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A STUDY OF SEROPREVALENCE OF JAPANESE ENCEPHALITIS CASES IN A TERTIARY CARE HOSPITAL, CHANDRAPUR, MAHARASHTRA

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A B S T R A C T

Globally, arboviruses are the cause of viral encephalitis. Japanese encephalitis is common throughout India. Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Bihar, Assam, West Bengal, Karnataka, Goa, and Maharashtra are among the Indian states where cases have been documented. The current study intended to determine the prevalence of Japanese encephalitis in patients at a tertiary care facility who had received a clinical diagnosis of viral encephalitis. The disease was first identified in Nagpur (1952) which is closer to chandrapur, where it was found that an unidentified viral encephalitis, later identified as JEV, a flavivirus spread by mosquitoes, had killed about 16 people. In the current study, amongst 68 samples,7 males and 2 females were tested positive. In September month the highest number of suspected cases were noted. Children aged 1 to 5 accounted for most JEV-affected individuals, and as age increased, fewer seropositive instances were reported. In places affected by the JE epidemic, immunizations' crucial role might also be cross-checked. Therefore, it may also be advantageous to include the JE Vaccine in routine vaccination programs in places where JEV is an epidemic.

Keywords: flavivirus,Japanese encephalitis virus, IgM antibody capture ELISA.

INTRODUCTION

Many neurotropic viruses, including the Arbovirus, West Nile Virus, Japanese encephalitis virus, St. Louis encephalitis virus, and Herpes Simplex virus, are thought to be the causes of viral encephalitis all over the world.[1]The primary cause of metazoonotic viral encephalitis in several Asian nations is the Japanese encephalitis virus (JEV), a member of the flaviviridae family (genus Flavivirus).[2,3] The disease was first recognized in 1952 in Nagpur, Maharashtra when it was identified as JEV after 16 people died from an unidentified viral encephalitis. The current tragedies were reported closer to Chandrapur.[4] It is estimated that between 30,000 and 50,000 clinical cases of JEV occur annually, with a potential fatality rate of 10,000 to 15,000 fatalities.[5]It is more prevalent in rural regions like Chandrapur district and the surrounding residential areas where regular rice production is practiced.Three mosquito species have been found to transmit JEV cycles; Culex(Culex tritaeniorhychus and Culex vishnuii) is the most significant, followed by Anopheles and Mansoni.[6]Humans arethe "dead end" hosts, while pigs arethe natural reservoir and amplifier for the JE virus.Since crossreactions are the most noticeable and all flaviviruses share antigens, tests with the highest specificity are required.7Five to twenty-five percent of patients who seek medical assistance die from aseptic meningitis or encephalitis.[8,9]The incubation periodis one to six days or up to fourteen days.Illnesses can start suddenly, acutely (less than a day), subacutely (one to three days), or gradually (more than three days).In endemic locations, children under the age of 15 were primarily impacted.[10]It has been hypothesized that waning immunity or other agingrelated biological variables could be risk factors.[11,12]Vectorcontrol procedures are expensive, have limited utility, and are not operationally feasible. About onethird of people die from it, and a comparable percentage of those who recover become disabled.[13]Therefore, the current study is an important step in both diagnosing the diseases and preventing their future spread over the Indian subcontinentwhich will also help doctors fight this metazoonotic illness.

MATERIAL AND METHODS:

The department of microbiology of the Govt. Medical College in Chandrapur (MH) conducted the current retrospective s tudy.For this investigation, all serum samples from clinically suspected JE patients obtained from GMC, Hospital Chandr apur, and the surrounding area of Chandrapur district were taken into consideration.Age, gender, address, and other demo graphic information were recorded, as well as the patient's date of admission, clinical history, symptoms, signs, and samp le collection.The National Institute of Pune (MH) supplied the necessary kitsand test results, and the received samples we re processed using JEVIgGIgM capture ELISA (Mac ELISA) for IgG and IgM antiJEV antibody.The test was conducted and analyzed in accordance with the World Health Organization's criteria.[14,15]The Mindray micro plate reader type MR96 A, manufactured by Shenzhen Mindray biomedical electronics in Shenzhen, China, was the ELISA apparatus that was uti lized.The test results were examined in accordance with the literature that was supplied, and the information gathered wa s used to determine the seroprevalence of JEV in the Chandrapur district.

RESULTS

In the microbiology lab, 68 samples from probable JEV patients were processed. Amongst 68 samples, 09(13.23%) were determined to be positive for JEV on ELISA. Out of the entire population being studied, 42(61.76%) were men and 26(33.82%) were women. Of these, 7 malesand 2 females tested positive. The majority of suspected caseswere seen in post monsoon period.With the current situation

The formula to determine the prevalence of JEV in the Chandrapur district's population is:

Prevalence of JEV = total number of positive cases ÷ sample size under observation × 100.

The prevalence of JEV during 2021,is therefore 27.87% and during 2023 is 7.14%.

Prevalence in the female population was found to be 6.69%, while in the male population it was 22.32%.

According to the Table 4 given

below, the majority of JEVaffected individuals were found in youngsters aged 1 to 5 years, and as those ages increased, fewer seropositive instances were noted.

Table 1. Monthly distribution of JEV reports amongst males and females in the year 2021:

Sr.No	Month	Totaltestedsamples			Positive	samples
		Tested	Negative	Positive	Males	Females
1.	Jan 21	Nil	Nil	Nil	Nil	Nil
2.	Feb 21	Nil	Nil	Nil	Nil	Nil
3.	Mar 21	Nil	Nil	Nil	Nil	Nil
4.	Apr21	Nil	Nil	Nil	Nil	Nil
5.	May 21	Nil	Nil	Nil	Nil	Nil
6.	Jun21	01	00	01	01	00
7.	Jul 21	07	06	01	01	00
8.	Aug21	08	07	01	01	00
9.	Sept21	07	05	02	01	01
10.	Oct 21	09	07	02	02	00
11.	Nov21	Nil	Nil	Nil	Nil	Nil
12.	Dec 21	Nil	Nil	Nil	Nil	Nil
	Total:	32	25	07	06	01

Table 2. Monthly distribution of JEV reports amongst males and females in the year 2022:

Sr.No	Month	Total tested samples			Positive	samples
		Tested	Negative	Positive	Males	Females
1.	Jan 22	Nil	Nil	Nil	Nil	Nil
2.	Feb 22	Nil	Nil	Nil	Nil	Nil
3.	Mar 22	Nil	Nil	Nil	Nil	Nil
4.	Apr22	Nil	Nil	Nil	Nil	Nil
5.	May 22	Nil	Nil	Nil	Nil	Nil
6.	Jun22	Nil	Nil	Nil	Nil	Nil
7.	Jul 22	05	05	00	Nil	Nil
8.	Aug22	01	01	00	Nil	Nil
9.	Sept22	02	02	00	Nil	Nil
10.	Oct 22	Nil	Nil	Nil	Nil	Nil
11.	Nov22	Nil	Nil	Nil	Nil	Nil
12.	Dec 22	Nil	Nil	Nil	Nil	Nil
	Total:	08	08	00	Nil	Nil

Table 3. Monthly distribution of JEV reports amongst males and females in the year 2023:

Sr.No	Month	Totaltestedsamples			Positive samples	
		Tested	Negative	Positive	Males	Females
1.	Jan 23	Nil	Nil	Nil	Nil	Nil
2.	Feb 23	Nil	Nil	Nil	Nil	Nil
3.	Mar 23	Nil	Nil	Nil	Nil	Nil
4.	Apr 23	Nil	Nil	Nil	Nil	Nil
5.	May 23	02	02	00	Nil	Nil
6.	Jun23	Nil	Nil	Nil	Nil	Nil
7.	Jul 23	Nil	Nil	Nil	Nil	Nil
8.	Aug23	10	10	00	Nil	Nil
9.	Sept23	14	12	02	01	01
10.	Oct 23	Nil	Nil	Nil	Nil	Nil
11.	Nov23	Nil	Nil	Nil	Nil	Nil
12.	Dec 23	02	02	00	Nil	Nil
	Total:	28	26	02	01	01

Table 4: Agewise distribution of JEV affected population in tertiary care centre at Chandrapur 2021 to 2023

Age group	**No. of Patients**	**JEV Positive cases**	**JEV Negative cases**
1 to5years	17	04	13
6 to10years	12	02	10
11 to15years	15	00	15
16 to25years	13	02	09
26 to50years	09	01	08
>50years	02	00	04

DISCUSSION

Japanese Encephalitis is one of the leading causes of Acute Encephalopathy, affecting children and adolescents in Tropical and Sub – tropical Asia. Japanese encephalitis virus (JEV) is an important cause of encephalitis in most of Asia, with high case fatality rates and often significant neurologic sequelae among survivors. Epidemic outbreaks of Japanese Encephalitis continue to pose a significant public health problem in most parts of India, especially in the Southern states. A fatal illness spread by a vector by obtaining the medical histories of the admitted patients and their parents, it was determined that Culex mosquitoes are the primary vector of JEV transmission. The diagnostic criteria for Japanese Encephalitis which was adopted in this study was the demonstration of the IgM antibodies.

The JE virus is particularly common in rural areas where irrigated rice fields attract the natural avian hosts and provide abundant breeding site for the vector.

The open sewage systems in Chandrapur city and the rice fields nearby may be to blame for this effect, which encourages mosquito proliferation. Smogging, upkeep, and effective pest control in the epidemic areas could be the answers to the issue. According to the current study, the first known JEV eruption occurred in Nagpur, where it claimed over a dozen lives and caused a serological survey disaster in the 1950s. [16,17]West Bengal experienced the next JEV eruption in 1973, and other states in the nation followed suit.[18,19,20,21]A serious JE outbreak with 5,700 cases and 1,315 fatalities occurred in Uttar Pradesh in 2005, following an incident in 1978 in North India.[22,23]Despite viruses being the most significant pathogens that produce infectious frequencies, they were found to be more prevalent in youngsters aged 1 to 3 years, who are thought to be easy prey for mosquitoes.Similar findings were noted by Phukan AC, Sarkar A, and Bandopadhyay B.[3,24,]25In north and northeastern India, hospital-based acute encephalitis syndrome (AES) surveillance revealed that 25% of patients tested positive for JE, which was most common in youngsters. In Tamil Nadu, a southern Indian state, the estimated incidence rate of JE in children aged 5 to 9 was 15 per 100,000. Up to 70.7% of the cases had a JEV infection rate. The current investigation showed similar findings.

The present study revealed significant number of JE cases in the postmonsoon season which is similar to the findings of higher incidence of JE during similar months.[22]This can be explained by the fact that the Culex mosquitoes breed abundantly in the paddy fields covered with stagnant water during the rainy season.

From the current study, we have observed that over the period of three years, the JE prevalence rate has significantly reduced from 21.87% in 2021 to 7.14% in 2023. Similar findings have also been reported.[21,22] Reason for this may be better awareness programs, strengthening of laboratory services, mass vaccination or simply due to herd immunity. According to some authors, there has been a changing epidemiological trend of flavivirus mediated diseases from JE to dengue in recent years possibly due to increased urbanisation of the remote villages.[21,23,24]In current study the JEV prevalence of 2021 is 21.87% and in 2023 is 7.14% may be a favorable risk factor for "summer abortion," which may be

brought on by "reported presence of mosquitoes," "lower elevation," or bore wells acting as a water cradle, as discovered by Thakur KK. Additionally, they stated that JEV is probably present in Nepal's mountain regions and should be regarded as dangerous for both domestic residents and tourists.[26]Since the majority of the illnesses in our study were found in patients who were not vaccinated, human blood or CSF should be the reservoir source from which isolation proper care of opportunistic infections is crucial.[27]Therefore, in order to lower the disease's fatality rate, it is highly advised that the JE Vaccine be included in regular vaccination programs in places where JEV is an epidemic.[5]

CONCLUSION

All age groups were affected by the sporadic character of the disease, however children accounted for 8% of the cases brought to our hospital throughout our study. Japanese encephalitis had a 12.5% fatality rate. In the Japanese encephalitis cases that survived, no sequelae were noted. There isn't a specific antiviral treatment for Japanese encephalitis. The precise aetiological diagnosis of Japanese encephalitis patients aids in patient care procedures and prevents needless antiviral medication use.

Supportive and symptomatic treatment is necessary for encephalitis cases caused by the Japanese encephalitis virus, as ac yclovir medication has not been shown to be beneficial in these cases.As a result, the management approach was limited t o control the temperature, sedation, seizures, increasing intracranial pressure, and fluid and electrolyte balance.

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