



CROSS-SECTIONAL SURVEY ON DENGUE FEVER IN JHARKHAND

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Abstract: -

Dengue has nowadays become one of the problematic infections transmitted by Aedes mosquito, it can be fatal if left untreated. It mostly spreads in tropical areas as in the case of Jharkhand state. Its symptoms commonly appear 2 to 5 days after exposure and it includes sudden onset of fever with high grade, nose bleeding, intense and prolonged headaches, muscular, abdominal, lower back pain, nausea vomiting. It can also lead to severe fatigue and significant blood loss and organ damage. Dengue may affect any person but it easily transmits infection more severely in immune compromised people. Diagnosis of dengue cases can be done via new molecular based techniques, serology tests, IgM and IgG Antibody testing constituted in ELISA based methods. Dengue fever can be of mild, hemorrhagic, and shock syndrome types. There is no particular medication or treatment for dengue but the proper fluid balance of the body should be maintained. Various statistical data has been reviewed related to the total number of positive cases as well as the district wise distribution of dengue fever active cases comprising in the state.

Key words: Dengue, immune, diagnosis, serology, antibody, hemorrhagic, syndrome.

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INTRODUCTION: -

Dengue fever (Breakbone fever) is a mosquito-borne infectious tropical disease caused by the dengue virus.(Heilman et al., 2014) There are four serotypes (DENV1, DENV2, DENV3 and DENV4) of dengue virus belongs to the family *Flaviviridae*. Transmission of the virus to humans is through the bite of infected mosquitoes: *Aedes aegypti*. All four DENV serotypes commonly cause a mild febrile illness (DF) which may progress to dengue hemorrhagic fever (DHF), and dengue shock syndrome (DSS), classified according to 1997 World Health Organization (WHO). The WHO estimates that 50–100 million infections occur annually, including 500,000 DHF cases and 22,000 deaths, mostly among children (WHO, 2012).(Ngwe Tun et al., 2016)

Dengue has so far not been reported in Jharkhand state in India and for the first-time during September to November 2006 about 1000 fever cases were re-ported and among them there were 13 confirmed cases of dengue and few unreported cases also occurred. Ranchi the capital city of Jharkhand is situated at an altitude of 2140 ft above the mean sea level. The mean minimum and maximum temperature ranges between 16.8 and 40.7°C and the average humidity ranges from 69 to 94%. All the localities within the municipal limits of Ranchi City were surveyed. The number of houses visited in each locality varied depending upon the expanse of the area and types of houses.(Singh et al., 2008)

In routine laboratories Dengue IgM and IgG ELISA kits are widely used for diagnosis of dengue infection. Variations are there in the detection limit during the acute phase of the disease. Usually it takes 4–5 and 1–14 days respectively after the onset of symptoms for anti-DENV IgM and IgG antibodies to become detectable. But it depends whether the patient has primary or secondary infection. During the first few days of illness, ELISA assays are used in combination of NS1 and IgM detection in samples. It was recommended to increase overall dengue diagnostic sensitivity.

Platelet therapy is used in standard clinical practice for dengue patients with severe thrombocytopenia. Platelet count is not done as introductory screening, in many cases.

In the state of Jharkhand, RIMS is one of the best tertiary care institutes. Department of Microbiology (Virology), in RIMS, Ranchi caters in diagnosis wide range of vector-borne diseases and other infectious diseases.(Topno et al., 2022)

Types of dengue fever

MILD DENGUE FEVER	DENGUE HAEMORRHAGIC FEVER	DENGUE SHOCK SYNDROME
<p>It takes up to 7 days for the symptoms of MDF to appear on the host.</p> <p>Symptoms: High fever, Intense and prolonged headaches.</p>	<p>DHF is a serious condition of dengue, when left untreated or improper medication is taken, this form of dengue can be fatal.</p> <p>Symptoms:Internal bleeding, sudden fever, cold chills, nose bleeds and a significant decrease of BP.</p>	<p>In DSS, the patient experiences a sudden onset of shock, high fever and is prone to sudden collapse due to a significant drop in BP.DSS is majorly seen in children under 10 years.</p> <p>Symptoms: Severe headache, Sore throat, Respiratory irregularities, Blood in stool and vomit, weak pulse and spitting up blood.</p>

Table 1: - Types of Dengue fever

Life cycle of dengue mosquito (Aedes)

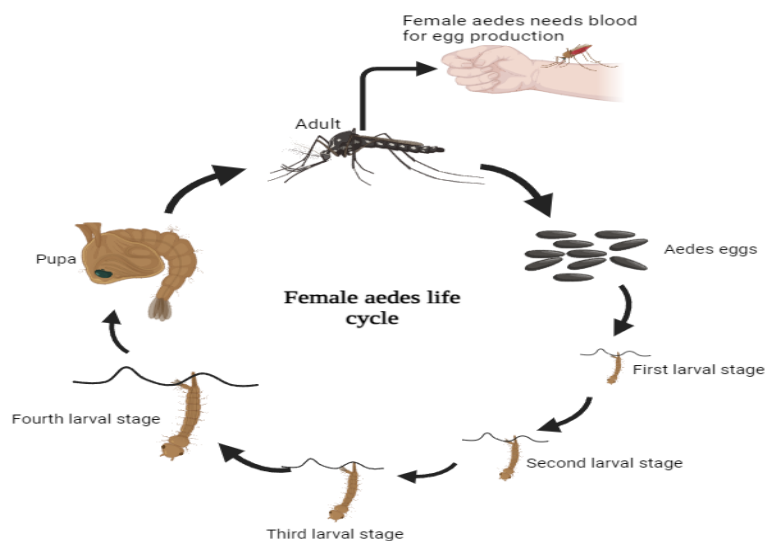


Figure 1: - Life cycle of dengue mosquito (aedes)

Role of IgM and IgG Antibody Testing in Dengue Diagnosis

Dengue is a viral infection that is transmitted by mosquitoes in tropical areas. According to WHO, Dengue fever is considered as the second most important tropical disease next to Malaria. South Asia has the highest burden, of which India is one of the countries maximally affected by it. All the four serotypes of Dengue virus are endemic in India. Asymptomatic infections are much more frequent than symptomatic ones. Infection with one serotype of Dengue does not confer cross protection against another serotype. On subsequent infection, it may lead to serious forms of the disease like Dengue Haemorrhagic Fever and Dengue Shock Syndrome. Considering this, it becomes very important to distinguish primary from secondary dengue, early in the course of infection. It helps in predicting prognosis and also in deciding about whether a patient needs hospitalization/close monitoring or could be managed at home. This is especially important during epidemics and outbreaks.

Serological tests

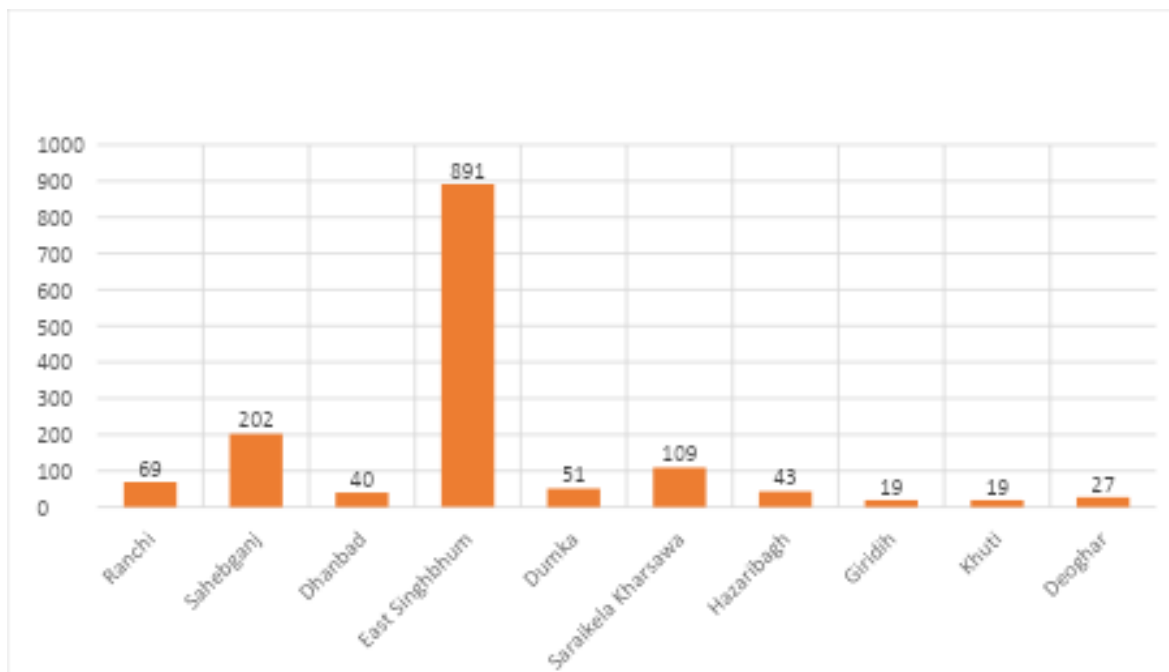
ELISA-based methods for the detection of dengue specific IgM and IgG. Dengue viraemia is universal in febrile patients with dengue; Dengue NS1 Antigen occurs prior to the onset of fever/symptoms and peaks 2-3 days after the onset of illness. Serologically, a primary dengue infection results in detectable levels of IgM antibodies by the 3rd afebrile day after infection, which generally persist for 2-6 months. Dengue IgG antibodies appear after IgM, approximately at the day 7 of the fever, in the primary infection and persist for a longer time, even up to years. Secondary Dengue infections are characterized by a rapid increase in IgG levels, with modest increases in IgM.

The following table summarizes results that may be seen with antibody testing:

IgM Result	IgG Result	Possible Interpretation
Positive	Negative	Current infection
Positive	Positive	Current infection
Low or negative or not tested	Four-fold increase in sample taken 2-4 week part	Recent infection
Negative	Positive	Past infection
Negative	Negative	Too soon after initial exposure for antibodies to develop or symptoms due to another cause

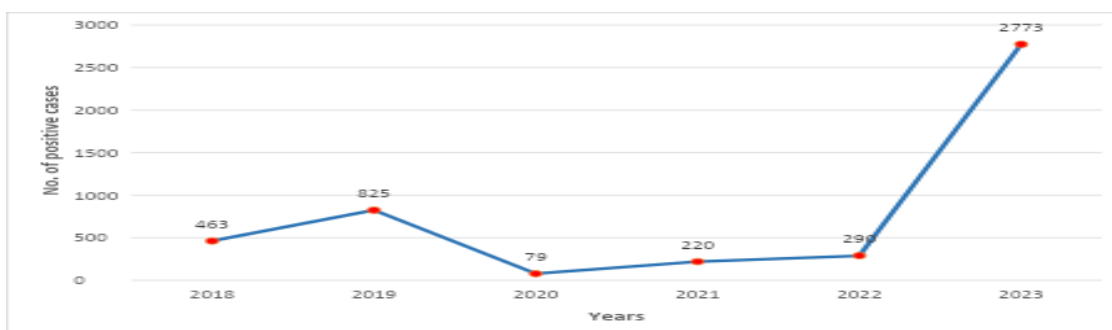
Table 2: - Antibodies testing

Dengue case in different districts of Jharkhand in 2023



It has been reported that in a total of ten different district of Jharkhand numerous dengue cases were active in the past year i.e. 2023. A total no of active cases was found to be 2773, in which East singhbhum has the highest no. of positive cases (891), then Sahebganj (202), Saraikela kharsawa (109), Ranchi (69), Dumka (51), Hazaribagh (43), Dhanbad (40), Deoghar (27), Giridih and Khuti (19). These states lie in the Eastern and Southern region of Jharkhand.

Dengue positive case in last 6 years



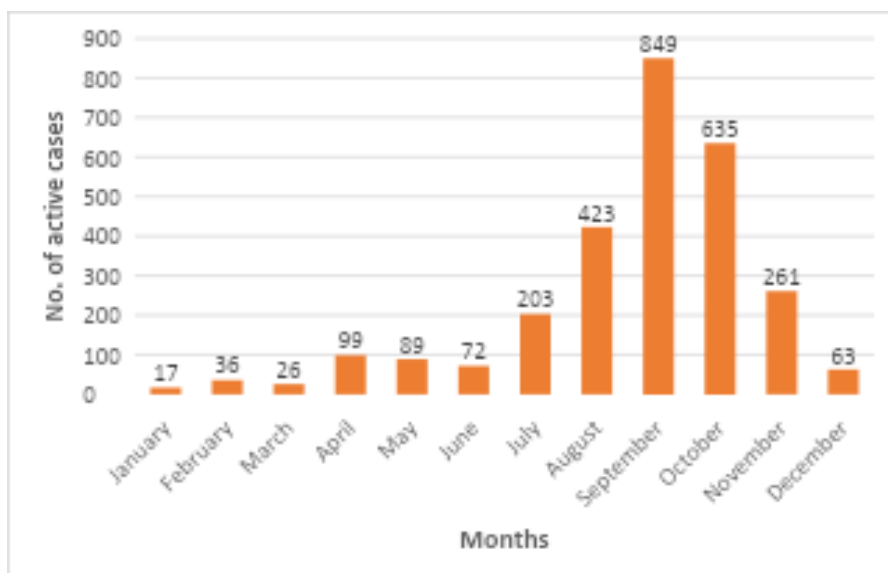
Year	2018	2019	2020	2021	2022	2023
No. of positive case	463	825	79	220	290	2773

There has been a significant increase in the number of positive cases of dengue fever. From 2018 to 2023 the number of positive cases in 2023 was 2773, in 2022 it was 290, in 2021 it was 220, in 2020 it was 79, in 2019 it was 825 and in 2018 it was 463.

In this graph, it is shown that there were 2773 cases in 2023 which was highest in no. and 79 cases in 2020 was the lowest no. of positive cases of this era.

Monthly distribution of active cases in 2023

Month	Active Cases
January	17
February	36
March	26
April	99
May	89
June	72
July	203
August	423
September	849
October	635
November	261
December	63



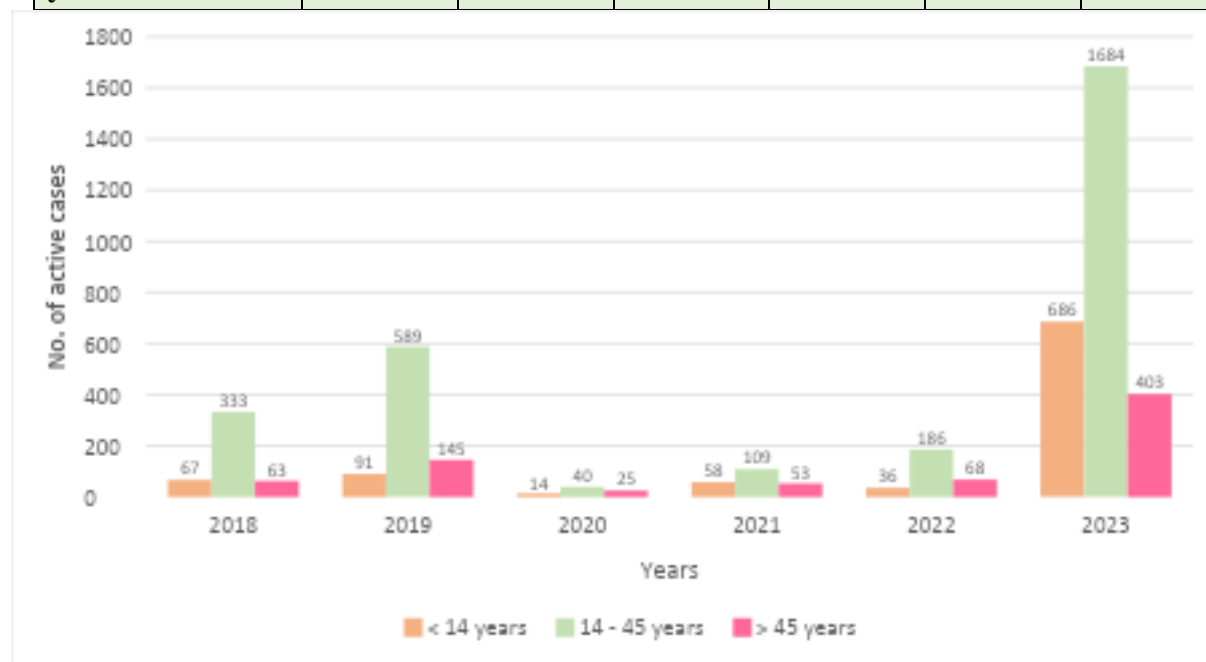
From the above graph, it has been determined that the active cases of dengue have been segregated on the basis of monthly distribution. September (894) occupies the highest no. of active cases and January (17) has the lowest no.in the year 2023.

The months which come under the rainy season comprises higher no. of active cases. Due to several reasons like accumulation of rainy water on roof, waste dumping areas, pits, tyres etc.

One of the most common reasons behind dengue transmission during the rainy season is the mosquitos lay eggs in the stagnant water, which results in the breeding of *aedes* mosquitos.

Age Distribution

Age group	Years	2018	2019	2020	2021	2022	2023
Less than 14 years		67	91	14	58	36	686
14 – 45 years		333	589	40	109	186	1684
More than 45 years		63	145	25	53	68	403



Age distribution for detecting no. of positive cases has been categorized into three groups. The first age group comprises the individual whose age is below 14 years, then the second age group comprises the individual whose age group is between 14 to 45 years and the third group comprises the individual whose age is more than 45 years.

From this graph we can consider that the individual with the age group between 14 to 45 years is more prone to Dengue fever in comparison with other age groups. Due to the reason that 14 to 45 age group people are more exposed to environmental conditions on a daily basis which increases the chances of contamination with *aedes* mosquitos.

Conclusion

Dengue fever is progressing day by day and the number of its active cases in the state is continuously increasing along with the various risk factors associated with the infection symptoms. Initially it shows symptoms like severe headache, nausea, fatigue, joint and muscle pain but when it gets progressed then its symptoms gets worse leading to dengue hemorrhagic fever, and sometimes can also be fatal. For this Jharkhand state and some of its districts has been taken into consideration and reported the annual report on a monthly basis in the different age group individuals. The most affected month was from August to October (rainy season) as it leads to more contamination of the dengue fever. In the past six years the year 2023 comprises the highest number of active cases in the individual having age groups between 14 to 45 years as comparison with other age groups. The most infected district is East Singhbhum consisting of 891 active cases then the second is Sahebganj having 202 active cases, and the least infected is among Giridih and Khunti having 19 active cases. Its risk factors consist of the individual's weak immune system, locality, exposure to mosquito, lack of mosquito control, previous dengue infection, etc. Diagnosis of dengue fever is done by serological testing which involves antibody test reports consisting of IgM and IgG tests which determines the positive active cases. Dengue fever infection has been a matter of concern as it does not have any particular treatment, therefore its screening and prevention should be implemented in a proper way to control its spread.

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