e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(8); 946-950

Original Research Article

Japanese Encephalitis (JE) - Cases and Preparedness in Gaya Region of Bihar, India

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Received: 25-05-2024 / Revised: 23-06-2024 / Accepted: 26-07-2024
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Conflict of interest: Nil

Abstract:

Japanese Encephalitis (JE) continues to pose a serious and significant public health problem in medium-endemic Central India. JE is mainly affects humans with an estimated 70,000 cases every year, of which 86% are from two Asian countries, India and China. The national incidence rate of JE was 1.08 cases per 1,000,000 populations during 2013–2021. In Bihar, the annual incidence rate was 0.55–1.78 per 100000 population during 2009–2014, indicating higher incidence than national rate. Affected person show mild to severe clinical illness with permanent neurologic or psychiatric sequelae among survivor and till now there is no effective antiviral drug exists. Therefore, an enhanced surveillance system is essential for planning and development of control/preventive measures against JE. The aim of the present study is to estimate cases of JE and their seasonal trends in Gaya region of Bihar. The seroprevalence data of one year (January 2021 to December 2021) in samples obtained from suspected JE patients from A.N.M. Medical College & Hospital, Gaya were analyzed. A total number of 35 suspected pediatric cases were studied. Out of these 35 suspected samples tested for JE IgM antibody by IgM-capture ELISA test, 04 (11.42 %) were found to be positive for IgM antibody against JE virus. In this study of JE burden a male preponderance were found and all are in pediatric age group (< 16 Yrs). Till now there is no effective antiviral agent against JE virus, therefore effective JE vaccination remains as the sole strategy for control and prevention of JE. The case surveillance should have mandatory notification system that requires all medical practitioners to report clinically suspected and laboratory-confirmed cases within 24 hours, which may help to find out focus of infection and thus to control the spread.

Keywords: Japanese Encephalitis, India, Gaya, Preparedness.

Introduction

JE is a vector-borne disease that is caused by Japanese encephalitis virus (JEV), belonging to family Flaviviridae[5]. JEV is the most important cause of viral encephalitis in Asia [6,7]. It is a mosquito-borne flavivirus, and belongs to the same genus as dengue, yellow fever and West Nile viruses [5,7]. The first case of Japanese encephalitis viral disease (JE) was documented in 1871 in Japan [8]. It occurs primarily in rural areas of Asia and as of March 2022 has been declared a "Communicable Disease Incident of National Significance" in Australia [9]

JEV is transmitted to humans through bites from infected mosquitoes of the Culex species (mainly Culex tritaeniorhynchus). Humans, once infected, do not develop sufficient viraemia to infect feeding mosquitoes. The virus exists in a transmission cycle between mosquitoes, pigs and/or water birds (enzootic cycle). The disease is predominantly found in rural and urban settings, where humans live in closer proximity to these vertebrate hosts.In most temperate areas of Asia, JEV is transmitted mainly during the warm season, when large epidemics can occur. In the tropics and subtropics, transmission can occur year-round but often intensifies during the rainy season and pre-harvest period in rice-cultivating regions.

Major outbreaks of JE occur every 2-15 years. JE transmission intensifies during the rainy season, during which vector population's increase. However, there has not yet been evidence of increased JEV transmission following major floods or tsunamis. The spread of JEV in new areas has been correlated with agricultural development and intensive rice cultivation supported by irrigation programmes. Most JEV infections are mild (fever and headache) or without apparent symptoms, but approximately 1 in 250 infections results in severe

clinical illness. The incubation period is between 4-14 days. In children, gastrointestinal pain and vomiting may be the dominant initial symptoms. Severe disease is characterized by rapid onset of high fever, headache, neck stiffness, disorientation, coma, seizures, spastic paralysis and ultimately death. The case-fatality rate can be as high as 30% among those with disease symptoms. Of those who survive, 20%–30% suffer permanent intellectual, behavioral or neurological sequelae such as paralysis, recurrent seizures or the inability to speak.

The annual incidence of clinical disease varies from <1 to >10 per 100000 population or even higher during outbreaks. Global burden of JE estimated as nearly 68000 clinical cases, with approximately 13,600 to 20,400 deaths each year [7]. JE primarily affects children. Most adults in endemic countries have natural immunity after childhood infection, but individuals of any age may be affected.

In India, JE was included under National Vector Borne Disease Control Programme (NVBDCP) in 2003. Since then, JE is declared as a notifiable disease in India. The disease notification helps in effective implementation of preventive measures and case management.

JE have been reported in 355 districts across 24 States/UTs in India and endemic states include Assam, Meghalaya, Manipur, Jharkhand, Bihar, Odisha, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Andhra Pradesh, Telangana, Karnataka, Tamil Nadu etc. Only Assam reported 30-50% of total JE incident cases in India in recent years [10]. Outbreaks have been reported from different parts of the country.

Recent data having >2500 number of cases with >500 deaths [11] and NVBDCP also reports thousands of cases [12] of JE every year in India suggestive of serious public health problem.

Aims & Objectives

1. To identify cases of JE in Gaya region of Bihar.
2. To know the seasonal variation of JE in Gaya region of Bihar.
3. To help policy makers for formulating appropriate control strategies against JE virus.

Materials & Methods

The present study was conducted at the Department of Microbiology, A.N.M. Medical College & Hospital, Gaya. The seroprevalence data of one year (01-01-2021 to 31-12-21) in samples obtained from suspected JE patients from A.N.M. Medical College & Hospital, Gaya were analyses. A total number of 35 suspected pediatric cases were studied. CSF and Blood samples were collected from clinically suspected cases of JE virus infection, from OPD, ICU, emergency services and admitted patients including samples referred from private hospitals and other government sector hospitals near Gaya region. The study population comprises clinically suspected JE cases in pediatric age group (<16yrs.) of both sex. Cases were selected as per symptomatic criteria [7] - gastrointestinal pain, vomiting, rapid onset of high fever, headache, neck stiffness, disorientation, coma, seizures, spastic paralysis.

After taking consent 02ml of CSF by lumbar puncture and/or 05 ml of blood sample were obtained by venipuncture from suspected patients under standard aseptic precautions. CSF and Serum samples were tested for JE IgM antibodies to diagnose JE virus infection. Subjects not giving consent were kept out of this study. Sera exhibiting hemolysis, lipaemia and turbidity were rejected and also not included in this study. All the samples were processed for the presence of IgM antibody against JE virus using IgM-capture ELISA test kits developed and supplied by NIV (National Institute of Virology), Pune.

In response to the potential threat of JE outbreak we conducted a survey with decision makers at local levels, who were involved with the response to the outbreak in Gaya. The objectives of the survey were to better understand the preparedness and response measures undertaken during the outbreak.

Data Analysis & Results

In this study a total number of 35 suspected cases were analyzed. Different results which were obtained after study were as follows. Fig 1 shows the monthly distribution of cases in the year of 2021. As the graph shows most of the cases occurring from May to September with a peak during August. Sex wise distribution shows that there was slight male preponderance. Out of total number of suspected cases (35), 51.42% (18) were males and 48.57% (17) were females. (Fig 2) Out of total 35 suspected cases, 04 (11.42 %) cases were found to be positive, 05 (14.28 %) were equivocal and 26 (74.28 %) were negative for IgM antibodies JE virus. (Fig 3)

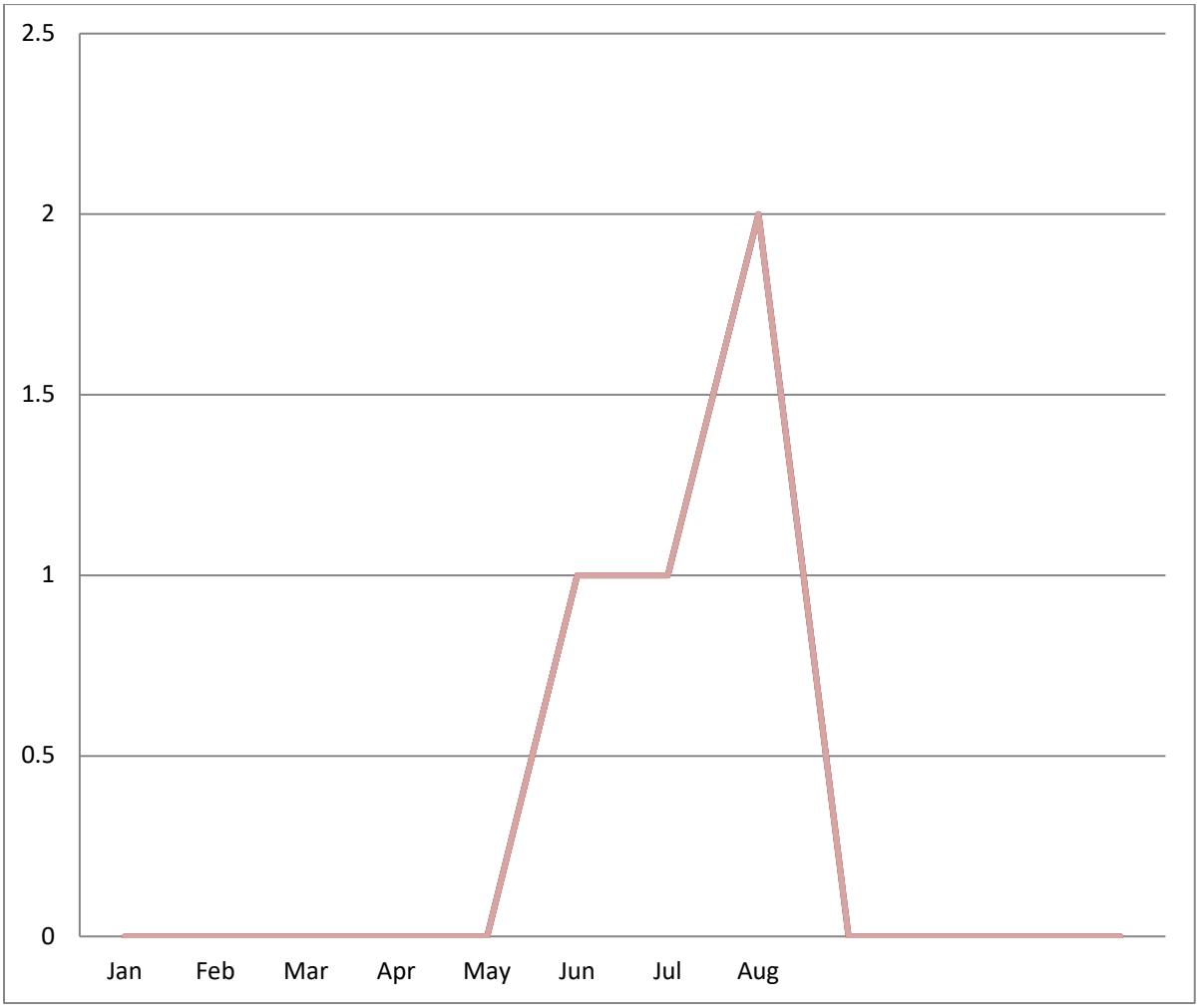

Figure 1: Monthly distribution of JE cases

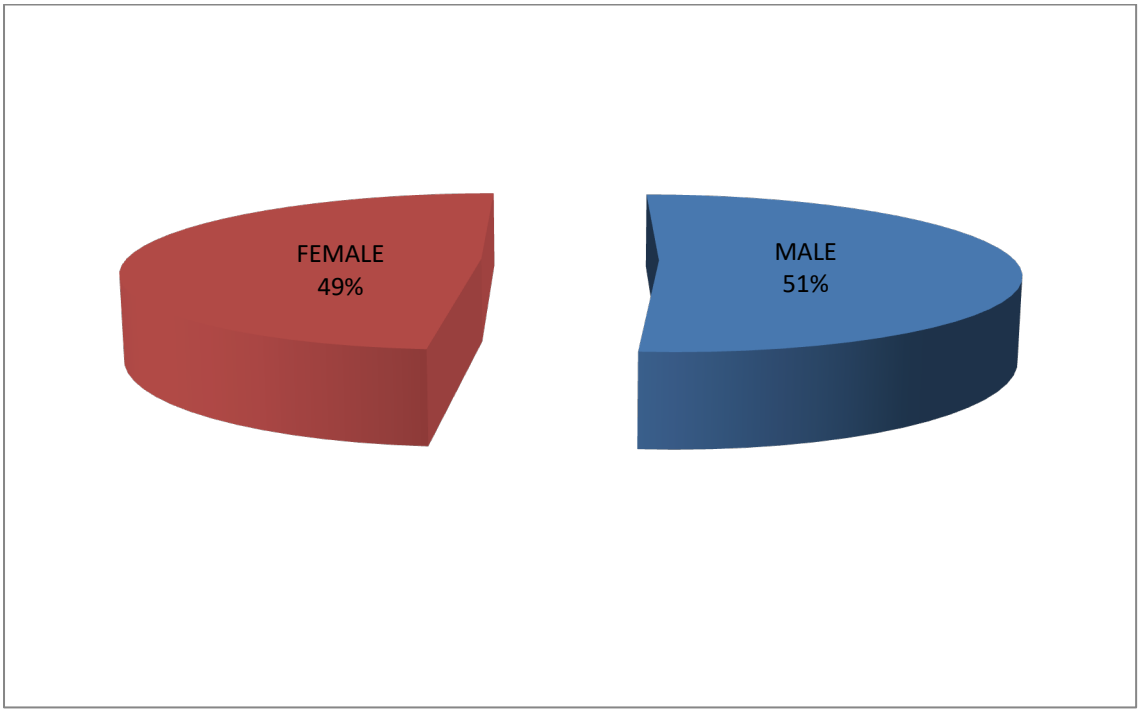

Figure 2: Distribution of JE cases according to sex

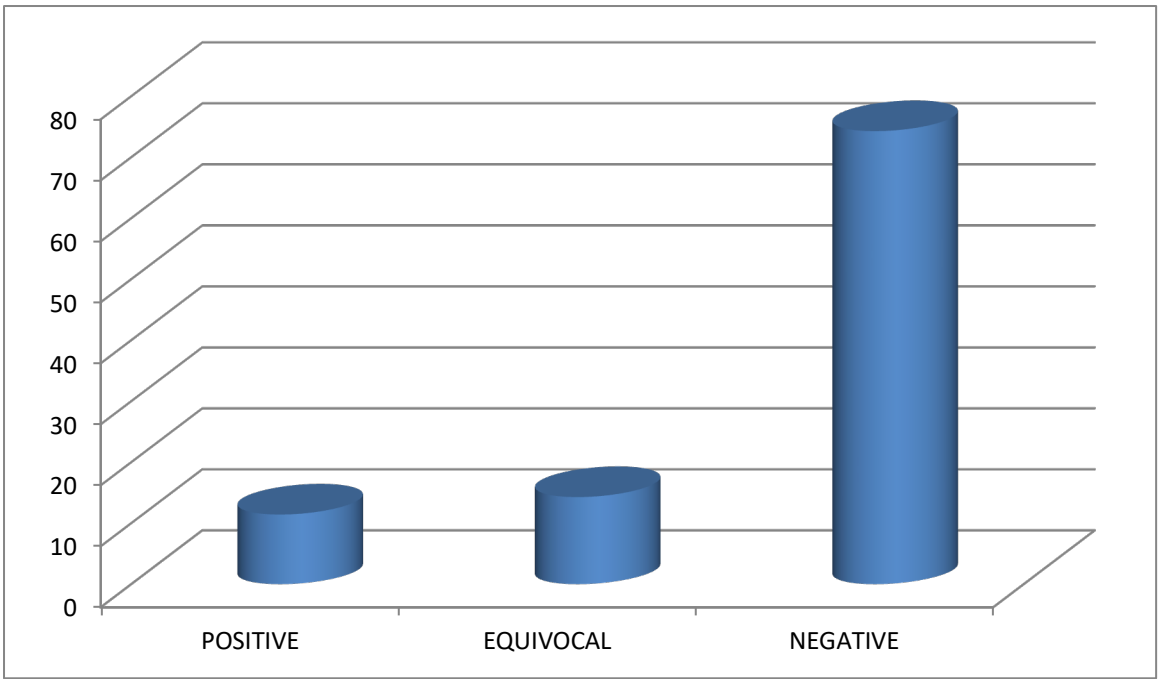

Figure 3: IgM ELISA Positivity in suspected JE cases

Discussion

A total no. of 35 suspected cases was selected by maintaining inclusion and exclusion criteria. Out of 35 samples tested for JE IgM antibody by IgM-capture ELISA test, 04 (11.42 %) were found to be positive for IgM antibody against JE virus.

There is slight male preference for JE in this study (51.42% males and 48.57% were females).

A study done by Kumar P and etal [4] on JE in Bihar districs and show disease peaks were during the start of Indian summer month which was very much similar to our study. Districts reported the maximum number cases in Kumar P and etal [4] study included Gaya with Patna, Jehanabad, Nawada, and East Champaran were other districs showing endemicity pattern in these districs.

Till now there is no antiviral drug effective for patients with JE. Thus treatment is supportive to relieve symptoms and stabilize the patient. Management of a JE has two aspects: preparedness and response. Outbreak preparedness includes institution of warning systems, supply of sufficient diagnostic kits, development of integrated vector control measures and community awareness. In the response process, particularly following an outbreak, it is important to develop an understanding of the strengths and weaknesses of prevention policies exercised in the field. It may be of great help for policy and programmatic development by the Nation.

Safe and effective JE vaccines are available to prevent disease. WHO recommends having strong JE prevention and control activities, including JE immunization in all regions where the disease is a recognized public health priority, along with strengthening surveillance and reporting mechanisms. To reduce the risk for JE, all travellers to Japanese encephalitis-endemic areas get vaccinated before travel and should take precautions to avoid mosquito bites through personal preventive measures include the use of mosquito repellents, long-sleeved clothes, coils and vaporizers.

Conclusion

This study aware that JE is alarming in Gaya region of Bihar with a seasonal trend and help in early management of JE in this local region. Early diagnosis of severe cases may be of great help to decrease mortality as till now there is no specific antiviral agent available for treatment of JE infection.

So, in the present scenario best way to control the disease is an effective JE immunization, surveillance system, rapid outbreak response, integrated vector control and community education. Even if the number of JE-confirmed cases is low, vaccination should be considered where there is a suitable environment for JE virus transmission. The findings of this study reinforce the perceived need for effective JE surveillance to enhance JE control strategies that need to be developed for future preparedness. Extensive efforts are needed to tackle the disease spread which may be of great help to reduce the associated healthcare cost. Education

and training are instrumental in controlling the outbreak, and early detection can be lifesaving.

References

1. Tandale BV, Bondre VP, Sapkal GN, Gopalkrishna V, Gurav YK, Rao RK, Qazi MS, Narang R, Guduru VK, Niswade AK, Jain M, Pediatric Viral Encephalitis Study Group Childhood encephalitis hospitalizations associated with virus agents in medium-endemic states in India. J Clin Virol. 2021; 144:104970. doi: 10.1016/j.jcv.2021.104970.
2. L. Turtle, H.E. Brindle, W. William Schluter, B. Faragher, A. Rayamajhi, R. Bohara, et al.
3. Low population Japanese encephalitis virus (JEV) seroprevalence in Udayapur district, Nepal, three years after a JE vaccination programme: A case for further catch-up campaigns?
4. World Health Organization. Japanese encephalitis (JE) reported cases and incidence. https://immunizationdata.who.int/pages/incidence/JAPENC.html?CODE=Global&YEAR. Accessed 30 Sept 2022.
5. Kumar P, Pisudde PM, Sarthi PP, Sharma MP, Keshri VR. Status and trend of acute encephalitis syndrome and Japanese encephalitis in Bihar, India. Natl Med J India. 2017;30(6):317–320. doi: 10.4103/0970-258X.239070.
6. Textbook of Microbiology; Ananthanarayan and Paniker 10th Edition.
7. https://www.uptodate.com/contents/japanese-encephalitis/print#:~:text=Japanese%20encephalitis%20virus%20(JEV)%2C,on%20its%20frequency%20and%20severity.www.who.int/news-room/fact-sheets/detail/japanese-encephalitis
8. Tsai TF. Japanese encephalitis vaccines. 1990. [cited 2008 Jul 30]. Available from http://www.cdc.gov/ncidod/dvbid/pubs/je-pubs.htm
9. Waller, C.; Tiemensma, M.; Currie, B.J.; Williams, D.T.; Baird, R.W.; Krause, V.L. Japanese Encephalitis in Australia—A Sentinel Case. N. Engl. J. Med. 2022, 387, 661–662.
10. https://ncvbdc.mohfw.gov.in/index1.php?lang=1&level=2&sublinkid=5926&lid=3760
11. National Vector Borne Diseases Control Programme. Directorate General of Health Services. Ministry of Health and Family Welfare, Government of India, New Delhi. https://nvbdcp.gov.in/index1.php?lang=1&level=1&sublinkid=5773&lid=3693. Accessed 30 Sept 2022.
12. Vasanthapuram R, Shahul Hameed SK, Desai A, et al. Dengue virus is an under-recognised causative agent of acute encephalitis syndrome (AES): results from a four-year AES surveillance study of Japanese encephalitis in selected states of India. Int J Infect Dis. 2019;84: S19–S24. doi: 10.1016/j.ijid.2019.01.008.