric at Gandhi Memorial Hospital Rewa, India. The study duration was 14 months, starting from August 2020 to October 2021. All children diagnosed with AES admitted in our intensive care unit during the study period were enrolled in this study.

Inclusion criteria:

- Children from 1 to 15 years of age
- Children diagnosed AES as per WHO case definition
- Parents who's given the written inform consent to Participate in the study

Exclusion criteria:

- Patients >15 years of age
- Children having generalized seizure without fever
- K/c/o TBM, Tuberculoma, NCC, Structural anomalies of brain, Reye syndrome or other non-infectious encephalopathy

Parents not given consent for participate in study. According to the WHO guidelines, AES is defined as acute onset of fever and a change in mental status, including disorientation, confusion, inability to talk and/or new onset of seizures excluding febrile convulsions; in a person of any age at any time of the year.

All the data were collected on a predesigned tested proforma under following findings: socio-demographic data (age, gender, socioeconomic status, locality, overcrowding) signs and symptoms of AES cases, measured vital parameter HR, RR, Pulse, SPO2, BP and laboratory tests for diagnosis of AES.

After obtaining written informed consent from guardian of the children, Samples of serum and CSF both were collected and analysed for the diagnosis. First sample (CSF and serum) were collected before the starting of the treatment on the day of admission and 2nd sample was collected 7 days interval. Both samples were immediately transported to the Microbiology laboratory following standard precautions.

Laboratory testing of CBC, LFT, RFT, Serum electrolytes (Na, k, Ca) CSF, IgM ELISA was performed for the diagnosis of JE.

Statistical analysis-All data was collected and analyzed by SSPS 22. Percentage, mean, standard deviation and Chi-square test was performed. $p<0.05$ were considered to be statistically significant.

RESULTS

A total of 110 diagnosed cases of AES were enrolled and analysed in this study, out of which 28 (25.5%) were diagnosed as Japanese encephalitis. Majority of the patients (46.4%) were 1-5 years of age group, predominantly male children (71.5%). Most (71.5%) of the patients were reported from rural area 89.3% belongs to lower socio-economic class and 78.6% patients residing in overcrowded area. The cases were found to be distributed throughout the year but mainly found in monsoon seasons (53.6%) in this region. Socio-demographic distribution of JE cases is shown in Table 1.

Clinical presentation of JE patients were fever (100%) altered sensorium (100%) followed by Seizers

Table 1: Socio-demographic characteristics of Japanese encephalitis cases

Socio-demographic characteristics	JE positive cases (n = 28)	JE negative cases (n = 82)	p-value
Age group (in years)			
1-5	13(46.4%)	37 (45.2%)	0.993
6-10	8 (28.6%)	21(25.6%)	
11-15	8 (28.6%)	24 (29.3%)	
Gender			
Male	20 (71.5%)	55 (67.1%)	0.669
Female	8 (28.6%)	27 (32.9%)	
Residential status			
Rural	20 (71.5%)	68 (82.9%)	0.189
Urban	8 (28.6%)	14 (17.1%)	
Socioeconomic class			
Upper	0 (0.0%)	2 (2.4%)	0.163
Middle	3 (10.7%)	21 (25.6%)	
Lower	25 (89.3%)	59 (71.9%)	
Overcrowding			
Yes	22 (78.6%)	40 (48.8%)	0.001
No	6 (21.4%)	42 (51.2%)	
Seasonal occurrence			
Pre- monsoon	5 (17.8%)	8 (9.7%)	0.103
Monsoon	15 (53.6%)	61 (74.4%)	
Post- monsoon	8 (28.6%)	13 (15.8%)	

Table 2: Distribution of JE according to different vitals parameters

Vitals parameters	JE positive (n = 28)	JE negative (n = 82)	p-value
Heart rate			
Normal	1 (3.6%)	13 (15.8%)	0.092
Tachycardia	27 (96.4%)	69 (84.2%)	
Respiratory rate			
Normal	8 (28.6%)	19 (23.2%)	0.669
Tachypnea	20 (71.5%)	63 (76.8%)	

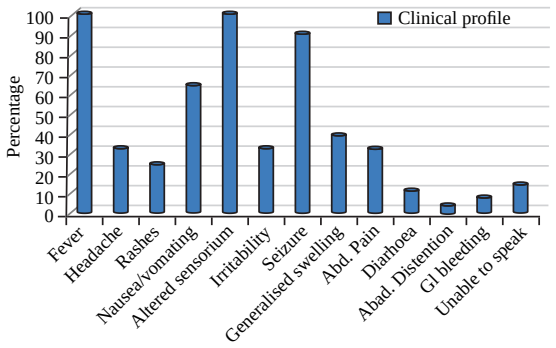

Fig. 1: Clinical profile of JE cases

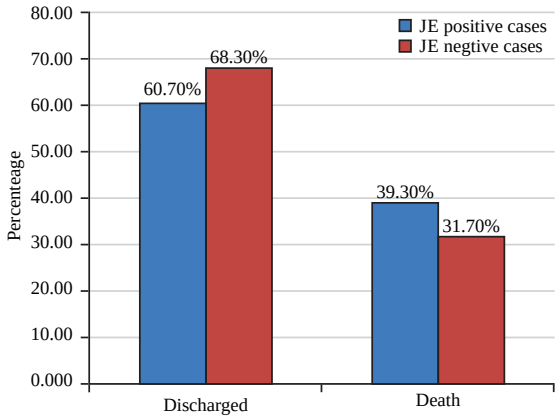

Fig. 2: outcome of Japanese Encephalitis patients

(89.3%) Nausea/Vomiting (64.3%) GI Bleeding (39.3%) and Abdominal Pain (32.2%).

Tachycardia was present in 96.4% and Tachypnea was seen in 71.5% of JE positive cases. No significant difference was obtained in terms of Heart rate (HR) and respiratory rate (RR) (p>0.05) between those found positive and negative for JE.

Mortality rate was higher among Japanese encephalitis positive cases (39.3%) as compared to JE negative cases (31.7%) (Fig. 2).

DISCUSSIONS

Previous investigations of outbreaks and sporadic hospitalized patients presenting with an encephalitis syndrome revealed viral infections as a major etiology. However, etiological diagnosis of AES cases still represents a diagnostic challenge[13].

In our study JE is the common cause of viral encephalitis of children, 25.5% of hospitalized children with AES were diagnosed as confirmed JE. Similar to the study carried out by Kabilan *et al*.[14] form tamilnadu and Dutta *et al*.[15] from dibrugarh, reported JE incidence 29.3% and 30% respectively. Some study like Dihingia, *et al*.[16] and Medhi *et al*.[17] reported very higher incidence of JE cases, 40.7 and 50%, respectively.

The most common affected age group was 0-5 years in current study, comparable with the Roy *et al*.[18] and Kamble *et al*.[19].

The proportion of AES was high in males than females; similar results were observed in some of the studies done in our country by Thapa *et al*.[20] and Saxena *et al*.[21].

In our study, majority of the children residing at rural areas, belong to low socio-economic and Overcrowding group. Our findings correlated with the other studies Kumar *et al*.[22] and Potula *et al*.[23]. This may be due to epidemiological factors like presence of water logged paddy field supporting profuse breeding of vector mosquitoes, non use of bed nets, piggeries in close proximity to residence and outdoor playing habits of children.

In our study the seasonal occurrence of AES cases was peak during the monsoon season (between July to October) which was consistent with mosquito transmission season, our results correlate with the many other researchers: Wu *et al*.[24], Zhang *et al*.[25] and Mohan *et al*.[26]. This difference in observations may be due to ecological variations of distribution of Culex mosquitoes. However, this was enumerated with the results obtained in an ecological study by Kanojia *et al*.[27] at National Institute of Virology (ICMR) Pune, where the general mosquito population showed bimodal pattern of peak occurrence[27]. Common clinical manifestations of AES were, Fever and altered sensorium (100%) seizure (89.3%) Nausea/Vomiting (64.3%) and headache (32.2%) observed in our study, which is similar to that reported by Rathore *et al*.[28] Mittal M *et al*.[29] and Panyang *et al*.[30].

Present study found the very higher mortality (39.3%) of AES children due to Japanese encephalitis, accordance to the Kakoti *et al*.[31], De *et al*.[32] and Patgiri *et al*.[33], reported mortality rate were 29.7, 29.9 and 44%, respectively.

CONCLUSION

We have concluded that, Japanese encephalitis is a major health issue among children; It causes significant morbidity and mortality among AES children. Children 1-5 year of age are more susceptible to the JE, transmission of the disease were climate dependant, mostly cases occurs in mansoon season. Fever, headache, nausea/ vomiting, Altered sensorium, seizure and signs of meningeal irritation were the common clinical manifestation. The higher mortality rate was recorded due to JE in children admitted with AES.

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