



Research Article

Study of Zika virus epidemic in Jaipur, Rajasthan

Authors

Pragya Kumawat¹, Kusum Gaur², Sadhana Meena^{3*}

^{1,3}Postgraduate, Department of Community Medicine

²Senior Professor, Department of Community Medicine

Sawai Man Singh Medical College and Hospitals, Jaipur, Rajasthan

*Corresponding Author

Dr Sadhana Meena

Address: d-121, Krishna Marg, Siwar Area, Bapunagar, Jaipur, India

Abstract

Background: First epidemic of Zika Virus in India occurred in Gujarat in November 2016, with that it becomes a new emerging disease in India. In Rajasthan 1st epidemic of Zika Virus emerged in September-October 2018. This present article is about that epidemic.

Method: Index case was reported on 21.09.18 who resided in Shastrinagar colony, Jaipur Rajasthan. Three Km area around index case was surveyed. Ward number 82 was of one that area. Door to door survey was conducted in the ward to identify fever cases, pregnant women and breeding habitats of mosquitoes. Vector indices like House Index (H.I.), Breteau Index (B.I.) and Container Index (C.I.) were calculated. Anti larval & anti adult mosquito measures were taken. Blood & urine sample of all the symptomatic fever cases & pregnant women were collected & send to S.M.S. Medical College for Zika Virus testing.

Results: In total 405 houses in ward 82, 2009 containers were found & out of them larval breeding was observed in 101 containers of 80 houses. Total 38 cases of fever & 28 pregnant women were found. All pregnant women & symptomatic fever cases were investigated for presence of Zika Virus infection. Among them 2 females with 6 and 8 months pregnancy and 1 case of fever were found positive. The BI, CI, HI were 24.94%, 5.03% & 19.75% respectively.

Conclusion: As vector indices were raised than expected level, so awareness regarding mosquito breeding places & proper water storage in houses should be created. In pregnant women, 7.14% was found positive for Zika Virus infection. Zika Virus causes serious complications in pregnancy, so all pregnant females may be screened out for Zika Virus and should managed accordingly.

Keywords: Zika Virus, Zika Virus Infection, Pregnancy, Fever, Epidemics, Breeding.

Introduction

Zika virus is an arbovirus which belongs to family flaviviridae and is closely related to yellow fever, Japanese encephalitis, dengue, and West Nile viruses¹. It was first isolated from febrile sentinel Rhesus monkey in Zika forest of

Uganda in 1947². Although it is mainly transmitted by bite of Aedes mosquito species², several other routes are also described in literature such as sexual³, intrauterine⁴, blood transfusion & breast milk²⁻⁵.

In 80% of the cases, infection is asymptomatic & if symptoms occur they are non-specific & self limiting¹. For clinical diagnosis, following criteria is considered- presence of maculopapular rash along with at least two of the following symptoms- low grade fever, non-purulent conjunctivitis, polyarthralgia, and periarticular edema⁵. Laboratory confirmation can be done by RT-PCR of acute phase serum¹.

Although the major complications of infection in adults is neurological such as Guillain-Barre Syndrome, meningoencephalitis & meningitis² but Zika is mainly known for its major impact on pregnancy i.e. microcephaly in fetus⁵.

As there is no specific treatment or vaccine available for Zika infection, limiting its transmission by vector control is the only option available to prevent further outbreaks of infection. Since 2017, Zika has become an emerging health problem in India with its first outbreak in Gujarat & then in Chennai^{6, 7}. In September 2018, Zika resurfaced third time in India, with reporting of maximum number of cases. This cross-sectional study is about the various measures taken during the epidemic to limit the spread of infection & increase awareness among people about Zika virus.

Materials & Methods

Study Site, Design & Period

The first case of epidemic was found on September 22, 2018, in Shastrinagar colony of Jaipur, Rajasthan, which was confirmed serologically by Microbiology laboratory of S.M.S Medical College & National Institute of Virology (NIV), Pune. State team visited the house of the case & confinement measures were taken immediately which included house to house search for fever & pregnancy cases, pyrethrum focal spray & fogging around the area of index case.

Mapping of the affected area was done which included 3km area around the index case. It covered eight wards (division as per Jaipur Municipality) of the city. With the positive cases

in other areas, 6 more wards were included, & in all these wards intensive house to house surveillance was done by team of medical and paramedical persons.

Zika Virus Survey

Ward no. 82 was selected for study by simple random sampling method. In this ward, house to house survey was done by team of Resident doctors of department of PSM, SMS Medical College. The survey included active surveillance for fever cases, pregnant women & identifying mosquito breeding sites & mosquito larvae. Blood & urine sample of all the pregnant women & fever cases with symptoms similar to Zika virus infection was taken & send to SMS medical college for further testing.

Entomological surveillance & vector management

All the houses were inspected thoroughly from inside & outside for presence of any possible water holding containers with immature stages of mosquitoes. Various Entomological Indices were calculated. These containers were emptied & discarded & those which cannot be emptied were treated with Temiphos. Indoor residential and space spraying with pyrethrum extract & outdoor fogging with Cyphenothrine 5 EC (Dose:- 7 mL/L diesel) in affected area was done with the co-operation of Jaipur Municipality. IEC of the residents of the affected area was done about Zika virus infection & proper water storage practices.

Entomological indices

From surveyed houses regular entomological surveillance data was collected to calculate vector indices like House index (HI), Container index (CI) & Breteau index (BI) for accessing the magnitude of problem & effect of confinement measures taken. These indices were calculated with the help of following formulae-

House Index (HI)= Number of house found infested x 100/Number of house inspected

Container Index (CI)= Number of containers found positive x 100/Number of containers inspected

Breteau index (BI)= Number of containers found positive x 100/Number of house inspected

Isolation of positive cases

All the cases tested positive were kept in isolation ward for 1 week from the date of laboratory confirmation. The patient and the medical staff of the ward was provided with mosquito repellents & LLIN & the all the anti larval& anti adult mosquito measures were taken to prevent further transmission of the infection from cases.

Results

Total 405 houses of ward 82 were randomly surveyed, from both inside & outside by the team during the epidemic, out of these houses, 80 houses (19.75%) had larval breeding in various containers. Out of 2009 water holding containers that were inspected during the survey, 101 containers (5.03%) were found to be infested by mosquito larvae. Entomological indices were calculated as House Index (HI) 19.75, Container Index (CI) 5.03 and Breteau Index (BI) 24.94. (Figure 1-3)

During surveillance 38 cases of fever & 28 pregnant women were found. All the pregnant females & symptomatic fever cases were further investigated. Out of 28 pregnant women, 2 females with 6 & 8 months pregnancy was found positive for Zika virus infection & out of 38 symptomatic fever cases, 1 was tested positive for Zika virus. (Table 1)

Figure 1: House Index (HI)

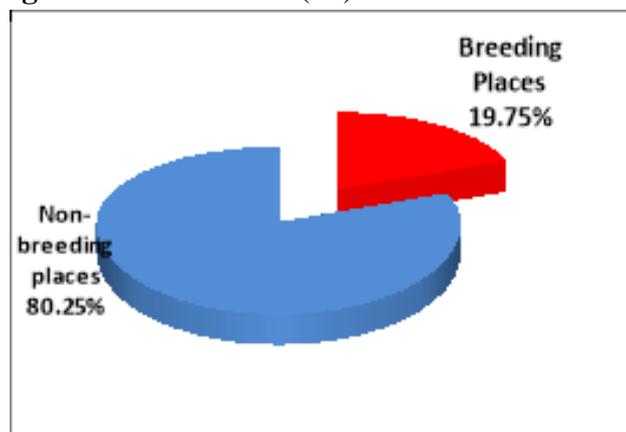


Figure 2: Container Index (CI)

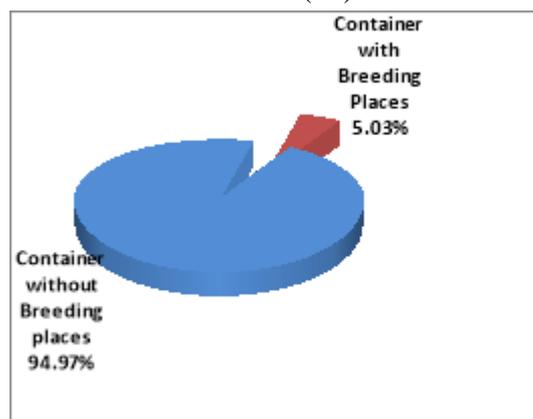


Figure 3: Breteau Index (BI)

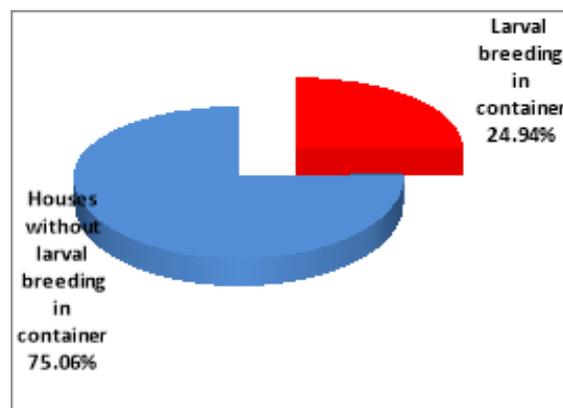


Figure 4 Zika Positives in Pregnant Females and Fever Cases

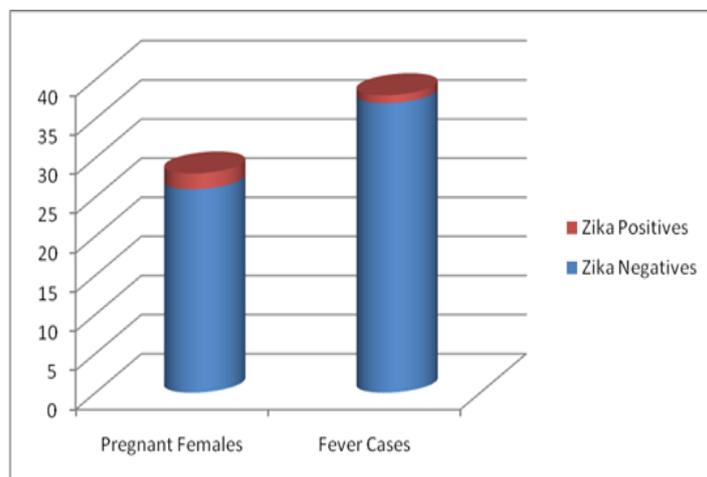


Table 1 Zika Positives in house to house survey in study area

S. No.	Type surveyed Persons	Total	Zika Positives	
			Number	Percentage
1	Pregnant Females	28	2	7.14
2	Fever Cases	38	1	2.63

Discussion

With first two epidemics in Gujarat & Tamil Naidu, Zika virus infection again reported third time in less than two years in India⁶ & has become an emerging disease in India. In recent epidemic in Jaipur, 159 cases were reported in 38 days by active & passive surveillance & no mortality was reported. During the epidemic, BI & HI observed in the study area were 24.94 & 19.75 respectively. Almost similar observations were made by Nand Kishore et al.⁸ who reported BI and HI 20 & 25 respectively in their study. As the indices in present study area were above the threshold of 5% for the BI & HI & 3% for CI, the area is at high risk for transmission of arbovirus⁹. Therefore, there is an immediate need for vector control measures to be taken to prevent further outbreaks in future.

During the survey, one case of fever was found positive for Zika virus infection who should be followed for other complications of Zika. Guillain-Barrésyndrome (GBS) is associated with Zika virus infection, although exact mechanism by which Zika virus causes GBS is not clear but studies suggested that the virus could exacerbate the immune response triggering an immunopathogenic process that in turn determines early onset of GBS.¹⁰

Also, the study showed presence of Zika virus infection in two females with 6 & 8 months old pregnancy. These Zika positive pregnancies should be followed for any miscarriage or congenital effect which may occur because of complications of Zika virus in pregnancies. Zika virus has devastating effects on the foetus as supported by the study done by Schuler-Faccini et al.¹¹ & Oliveira- Szejnfeld PS, et al.¹¹. Zika virus has tropism for neural precursor cells, thus affects normal development of fetal brain¹². There is greater risk of congenital malformations, when the infection occurs in first trimester^{11,13}. A significant increase in the cases of microcephaly occurred in Brazil in the areas with high Zika virus infection hypothesized the correlation b/w these two diseases⁵.

Conclusion

As vector indices in the affected area were raised than expected level, so awareness regarding mosquito breeding places & proper water storage in houses should be created. Of total identified pregnant women, 7.14% were found positive for Zika Virus infection. As Zika Virus causes has serious complications such as microcephaly or congenital Zika syndrome in fetus, so all pregnant females may be screened out for Zika Virus and should managed accordingly. Awareness regarding Zika virus & its effects in the community should be raised. Zika has become an emerging health problem in India & it requires immediate attention with collaboration between government, public health care system and the community.

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