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Prevalence of Japanese Encephalitis (JE) in Gondia District

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Abstract

Japanese encephalitis (JE) is one of the leading forms of viral encephalitis worldwide; mostly affecting children below 15 years of age.JE is a disease of major public health importance due to its high epidemic potential, high case fatality rate (CFR), and permanent neuropsychiatric sequelae among survivors. The most important vectors of JEV, such as Culex tritaeniorhynchus, commonly undergo larval development in rice fields in rural areas. Gondia is also known as "Rice City" of Central India is double crop rice growing District. In our study, the outbreak occurred at Selapur Village of Gondia District in the month of February where the density of mosquito of culex species was 6. Serum sample from total 22 suspected cases were tested for IgM ELISA, out of which 14 (63.63%) cases were positive. All cases were below the age of 15 years. Males were more affected than females. One death of 12 years Male was reported. Health system should be alert to prevent JE.

Keywords: *Japanese encephalitis (JE), Culex tritaeniorhynchus, Rice fields*

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Introduction

Japanese encephalitis (JE) is a common mosquito borne flaviviral encephalitis. It is one of the leading forms of viral encephalitis worldwide, mostly prevalent in eastern and southern Asia, covering a region with a population of over three billion. Most infections of JE are asymptomatic, but if clinical illness develops, it causes significant morbidity and mortality. Though under reported, JE causes an estimated 50,000 cases and 15,000 deaths annually. JE is a disease of public health importance because of its epidemic potential and high fatality rate. In endemic areas, the highest age-specific attack rates occur in children of 3 to 6 years of age.[1]

The infection causes a spectrum of clinical illness that begins with flu-like symptoms, neck stiffness, disorientation, coma, seizures, spastic paralysis and eventually death. JEV is one of the major public health problems not only because of a large number of deaths but also due to sever neuro-psychiatric sequelae that necessitates lifelong support amounting towards considerable socioeconomic burden.[2]

Japanese encephalitis virus is transmitted naturally between wild and domestic birds, and pigs by Culex mosquitoes—the most important for human infection being *Culex tritaeniorrhynchus* which breeds in pools of stagnant water (such as rice paddy fields). Pigs are the most important natural host for transmission to humans, because they are often kept close to humans, have prolonged and high viraemias, and produce many offspring—thus providing a continuous supply of previously uninfected new hosts. Humans become infected with Japanese encephalitis virus coincidentally when living or travelling in close proximity to the enzootic cycle of the virus. Epidemiological studies have shown that after the monsoon rains mosquitoes breed prolifically, and as their

numbers grow, so does their carriage of Japanese encephalitis virus and the infection rate of pigs. Human infection soon follows. [3]

JE is now an emerging viral disease having international importance because it is invading the previously non-endemic areas. JE was first recognized in India in 1955 and since then major outbreaks from different parts of the country have been reported predominantly in rural areas. So far, incidence of JE has been reported from 15 States including Maharashtra. During 2003-2004, JE cases were reported from Bhandara and Gondia districts of Maharashtra State for the first time (unpublished data).[4]

Japanese encephalitis (JE) distribution is significantly linked to irrigated rice production combined with pig rearing.[5]Gondia is also known as "Rice City" of Central India. Gondia district is a double crop rice growing District. So, we conducted this study to see the prevalence of Japanese encephalitis in Gondia District.

Materials and Methods

This study was conducted at Department of Microbiology, GMC, Gondia under NVBDC program. In Selapur Village, Devari Taluka, Gondia District, there was epidemic of JE in the month of February 2019. Serum samples from suspected cases of Japanese encephalitis were collected. Samples were sent to sentinel laboratory for JE at GMC, Nagpur. Positive cases were confirmed by IgM ELISA.

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 Program (NVBDCP), Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India. [6]

Vector density was calculated as the number of mosquitoes collected per man hour. Virus infection rate in mosquitoes was expressed as minimum infection rate (MIR) per 1000 females tested. [7]

MIR = Number of positive pools/Total number of mosquitoes tested × 1000.

Results

Selapur village is double crop rice growing village. First crop is grown from July to December and Second from January to April. In the month of February, total 22 cases were suspected. All cases were below the age of 15 years. The percentage of JE positivity was higher in males compared to females.

Table 1 shows distribution of positive and negative cases in males and females. As the village is double crop rice growing village, the density of mosquito increases from the month of November to February. Table 2 shows density of mosquitoes in the month of February in Selapur Village.

Table 1: Distribution of positive and negative cases (n=22,<15 yrs)

	Male	Female	Total
Positive	10 (83.33%)	04 (40%)	14
Negative	02 (16.64%)	06 (60%)	08
Total	12 (100%)	10(100%)	22

Graph 1: Sex wise distribution of positive and Negative cases

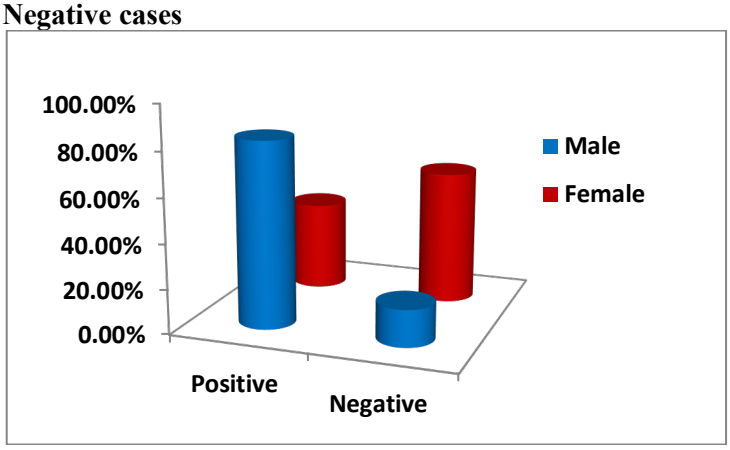
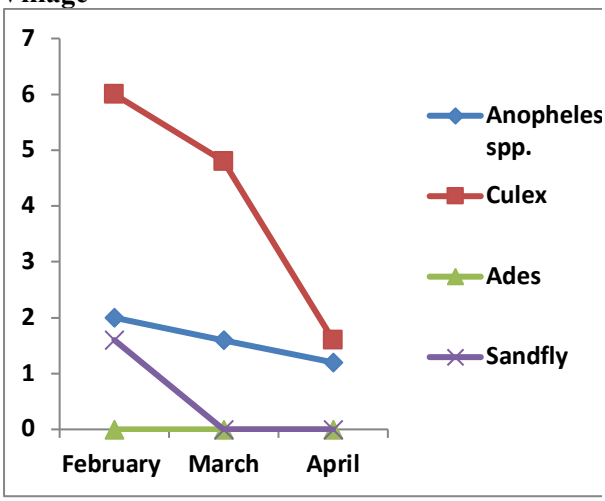


Table 2: Density of vectors in Selapur Village.

Month	Species of vector			
	Anopheles spp.	Culex spp.	Ades	Sand fly
February	2	6	0	1.6
March	1.6	4.8	0	0
April	1.2	1.6	0	0

Graph 2: Density of vectors in Selapur Village



Discussion

Although considered by many in the west to be a rare and exotic infection, Japanese encephalitis is numerically one of the most important causes of viral encephalitis worldwide, Most of China, Southeast Asia, and the Indian subcontinent are affected by the virus, which is spreading at an alarming rate.[3] The most important vectors of JEV, such as *Culex tritaeniorhynchus,* commonly undergo larval development in rice fields in rural areas.[8] In India, JE is a leading pediatric health issue and epidemics have been reported from many regions since 1955. The earliest evidence of JEV in India was obtained through the studies conducted in 1952.[9] Cross sectional serological surveys have shown that in rural Asia most of the population are infected with Japanese encephalitis virus during childhood or early adulthood.[10] In our study, all the positive cases were children less than 15 years of age. JE is mostly a disease of children and young adults. Rates of infection in the 3 to 15years age group are five to ten times higher than in older individuals, because of high background immunity in older individuals.[1] Serum sample from total 22 suspected cases were tested for IgM ELISA, out of which 14 (63.63%) cases were positive. Males were more affected than females. Our findings are similar to study by Medhi M, in which, although the percentage of JE positivity was higher in males (63.22%) compared to females (36.78%), the difference was not significant [11] One death of 12 years Male was reported. CSF IgM ELISA of this patient was negative. In our study, the case fatality rate was 4.54%. George et al; have reported 27.85% case fatality rate.[12] So in this study death rate is very low.

In our study, the outbreak occurred in the month of February where the density of mosquito of culex species was 6. The study by Medhiet.al; [11] showed clustering of cases in monsoon *i.e.*, starting from June, the peak was in July-August similar to other studies from Assam.[13,14] Studies from different states of India [15,16,17] also showed higher JE, positivity during rainy season because the paddy fields covered with stagnant water serves as good breeding environment for the vector.

Vaccination is the most cost-effective therapeutic intervention. Elimination of the virus is not possible, since, it is maintained in an enzootic cycle involving mammals and birds. Therefore, immunization is most effective for prevention and achieving long-term protection. Advancements in the availability and development of JEV vaccines have rejuvenated the scenario for JE control.[2]

Vector control is important in primary prevention. To control the vector population, classical methods such as insecticide and bed nets are widely applied in endemic areas.[18] In our study, in the month of February, Health services started fogging, spray insecticide in Selapur village, and the weather becomes dry in the month of March-April, density of culex mosquito falls down from 6 to 1.6. As the district is double crop growing, the density of culex mosquito might increase from the month of November to February, so there may chances be repeated outbreak. Hence the health system should be alert.

Conclusion

As the district is double crop growing, the density of culex mosquito might increase from the month of November to February, so there may chances be repeated outbreak. Hence the health system should be alert to prevent JE.

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