

Brief Epidemiological Report on Chikungunya Outbreak in Bihar, India in 2017: Implications for Control

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: The present study was done to identify the epidemiology of the disease outbreak in Bihar in 2017 and suggest remedial measures for the prevention of possible future outbreaks of Chikungunya.

Study Design: Daily reports on Chikungunya were collected in prescribed format from the District Surveillance Unit, Integrated Disease Surveillance Programme (IDSP) that included case details from Govt. Medical Colleges and various Private Hospitals in the State.

Place and Duration of Study: Index case of Chikungunya was reported in Bihar, India on 15 Feb 2017. After that, few scattered cases were reported till 23 Aug 2017. Cases started increasing from 24 Aug 2017 onwards. From 15 Feb till 31 Dec 2017, total 1223 cases were reported from 32 districts in Bihar.

Methodology: The cases were analysed concerning time, place and person. Daily reporting on the health conditions of the cases and the status of the control measures like fogging and larvicidal spray in the affected area was monitored at the State level.

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Results: Case Fatality Rate (CFR) due to the disease was Nil in the State. The outbreak peak laid from 3-Nov to 12-Nov when 218 cases were reported. Out of 1223 cases, 100% cases were ELISA confirmed. Almost all age groups were affected, but the frequency was greater in the age group 21-30 (25%)> 31-40 (21%)>11-20 (19%). Males (61%) were more affected than females (39%). Out of the total 1223 cases, 100% of the cases were reported from Govt. institutions. State Health Department, Govt. of Bihar took many measures to limit the outbreak, and through strengthening the surveillance and response activities, transmission of the disease was curtailed in the State.

Conclusion: Patna district was most affected followed by Nalanda and Vaishali. Young adults of age group 21-30 were most affected. Males were more affected than females.

Keywords: Chikungunya; case fatality rate; surveillance; ELISA.

1. INTRODUCTION

In India, Chikungunya outbreak was first reported in 1963 from Calcutta in Sarkar [1]. Dengue and Chikungunya were found circulating together. The mosquito-borne viral disease Chikungunya has affected more than 1 million people worldwide in epidemic outbreaks since 2005 which seem to have originated in the Kenyan coastal towns of Lamu and Mombasa [2]. Outbreaks of Chikungunya fever was also reported from Italy [3,4] Mauritius [5,6,7] and from reunion island Josserean et al. 2006. From February 2006 to 10 October 2006, the WHO Regional Office for South-East Asia reported 151 districts in 8 states/provinces of India affected by Chikungunya fever. The affected states were Andhra Pradesh, Andaman and Nicobar Islands, Tamil Nadu, Karnataka, Maharashtra, Gujarat, Madhya Pradesh, Kerala and Delhi. More than 1.25 million suspected cases were reported from the country, of which 752,245 were from Karnataka and 258,998 from Maharashtra provinces. In some areas reported attack rates reached 45%. Chikungunya is an acute viral infection transmitted to humans through the bite of an infected adult female *Aedes aegypti* mosquito which usually bites during daylight hours [8]. However, from 2004 to 2005, a large epidemic spanned an area of Kenya over to the southwestern Indian Ocean region, India, and Southeast Asia was found to be before the developing the mechanism of the above disease. Identified in 2005, the E1 glycoprotein A226V mutation of the East/Central/South Africa genotype conferred enhanced transmission by the *A. albopictus* mosquito and has been implicated in CHIKV's further spread in the last decade. The arthritic symptoms are associated with *Chikungunya* can be debilitating and may persist for months or even years in some patients. *Ae. albopictus* is more susceptible and has a greater ability to transmit the virus vertically than *Ae. Egypt*. This knowledge would

be useful for risk assessments of the maintenance of CHIKV in nature, which is crucial for disease surveillance, vector control and the prevention of potential CHIKV epidemics.

It is characterised by sudden onset of fever, chills, headache, nausea, vomiting and severe joint pain with or without swelling, low back pain and rash. The incubation period is usually 2-3 days but can range from 1-12 days [8]. These symptoms are usually self-limiting and rarely fatal. In Bihar, first ever Chikungunya fever outbreak was reported from Nalanda district in September 2011. After that recurring outbreaks are being reported in the State. The present study was done to identify the epidemiology of the disease outbreak in Bihar in 2017 and suggest remedial measures for the prevention of possible future outbreaks of Chikungunya.

2. MATERIALS AND METHODS

2.1 Case Definition

Standard Case definition as prescribed by NVBDCP, Govt. of India was used to identify the cases as mentioned below:

Probable or suspected case: An acute illness characterised by sudden onset of fever with any of the following symptoms: a headache, backache, photophobia, severe arthralgia and rash.

Confirmed (definitive) case: A patient meeting both the clinical and laboratory criteria,

A case compatible with the clinical description of chikungunya fever with at least one of the following: Demonstration of IgM antibodies by IgM antibody capture ELISA in a single serum sample; Detection of viral nucleic acid by PCR;

Isolation of chikungunya virus from a clinical specimen.

Further differential diagnosis: For the confirmation of Chikungunya was done as Fever with or without arthralgia is a very common manifestation of several other diseases like Dengue Fever, Malaria, Leptospirosis, Enteric Fever, Rheumatic Fever, Reactive arthritis, Serum sickness illness, Rickettsial disease etc. Due to the similarity in symptoms of Dengue and Chikungunya, the majority of the clinicians underreport Chikungunya cases when compared to Dengue. Therefore, the following criteria were used for differential diagnosis of Chikungunya cases

Sl. no.	Features	Chikungunya	Dengue
1.	Fever Onset Duration	Acute 2-4 days	Gradual 5-7 days
2.	Rash	Maculopapular	Petechiae maculopapular
3.	Arthralgia Frequency Duration	Frequent May last longer than a month	Less common Short duration
4.	Hypovolaemic shock	Rare	Common
5.	Leukopenia	Common	Infrequent
6.	Thrombocytopenia	Infrequent	Common
7.	Haematocrit	Normal	High

2.2 Data Collection

Daily reports on Chikungunya were collected in prescribed format from the District Surveillance Unit, Integrated Disease Surveillance Programme (IDSP) that included case details from Govt. Medical Colleges and various Private Hospitals in the State.

2.3 Data Analysis

The cases were analysed concerning time, place and person. Daily reporting on the health conditions of the cases and the status of the control measures like fogging and larvicidal spray in the affected area was monitored at the State level.

3. RESULTS AND DISCUSSION

The index case of Chikungunya was reported on 15 Feb 2017. After that, few scattered cases were reported till 23 Aug 2017. Cases started increasing from 24 Aug 2017 onwards. From 15 Feb till 31 Dec 2017, total 1223 cases were reported from 32 districts in Bihar. 1 case each was also reported from Jharkhand & UP. District most affected was Patna (1081 cases that represented 88% of the overall reported cases) > Nalanda (26 cases that represented 2% of the overall reported cases) and Vaishali (24 cases that represented 2% of the overall reported cases).0.40% of the cases were migratory. Case Fatality Rate (CFR) due to the disease was Nil in the State. The outbreak peak laid from 3-Nov to 12-Nov when 218 cases were reported. Out of 1223 cases, 100% cases were ELISA confirmed. Almost all age groups were affected, but the frequency was greater in the age group 21-30 (25%)> 31-40 (21%)>11-20 (19%). Males (61%) were more affected than females (39%). Out of the total 1223 cases, 100% of the cases were reported from Govt. institutions. Health Department, Govt. of Bihar took various measures for the control of the outbreak. Health Alert including all the necessary guidelines and

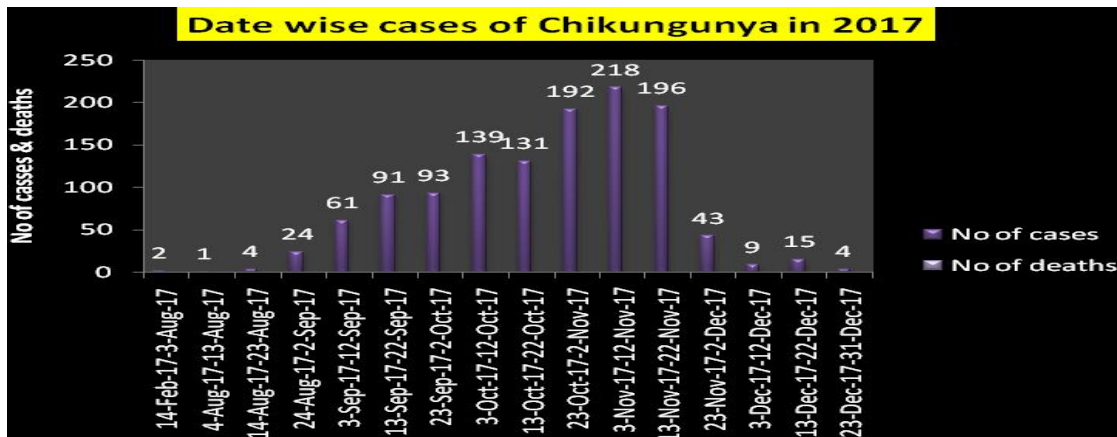


Fig. 1. Time distribution of Chikungunya cases

Table 1. Person distribution of Chikungunya cases

Age group	Frequency	Percentage (%)
0-10	89	7
11-20	237	19
21-30	310	25
31-40	246	21
41-50	186	15
51-60	108	9
61+	47	4
Total	1223	100
Sex	Frequency	Percentage (%)
Male	740	61
Female	483	39
Total	1223	100



Fig. 2. Place distribution of Chikungunya cases

protocols on Chikungunya were sent to the districts & Govt. Medical Colleges & Hospitals, Bihar much earlier than the occurrence of the outbreak. Daily monitoring of the cases & the status of the control measures like fogging and larvicidal spray was done at the State level. Adequate stock of drugs, larvicide, malathion for larva and adult control and ELISA kits for laboratory confirmation of the samples were made available in the districts and Govt. Medical

College & Hospitals respectively. In 2016, 608 cases of Chikungunya were reported in the State that just doubled in 2017 when 1223 cases were reported. With recurrent outbreaks of Chikungunya in the State, there is dire need to expedite the process of early preparedness for the control of the outbreak. Strengthening the communicable disease surveillance in the State would help in early recognition of potential outbreaks, and further would also help to reduce

the morbidity and mortality due to the disease. Summary of the epidemiological observations has been briefed in Figs. 1 and 2 and Table 1.

4. CONCLUSION

Overall 1223 cases of Chikungunya were reported during the outbreak period in 2017. The outbreak peak was recorded from 3-Nov to 12-Nov 2017 when 218 cases were reported. Patna district was most affected followed by Nalanda and Vaishali. Young adults of age group 21-30 were most affected. Males were more affected than females. Health Department, Govt. of Bihar took various measures for the control of the outbreak. By strengthening the surveillance and response activities, transmission of the disease was curtailed in the State. The outbreaks of Chikungunya are recurrently being reported in the State since 2011 which is a great concern for the State. Early preparedness to prevent the outbreak including active fever surveillance before the peak season would help in reducing the morbidity and mortality due to the disease in the State.

5. RECOMMENDATIONS

- Strengthening of the surveillance, particularly fever and entomological surveillance, along with appropriate response is important. Surveillance should also be strengthened in other unaffected areas to ensure a relevant and timely response.
- Sensitisation of medical and para-medical personnel in the government as well as private sectors needs to be undertaken for appropriate and timely management of cases.
- District level coordination meeting comprising of local community leaders of affected areas and other departments like a municipality and other stakeholders should be called to spread awareness regarding the disease & to prevent future outbreaks.
- Medical camps in affected areas would be beneficial as this would also ensure community awareness.
- For emergency, immediate control of infective mosquitoes may be undertaken by Pyrethrum space spray (2%) within 100 meters radius of a Chikungunya case house. However, in large areas having a concentration of cases or areas with higher

vector density, Malathion fogging must be undertaken on a priority basis.

- Anti-larval measures with Temephos (Abate) (1 ppm) should be taken. Larvicide may be put in big drums and containers from which water cannot be discarded or thrown away.
- Vector & larval surveillance should be carried out throughout the year to map the vector density & larval breeding sites.
- Awareness of Community through IEC, IPC & BCC must be done for the success of intervention methods. This should cover following aspects:
 - i) Cause and transmission of Chikungunya fever, about the vector breeding places, specifically household container breeding and biting habits, etc., symptoms of the disease, management including treatment of the cases, and community measures for prevention of breeding and to prevent man mosquito contact.
 - ii) Vector control measures like an intensification of entomological surveillance in the area on a regular basis, emptying the containers on a weekly basis and scrubbing & drying them when not in use.
- All paces adjoining the affected areas where a case of Chikungunya has been recorded should be made alert & an eye on all the fever cases should be kept for timely referral & cases management and to prevent a future outbreak.
- The possibility of providing regular water supply to residential areas.
- Number of laboratories should be strengthened to support for the early diagnosis of
- Chikungunya fever and for blood collection from suspected cases.
- Waste management should be properly planned by District Health Authorities & Municipality.

5.1 Future Recommendation

From 6 Jun till 15 Sep 2017, total 25 cases were reported from 7 districts in Bihar. Out of total 25 reported cases, seven were cross-notified from other States while 18 cases were reported within the State. District most affected was Patna (15 cases that represented 60% of the overall reported cases) > Gopalganj (3 cases that

represented 12% of the overall reported cases) followed by Muzaffarpur (2 cases that represented 8% of the overall reported cases). 24% of the cases were migratory. The outbreak peak laid from 6-Jun to 26-Aug 17 when 18 cases were reported. Almost all age groups were affected, but the frequency was greater in the age group 21-30 (24%) = 41-50 (24%)>21-60 (20%). Males (68%) were more affected than females (32%). 89% of the internal cases were managed by providing drugs, masks and by keeping them in home isolation. 11% of the cases required hospital admission for treatment and management. Daily monitoring of the health conditions of each case was done, and control measures were taken by the Health Department, Govt. of Bihar. Due to rigorous monitoring and active involvement by the Health Department at the State level, the H1N1 outbreak was efficiently managed, and substantial mortality due to the disease was reduced in the State when compared to other States where many deaths were reported. The report would guide other outbreak-prone States for early preparedness and to ensure public health response to manage future outbreaks due to H1N1.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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