

A Retrospectives Study of Seroprevalence of Japanese Encephalitis in Patients Attending Microbiology Department of MGM Medical College, Jamshedpur

Shubhashish Sircar¹, Kumar Vimal^{2*}, Akhouri Amitabh Chandra Srivastava³, Sujeet Kumar Satpathy⁴

¹Associate Professor, Department of Community Medicine, HMC, Hazaribagh, Jharkhand, India.

^{2*}Research Scientist I, MRU, MGM Medical College, Jamshedpur, Jharkhand, India.

³Professor, Department of Microbiology, MGM Medical College, Jamshedpur, Jharkhand, India.

⁴Laboratory Technician, MTMH, Jamshedpur, Jharkhand, India.

ABSTRACT

Background: Japanese Encephalitis is one of the most important causes of viral encephalitis worldwide, with an estimated 50,000 cases and 15,000 deaths annually. The present study was undertaken to investigate the Seroprevalence and Seasonal Trend of Japanese Encephalitis in Jamshedpur.

Methods: It was a hospital-based retrospective study conducted from August 2011 to December 2017. A total of 571 consecutive non-repetitive patients, satisfying the clinical case definition of JE as per the WHO guidelines, were included in the study. Cerebrospinal fluid (CSF) and serum samples were tested for JEV-specific IgM antibodies by the NIV JE IgM Capture ELISA Kit.

Results: Out of which 166/571 (29.07%) were JE positive diagnosed by IgM Mac ELISA antibody kit. We have observed that in a period of six years, the JE positivity rate has significantly reduced from 39.84% in 2011 to 7.29% in 2017.

Conclusions: A declining trend of JE was seen in this study, however further research work needs to be done to look for non-JE causes of JE. Surveillance & effective vaccination

should be carried out regularly for early detection of an impending outbreak and to initiate timely preventive and control measures.

Keywords: Japanese Encephalitis (JE), Seroprevalence, JE Seasonal Trend, Immuno Globulin Enzyme-Linked Immunosorbent Assay.


*Correspondence to:

Dr. Kumar Vimal,
Research Scientist-I,
Multi-Disciplinary Research Unit,
Mahatma Gandhi Memorial Medical College,
Dimna Road, Mango, Jamshedpur, Jharkhand, India.

Article History:

Received: 30-09-2019, Revised: 29-10-2019, Accepted: 28-11-2019

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.6.024	

INTRODUCTION

Japanese encephalitis virus (JEV) belongs to the family flaviviridae and genus flavivirus, a leading form of viral encephalitis worldwide. It was first reported from Japan in year 1943. The disease at present is reported from South Asia, South-East Asia, East Asia and the Pacific region.¹ Three billion people live in countries where JE virus is endemic.²

It is a single stranded, positive-sense polarity RNA genome of approximately 11 kb in length. The virion of JEV contains three structural proteins – nucleocapsid or core protein (C), non-glycosylated membrane protein (M), and glycosylated envelope protein (E), as well as seven non-structural (NS) proteins-NS1, NS2A, NS2B, NS3, NS4A, NS4B, and NS.³

In India JE Virus has been reported from different parts of the country.^{4,5} It was first isolated in humans in Vellore (North- Arcot) district of Tamil Nadu in 1955.⁶

Large outbreak occurred in the districts of Bankura and Burdwan in West Bengal in 1973.⁷ Since then, the virus is active in many parts of India and outbreaks have been reported from the states of Bihar, Uttar Pradesh, Assam, Manipur, Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu, Haryana, Kerala, West Bengal, Orissa and union territories of Goa and Pondicherry.⁸

The JEV is transmitted to vertebrates by mosquitoes. Mosquito transmission was suspected during the early 1930s; in 1938, Mitamura et al. reported isolation from *Culex tritaeniorynchos*.⁹ The ecology of JEV has come from various studies carried out in Japan by Scherer et al.¹⁰ The natural cycle of JE virus in Asia involves water birds and *Culex* mosquitoes. However, unlike many other mosquito-borne diseases, an amplifying host is important in the epidemiology of human JE. In Asia, pigs are considered to be

the most important amplifying host, providing a link to humans through their proximity to housing.¹¹ The life cycle of the virus is illustrated in Fig. 1. There are two epidemiological patterns of transmission: an endemic pattern in tropical areas with viral circulation in most months of the year, but with a broad seasonal peak, probably resulting from irrigation practices; and an epidemic pattern in more temperate areas with clear summer seasonality.^{12,13}

Japanese encephalitis disease is mostly children and young adults. Japanese encephalitis infection is most often asymptomatic. The first signs of infection appear after an incubation period between 6-14 days. It usually starts with a fever above 38°C, chills, muscle pain, and meningitis-type headaches accompanied by vomiting. The initial presentation in children usually begins with gastrointestinal symptoms: nausea, vomiting, and abdominal pains.

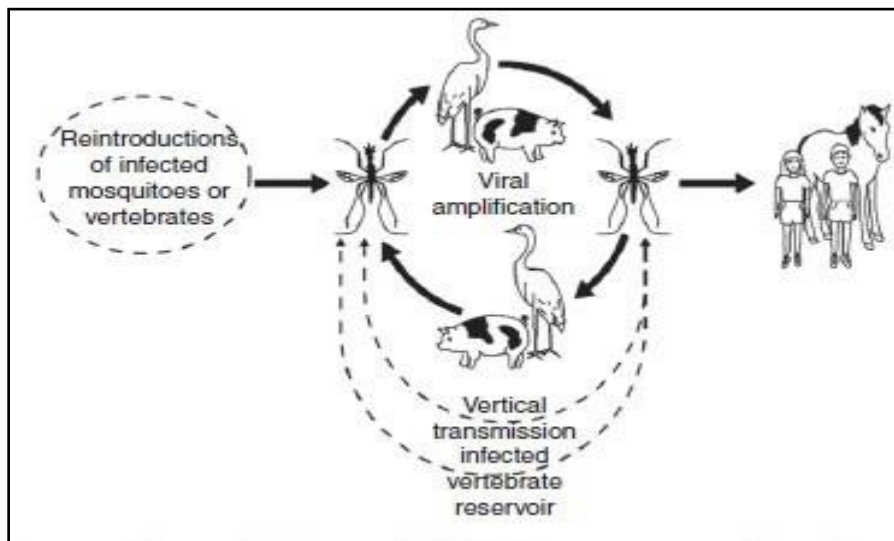


Fig 1: Transmission Cycle of Japanese encephalitis virus

OBJECTIVE

The present study was therefore undertaken to do a retrospective Study of Seroprevalence and trend of Japanese Encephalitis in Patients Attending Microbiology Department of MGM Medical College, Jamshedpur, India. There were very few studies on this matter and no such study were done in Kolhan region of Jharkhand

MATERIALS AND METHODS

Study Design: A retrospective observational study was conducted to find out Sero-prevalence and seasonal trend of Japanese encephalitis from July 2011 to June 2017 at a Virology unit in Microbiology Department, MGM Medical College, Jamshedpur, Jharkhand (India).

Setting: Virology unit in department of microbiology, Mahatma Gandhi Memorial Medical College and Hospital, Jamshedpur, was selected.

Participants: Indoor, outdoor patients and other government and private hospital suspected of Japanese encephalitis were selected.

Inclusion Criteria: Includes the clinical case as per WHO guidelines according to patients who present with fever, altered sensorium (including symptoms such as confusion, disorientation, coma or inability to talk), and/or new onset of seizures.¹⁴

Sample Collection: CSF and Serum samples were collected from all the 571 cases. In 308 numbers of cases only serum sample was received. CSF samples were collected in sterile vials. All the samples were tested for IgM antibodies by the National Institute of Virology (NIV) JE IgM Capture MAC ELISA Kit supplied by NVBDCP. If optical density (OD) value of sample tested exceeded the OD of negative control by a factor of 5, the sample was considered as positive.

Data Analysis: Data were entered in the Microsoft Excel software and was analyzed by and Microsoft Excel 2007.

Permission: Necessary Permission was sought prior to the conduction of the study.

RESULTS

Table 1 showed that In August 2011 to December 2011 total 42 cases were reported out of which 33.33% were found positive and 66.66% were negative. Most of the Japanese Encephalitis cases occurred at monsoon and post-monsoon period. (Figure 2 & 3)

Table 2 showed that In August 2012 to December 2012 total 10 cases were reported out of which 20% were found positive and 80% were negative. Most of the Japanese Encephalitis cases occurred at summer, monsoon and post-monsoon period. (Figure 2 & 3)

Table 3 showed that In January 2013 to December 2013 total 128 cases were reported out of which 39.84% were found positive and 60.15% were negative. Most of the Japanese Encephalitis cases occurred at Monsoon and post moon soon period. (Figure 2 & 3)

Table 4 showed that In January 2014 to December 2014 total 236 cases were reported out of which 37.28% were found positive and 62.71% were negative. Most of the Japanese Encephalitis cases occurred at monsoon and post monsoon period. (Figure 2 & 3)

Table 5 showed that In January 2015 to December 2015 total 59 cases were reported out of which 6.77% were found positive and 93.22% were negative. Most of the Japanese Encephalitis cases occurred at summer period. (Figure 2 & 3)

Table 6 showed that In year 2016-17 total 96 cases were reported out of which 7.29% were found positive and 92.70% were negative. Most of the Japanese Encephalitis cases occurred at summer and Post monsoon period. (Figure 2 & 3)

Table 1: Distribution of Japanese Encephalitis cases in year 2011

Year from August 2011 to December 2011	Sample no. %
JE Positive cases	14(33.33%)
JE Negative cases	28(66.66%)
Total	42

Table 2: Distribution of Japanese Encephalitis cases in year 2012

Year from August 2012 to December 2012	Sample no. %
JE Positive cases	02(20%)
JE Negative cases	08(80%)
Total	10

Table 3: Distribution of Japanese Encephalitis cases in year 2013

Year from January 2013 to December 2013	Sample no. %
JE Positive cases	51(39.84%)
JE Negative cases	77(60.15%)
Total	128

Table 4: Distribution of Japanese Encephalitis cases in year 2014

Year from January 2014 to December 2014	Sample no. %
JE Positive cases	88(37.28%)
JE Negative cases	148(62.71%)
Total	236

Table 5: Distribution of Japanese Encephalitis cases in year 2015

Year from January 2015 to December 2015	Sample no. %
JE Positive cases	04(6.77%)
JE Negative cases	55(93.22%)
Total	59

Table 6: Distribution of Japanese Encephalitis cases in year 2016-17

Year from January to December 2016-17	Sample no. %
JE Positive cases	7(7.29%)
JE Negative cases	89(92.70%)
Total	96

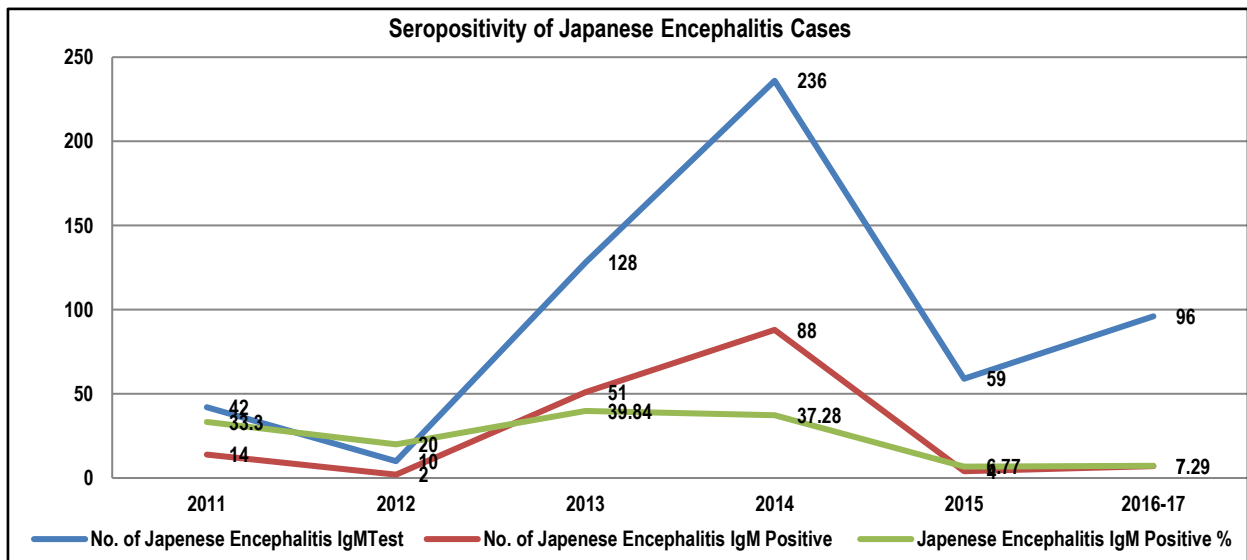


Figure 2: Seropositivity of Japanese Encephalitis Cases.

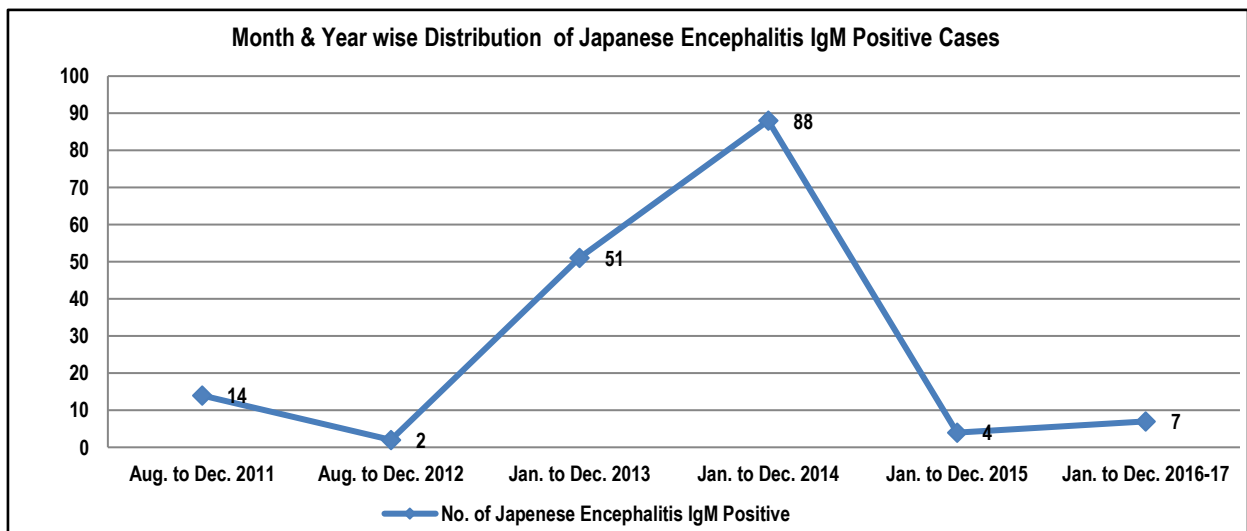


Figure 3: Month & Year wise distribution of Japanese Encephalitis Cases.

DISCUSSION

We have observed that period of six years, the JE positivity rate has significantly reduced from 39.84% in 2011 to 7.29% in 2017. In this study it was reported that a total of 571 sera samples from the patients clinically suspected with JE were collected from the year 2011 to 2017. Out of which 166/571 (29.07%) were JE positive diagnosed by IgM Mac ELISA kit.

Similar findings have also been reported. Fever, Sensorium and headache were the most predominant symptom. similar observation of other authors.¹⁵⁻¹⁸ Study carried out by (Sarkar *et al.*, 2012)¹⁹ another study in Assam, India, JE positive cases were found to be 33.6%.²⁰ In our study the incidence of JE was found to be more common in males compared to females, similar findings were also reported were JE cases were more prevalence in male as compare to female.²¹ Although studies have indicated that JE is more common in children as compared to early adulthood.²²

In northern Thailand the incidence has been estimated to be up to 40 per 1,00,000 for the ages of 5 to 25 declining to almost zero for those above 35.^{22,23} The incidence is lower among young children (<3 years old) than in older children possibly reflecting behavioral factors for example playing outside after dusk.²³ When epidemics first occur in new locations like Sri Lanka, India and Nepal, adults are also affected.²⁴ In northern India huge epidemics occur during the summer months and in southern India. JE tends to be endemic and cases occur sporadically throughout the year peaking at the start of the rainy season.

CONCLUSION

Japanese Encephalitis is a public health problem, etiology and epidemiology of which still are largely unknown, which critically challenges the scientific community. JE is emerging as a major health concern in Jharkhand. To The changing epidemiology particularly in the context of its varied etiology needs further research work. Prevention and control of JE may be possible only after developing a strong vigilance, awareness, vaccination of school going children together with a immunization program. Other measures include modified agricultural practices, pig vaccination, vector control, and improved living standards.

ACKNOWLEDGEMENT

We would like to thank to the Principal, Head of Department of Microbiology, faculty, and colleagues, the laboratory staff of the Department of Microbiology, MGM Medical College, Jamshedpur for Scientific & technical advice. We are grateful for the cooperation of those patients who participated in this study and also grateful to National Vector Borne Disease Control Programme, National Institute of Virology (NIV), Pune, India for supply of ELISA kits.

REFERENCES

1. Solomon T. Control of Japanese encephalitis– within our grasp. *New Engl Journal of Medicine*. 2006; 355:869-71.
2. United Nations. The United Nations urbanization prospects: the 2005 revision. POP/DB/WUP/Rev.2005/1/F1. New York: United Nations; 2005
3. Chambers TJ, Hahn CS, Galler R, Rice CM. Flavivirus genome organization, expression, and replication. *Annu Rev Microbiol*. 1990;44:649-88.

4. Dutta K, Rangarajan PN, Vрати S, Basu A. Japanese encephalitis: pathogenesis, prophylactics and therapeutics. *Current Science*. 2010; 98(3):326-34.
5. Dhillon GP, Raina VK. Epidemiology of Japanese encephalitis in context with Indian scenario. *Journal of the Indian Medical Association*. 2008; 106(10):660-3.
6. Webb JKG, Pereira SM. Clinical diagnosis of arthropod borne type viral encephalitis in children in North Arcot district, Madras state, India. *Indian Journal of Medical Science*. 1956; 10:572.
7. Banerjee K, Sengupta SN, Dandawate CN, Tongaonkar SS, Gupta NP. Virological and serological investigations of an epidemic of encephalitis which occurred at Bankura district, West Bengal. *Indian Journal of Medical Research*. 1976; 64:121-30.
8. Kabilan L, Rajendran R, Arunachalam N, Ramesh S, Srinivasan S, Samuel PP et al. Japanese encephalitis in India: an overview. *Indian Journal of Pediatrics*. 2004; 71:609-15.
9. Burke DS, Monath TP. Flaviviruses. In: Knipe DM, Howkey PM, editors. *Fields Virology*. 4th edition. Philadelphia, PA: Lippincott-Ravin Publishers; 2001;1043-1125.
10. Buescher EL, Scherer WF, Mc CH, et al. Ecologic studies of Japanese encephalitis virus in Japan. IV. Avian infection. *Am J Trop Med Hyg*. 1959;8:678-88.
11. Kabilan L, Rajendran R, Arunachalam N et al. Japanese encephalitis in India: an overview. *Indian J Pediatr*. 2004; 71: 609-15.
12. Vaughn DW, Hoke Jr CH. The epidemiology of Japanese encephalitis: prospects for prevention. *Epidemiol Rev*. 1992;14:197-221.
13. Mackenzie JS, Gubler DJ, Petersen LR. Emerging flaviviruses: the spread and resurgence of Japanese encephalitis, West Nile and dengue viruses. *Nat Med*. 2004;10 12 Suppl: S98-109.
14. World Health Organisation. WHO - Recommended Standards for surveillance of Selected Vaccine - Preventable Diseases. Geneva: WHO; 2003. Accessed on 12 June 2018. Available at: <http://apps.who.int/iris/bitstream/10665/68334/1/WHO-V-B-03.01-neg.pdf>,
15. Bandyopadhyay B, Bhattacharyya I, Adhikary S, Konar J, Dawar N, Sarkar J, et al. A comprehensive study on the 2012 dengue fever outbreak in Kolkata, India. *ISRN Virol*. 2013 Aug 7;2013.
16. Medhi M, Saikia L, Patgiri SJ, Lahkar V, Hussain ME, K Kakati S. Incidence of Japanese Encephalitis amongst Acute Encephalitis Syndrome cases in upper Assam districts from 2012 to 2014: A report from a tertiary care hospital. *Indian J Med Res*. 146, August 2017;267-71.
17. Patgiri SJ, Borthakur AK, Borkakoty B, Saikia L, Dutta R, Phukan SK. An appraisal of clinicopathological parameters in Japanese encephalitis and changing epidemiological trends in upper Assam, India. *Indian J Pathol Microbiol*. 2014; 57(3):400-6.
18. Phukan AC, Borah PK, Mahanta J. Japanese encephalitis in Assam, Northeast India. *Southeast Asian J Trop Med Public Health*. 2004;35:618-22.
19. Sarkar A, Taraphdar D, Mukhopadhyay BB, Kumar M, Mukhopadhyay SK, Chatterjee S. Influence of socio-economic status and environmental factors on serologically diagnosed Japanese encephalitis cases in the state of West Bengal, India during 2005-2010. *Health*. 2012; 4(1):6-12.

20. Borah J, Dutta P, Khan SA, Mahanta J. A comparison of clinical features of Japanese encephalitis virus infection in the adult and pediatric age group with Acute Encephalitis Syndrome. *Journal of Clinical Virology*. 2011;52(1):45-9.
21. Gogoi A, Panyang R, Baro L. Acute encephalitis syndrome in children with special reference to Japanese encephalitis: a retrospective analysis. *J Evolution Med. Dent. Sci.* 2016; 5(51):3289-94.
22. Hoke CH, Nisalak A, Sangawhipa N, Jatanasen S, Laorakapongse T, Innis BL, Kotchasene S, Gingrich JB, Latendresse J, Fukai K, et al. Protection against Japanese encephalitis by inactivated vaccines. *N Engl J Med*. 1988 Sep 8;319(10):608-14.
23. Richard A. Grossman, Robert Edelman, Douglas J. Gould. Study Of Japanese Encephalitis Virus In Chiangmai Valley, Thailand. *American Journal Of Epidemiology* 1973. 100(1); 69-76.
24. Umenai T, R Krzysko, TA Bektimiroc, FA Assaad. Japanese Encephalitis: current worldwide status *Bull world Health Organ* 1985; 63:625-31.

Source of Support: Nil.

Conflict of Interest: None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: Shubhashish Sircar, Kumar Vimal, Akhouri Amitabh Chandra Srivastava, Sujeet Kumar Satpathy. A Retrospectives Study of Seroprevalence of Japanese Encephalitis in Patients Attending Microbiology Department of MGM Medical College, Jamshedpur. *Int J Med Res Prof*. 2019 Nov; 5(6):100-04. DOI:10.21276/ijmrp.2019.5.6.024