

Geographical Distribution of Cases of Japanese Encephalitis in Bihar: A Hospital Based Study

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ABSTRACT

Introduction: The first clinical case of Japanese Encephalitis (JE) in India was revealed from Vellore in 1955, there had been many major JE outbreaks reported from 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. We studied geographical distribution of cases of Japanese Encephalitis in Bihar from the patients resident of Bihar reporting to Patna Medical College.

Materials and Methods: The present study was comprised of 304 cases of patients reported with symptoms of encephalitis and samples reaching from various areas of Bihar and was carried out in the department of Microbiology in Patna Medical college, Patna from 2009 to 2011 over a period of two years. Data so obtained were arranged accordingly to district or area wise, Urban and rural distribution, socioeconomic status, year wise and expressed as percentage and number as required using SPSS- 20.

Results: Patna and nearby area has maximum number of positive cases and also maximum number of patient investigated for JE is from Patna and nearby area. After Patna 2nd maximum number of positive cases belongs to Chhapra, after that maximum number of positive cases belong to Jamui.

The JE activity was significantly higher in rural population than the urban population. The JE activity was significantly higher in low and middle socio-economic group than high socioeconomic group.

Conclusion: Agricultural area was affected more from Japanese encephalitis than urban area. JE viral activity was present both in Urban and rural area. The activity was higher in rural population than the urban population ($p < 0.05$).

Keywords: Bihar; Japanese Encephalitis; Viral infection.

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INTRODUCTION

JEV is a member of the genus Flavivirus (family Flaviviridae) that is transmitted between birds, pigs, and some other domestic animals by Culex mosquitos. Humans are an incidental host, infected when living or passing in close proximity to this enzootic cycle.¹

The first clinical case of JE in India was revealed from Vellore in 1955,² there had been many major JE outbreaks reported from 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.^{3,4}

Kalimuddin MD et al⁵ examined serum samples from 404 pigs originating from eight districts of Bihar for haemagglutination-inhibiting and complement fixing antibodies of Japanese Encephalitis, Dengue-2, West Nile and Chikungunya viruses. Japanese Encephalitis viral infection was found to be widely prevalent compared to other arboviruses tested. Relatively large number of pigs had antibodies to JEV only (i.e. monoconverters).

High geometric mean titre to JEV was observed. These observations appear to be of epidemiologic significance to the 1978 epidemic of encephalitis in Bihar. Epidemic of encephalitis was reported in 1978 from several states of India including Bihar. The only evidence of the activity of Japanese Encephalitis in Bihar came from Khan et al⁶ who found neutralizing antibodies in ardeid birds from Asansol - Dhanbad regions. Hence, we studied geographical distribution of cases of Japanese Encephalitis in Bihar from the patients resident of Bihar reporting to Patna Medical College.

MATERIALS AND METHODS

The present study was comprised of 304 cases of patients reported with symptoms of encephalitis and samples reaching from various areas of Bihar and was carried out in the department of Microbiology in Patna Medical college, Patna from 2009 to 2011 over a period of two years. Patient having fever, headache, corrhiza or flue like illness during febrile and acute presentation of

symptoms of encephalitis like headache, nausea, diarrhea, vomiting, myalgia, irritable, altered behavior, convulsions and coma or difficulty of speech and other neurological deficits like ocular palsies, hemiplegia, quadriplegia, and extra pyramidal signs in the form of dystonia, choreoathetosis and coarse tremors were included in the study.

The collection, transport and storage of specimens were done according to the standard procedures followed at national institute of virology (NIV), Pune and were analysed for the IgM against Japanese encephalitis detection through ELISA. Data so obtained were arranged accordingly to district or area wise, Urban and rural distribution, socioeconomic status, year wise and expressed as percentage and number as required using SPSS- 20.

Table 1: District or area wise distribution of JE activity

Place	Positive	Percentage
Patna & near by	22	33.8
Vaisali	2	3.0
Buxar	3	4.6
Chhapra	9	13.8
Munger	1	1.5
Aurangabad	3	4.6
Samastipur	0	00
Bhojpur	0	00
Siwan	1	1.5
Betia	0	00
Jahanabad	3	4.6
Arah	1	1.5
Muzafferpur	0	00
Champaran	2	3.0
Motihari	1	1.5
Khauli	0	00
Deoghar	0	00
Rohtas	1	1.5
Lakhisarai	1	1.5
Nalanda	1	1.5
Madhubani	0	00
Khagaria	1	1.5
Begusarai	0	00
Sitamari	2	3.0
Jamui	7	10.7
Saharsa	1	1.5
Sheikhpura	0	00
Gaya	0	00
Nawadah	2	3.0
Gopalganj	0	00
Bhagalpur	0	00
Saran	1	1.5
Koderma	0	00
Bihar sarif	0	00

Table 2: Urban and rural distribution of JE activity

Population	Total	Positive	Percentage
Urban	170	26	15.29
Rural	134	39	29.1
	304	65	

RESULTS

The prevalence of JE activity was found in whole state with different frequency. But area around Patna showed high percentage because easy to reach PMCH ($P>0.05$). Table 1 shows that Patna and nearby area has maximum number of positive cases and also maximum number of patient investigated for JE is Patna and nearby area. After Patna 2nd maximum number of positive cases belongs to Chhapra, after that maximum number of positive cases belong to Jamui. All other district of Bihar are about to equal frequency of JE activity.

The prevalence of JE virus activity amongst the urban and rural population is shown in table 2. Out of 170 urban individual 26 (15.29) showed evidence of JE virus activity while out of 134 of rural individual 39 (29.1) showed JE virus activity. This suggested that although JE virus activity was present both in urban and rural area. The activity was significantly higher in rural population than the urban population.

The prevalence of JE virus activity amongst the low socio-economic group, middle socio-economic, high socioeconomic group population is shown in table 3. Out 164 low socio-economic group 44(26.82%) showed evidence of JE virus activity while out of 119 of middle socioeconomic group cases 20 (16.32%) showed JE activity and out of 21 of high socioeconomic group 1(4.74%) showed JE activity. This suggested that although JE virus activity was present in all group. The activity significantly was higher in low and middle socio-economic group than high socioeconomic group.

In year 2009 total investigated cases are 43 out of this 8(18.60) cases showed JE activity, in year 2010 out of 38 cases investigated only 1 (2.63%) case were positive, in year 2011 out of 223 cases investigated 56 (25.11%) cases are positive. This suggested that although JE virus activity was present in all the three year, the activity significantly higher in 2011.

Graph 1: Urban & Rural distribution of JE

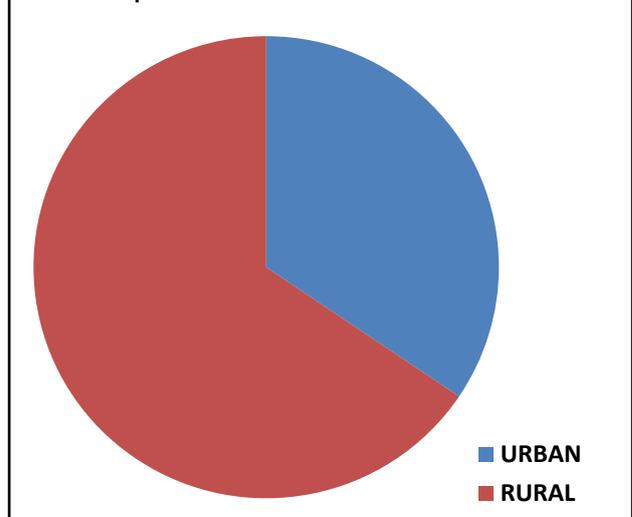


Table 3: Socio-economic wise distribution of JE cases

Group	Total	Positive	%
Low Income Group	164	44	26.82
Middle Income Group	119	20	16.8
High Income Group	21	1	4.74

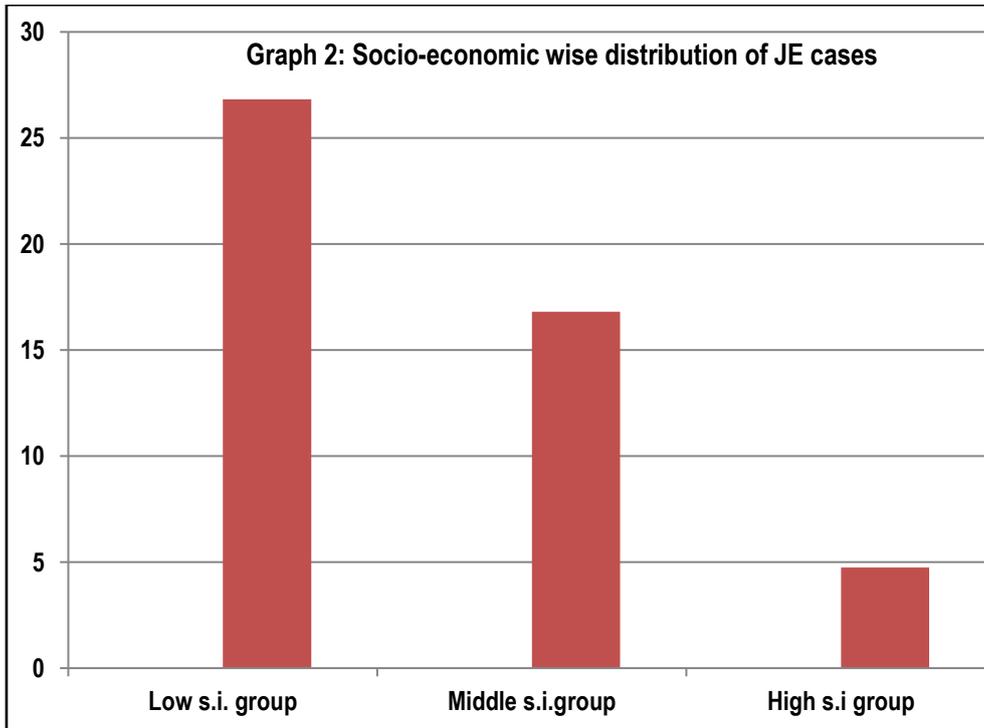
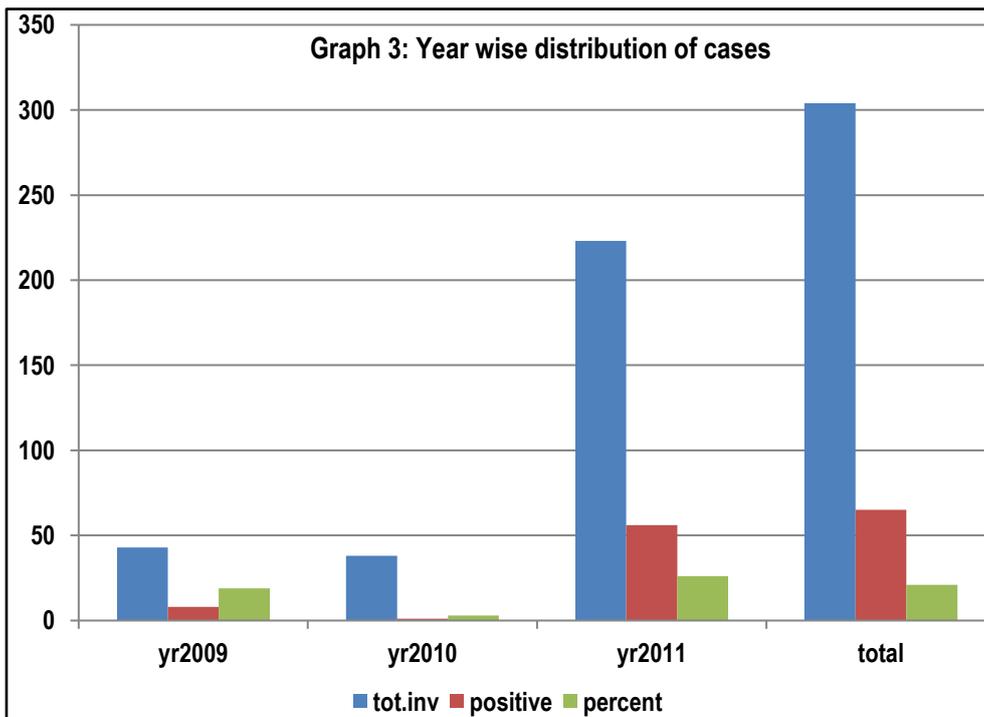


Table 4: Year wise distribution of cases

Year	Total investigated cases	Positive	Percentage
2009	43	8	18.6
2010	38	1	2.63
2011	223	56	25.11



DISCUSSION

Various study in Bihar regarding Japanese encephalitis revealed that Japanese encephalitis is prevalent continuously from past to present. Our study was commenced from July 09 during this year some patient shows JE activity and in 2010 suddenly down but again after one year incidence of JE activity suddenly increased during august and September 2011.

In India, JE is a major pediatric problem and epidemics are reported from many parts with about 65 cases reported between 1955 and 1966 in South- India.^{7,8} Many major outbreaks have been reported from various parts, predominantly in the rural areas. In 1973, the first major outbreak occurred in Burdwan and Bankura, the two districts of West Bengal with about 700 cases

and 300 deaths.⁹ Another outbreak in West Bengal occurred in 1976 with 307 cases and 126 deaths.^{8,10} Presently, JE is not only endemic in many areas; it is also spreading to non-endemic areas. Reuben and Gajanana¹¹ reported that JE has emerged as a major public health problem in Kerala. Epidemic of JE has occurred in Andhra Pradesh during October-November, 1999 affecting 15 out of 23 districts with 873 cases and 178 deaths¹² Also at the same time, 3 JE cases were reported for the first time from two villages in Tamil Nadu.¹³ Later, in July 2003 outbreak occurred in Andhra Pradesh.¹⁴ Several outbreaks are reported from Assam from August 2000-2002.¹⁵ In Northern part of the country, the disease was reported to occur between 1997 and 1981.¹⁶ An epidemic of viral encephalitis was reported in 2005 in Gorakhpur. It was the longest and most severe epidemic in 3 decades; 5,737 persons were affected in 7 districts of eastern Uttar Pradesh, and 1,344 persons died.^{8,17}

In our study in year 2009 out of 43 cases 8 cases were positive, in year 2010 out of 38 cases only one case were positive and year 2011 out of 223 cases, 56 cases were positive, cases were decreased in 2010 and again sudden rise of cases in 2011.

Out of 170 urban individual 26 (15.29%) showed evidence of JE virus activity while out of 134 of rural individual 39(29.1%) showed JE virus activity. This suggested that although JE virus activity was present both in urban and rural area. The activity was significantly higher ($p < 0.05$) in rural population than the urban population. Out of 164 low socio-economic group 44 (26.82%) showed evidence of JE virus activity while out of 119 of middle socioeconomic group cases 20 (16.32%) showed JE activity and out of 21 of high socioeconomic group only one (4.74%) showed JE activity. This suggests that although JE virus activity was present in all group. The activity significantly higher ($p < 0.05$) in low socio-economic group than other group.

Sero conversion against JE with an increase antibody titre is indication of JE virus activity in pigs, detection JE maternal antibodies in piglets, is an indication of an infected mother in past. Considering these criteria Baruah et al from studies in the sentinel pig suggested the seasonal activity of JE virus in north east region. They also observed JE activity in human population in India reaching peak in august /September and gradually declining the cases towards subsequent months. This timing can be correlated with human serologically proved JE cases in an around Dibrugarh district.¹⁸

An indirect immunofluorescent technique for rapid diagnosis of patients of Japanese encephalitis (JE) was developed by demonstrating the viral antigen in CSF cells. The CSF samples of 31 consecutive patients admitted with acute viral encephalitis during 1987 were studied. In 15 patients the diagnosis of JE virus infection was made on the same day. Classical techniques for virus detection and antibody serology were also conducted in these patients. The indirect immunofluorescence for JE virus antigen detection in CSF cells proved to be a rapid and simple procedure for making a quick diagnosis of infection.¹⁹

Correlation between the incidence of virologically confirmed cases of Patna Medical College hospital and this observation indicates the same. This may be due to the fact that most of the known and potential JE vectors breed abundantly in paddy field and fresh water. These sources are very common in villages of agriculture related area. It was expected that the attack rate in agricultural area will be more. This study reaffirm the fact that JE is more

prevalent in agriculture related area in district of Bihar and also have more prevalence of JE as determined by presence of antibody in them.

CONCLUSION

Agricultural area was affected more from Japanese encephalitis than urban area. JE viral activity was present both in Urban and rural area. The activity was higher in rural population than the urban population ($p < 0.05$).

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