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A STUDY OF PREVALENCE OF SEROPOSITIVE DENGUE CASES IN A TERTIARY CARE HOSPITAL, CHANDRAPUR

Dr Rajendra Surpam	Prof. and Head, Dept of Microbiology Govt Medical College, Chandrapur (MH)
Dr Virendra Kolhe*	Assistant Professor, Dept of Microbiology Govt Medical College, Chandrapur (MH) *Corresponding Author
Dr Neha Komatwar	Senior Resident, Dept of Microbiology Govt Medical College, Chandrapur (MH)
Dr Rajani Tore	Associate Professor, Dept of Microbiology Govt Medical College, Chandrapur (MH)

ABSTRACT During the recent decades, dengue virus infection has been emerged as a major public health problem. Dengue is one of the important mosquito borne arboviral infection in India, causing high mortality and morbidity of humans and it has become endemic in India with consistent episodes. Dengue is an acute febrile illness caused by Dengue Virus (DENV-1, DENV-2, DENV-3, DENV-4). The present retrospective study was conducted for a period of three years in Department of Microbiology, Government Medical College Chandrapur, Maharashtra, India, from January 2021 to December 2023, to determine the seroprevalence of the Dengue virus. in which suspected cases from city and periphery of the Chandrapur district of Maharashtra state were taken in to an account. A total of 4485 serum samples of clinically suspected dengue patients were tested for immunoglobulin M (IgM) anti-dengue antibodies by ELISA. After analysing the suspected cases 951 males and females were found positive with period prevalence of 22.36% in the duration from January 2021 to December 2023. Throughout the three-year study period, the year-specific seroprevalence rate was discovered to be 27.46% (435) in 2021, 17.13% (104) in 2022 and 19.98% (412) in 2023. With the findings of present study it could be concluded that continuous dengue virus surveillance is required for monitoring of dengue virus so that early detection can be carried out. Effective vector control measures should be implemented for early detection of impending outbreak and to initiate timely control measures.

KEYWORDS : Dengue, Seropositivity, Aedes aegypti, IgM ELISA

INTRODUCTION

Dengue fever is caused by single positive stranded enveloped RNA virus of the flaviviridae family, genus flavivirus. There are four different serotypes of Dengue virus; DENV-1, DENV-2, DENV-3, and DENV-4, which are further sub classified based on their individual genotype.[1] By genetic sequence analysis, a fifth serotype (DENV-5) which follows sylvatic cycle has been detected in Sarawak state of Malaysia in October 2013.[2] Dengue virus is transmitted by the bite of female mosquitoes mainly of the species Aedes aegypti and, to a lesser extent, Aedes, Albopictus which bites during the day time. Perinatal transmission can occur, which may increase the symptomatic infection in the new-born. Dengue can also be spread through blood transfusion, needle stick injury or organ transplant. Dengue virus infection is a notable public health problem in terms of the mortality and morbidity.[3] Dengue is endemic in many parts of India.[4] In India, the first epidemic of clinical dengue-like illness was recorded in Chennai in 1780 and the first virologically proved epidemic occurred in Kolkata and Eastern Coast of India in 1963- 1964.[5] Infant DHF/DSS was first reported in 1970. Dengue fever is a self-limiting illness of short duration known as break-bone fever. The incubation period varies from 3 to 7 days after the bite from infected mosquito. Based on severity of infection there are two stages of dengue, dengue with or without warning signs and severe dengue (2009 WHO classification).

After the onset of illness, the virus can be detected in serum, plasma, circulating blood cells and other tissues for 4–5 days. Infection by one serotype induces high titred neutralising antibody and recovery from infection provides lifelong immunity against reinfection by the same serotype but only partial protection against infection with the other serotypes. The major diagnostic methods are viral culture, viral RNA detection by RT-PCR and serological tests such as NS1 Ag detection, IgM and IgG capture ELISA. Virus isolation mainly used for research purposes can be done by inoculation into mosquito cell lines C6/36 and AP 61. RT-PCR which is more sensitive and specific, can be used for the detection of serotypes and viral load quantification.[6] NS1 antigen stimulates strong humoral immune response. NS1 antigen is detectable from day 1 of fever and remains positive up to 18 days. Sensitivity of NS1 antigen –capture ELISA is depended on the level of viremia and host humoral immune response. NS1 Ag assay is a useful early diagnostic marker for dengue fever which allows rapid detection on the first day of fever, before antibodies appear. IgM appears first after 5 days of fever and disappears within 90 days 8and the antibody levels are consistent with acute-phase infection. Cross reactivity with several other flaviviruses like Zika virus, West Nile virus, and St. Louis encephalitis virus may lead to false positive results with IgM ELISA. MAC ELISA (IgM antibody capture ELISA) is the recommended serological test in India. The dengue IgG detectable at low titre in 14-21 days and then slowly increases, and persist for months or years which often reactive with many flaviviruses. Of these three different tests, NS1 antigen detection had the highest sensitivity in the early stages while IgM detection was more sensitive in the later part of the illness. Positive dengue IgM and IgG tests for dengue antibodies in an initial blood sample means that the person became infected within recent weeks. According to WHO dengue-specific laboratory tests are often not required for acute management of cases but should be performed to confirm the diagnosis. Appropriate clinical management can save the lives of patients with DHF and DSS and mortality can be reduced to less than 1%.[7] Prevention of dengue virus transmission entirely depends on effective vector control measures or interruption of human–vector contact. Early diagnosis of dengue infection remains the cornerstone for treatment and prevention of dreadful complications such as DHF and DSS.[8] Although there is no specific treatment available for dengue, accurate and timely diagnosis has an important role in individual case management and in planning and implementing control strategies. Hence considering the severity of the diseases its prevention and cure is now socially seeking the top priority of the practitioners. Hence in the present retrospective study yearly changes from January 2021 to December 2023 are being plotted which may help to construct a resilient health system against the disease.

MATERIAL AND METHODS:

The Department of Microbiology at the Govt. Medical College in Chandrapur (MH) conducted the current retrospective study at the Dengue Sentinel Surveillance Center. The present study took into consideration all serum samples from clinically suspected dengue patients who were referred to GMC, Hospital Chandrapur, and the surrounding area of Chandrapur district. Age, gender, residence, and patient information, including the date of admission, clinical history, signs, symptoms, and sample collection were recorded.

Dengue IgM capture ELISA (Mac ELISA) was used to process the received samples for IgM antidengue antibody, and National Instituteof Virology, Pune (MH) supplied the necessary kits.The ELISA instrument utilized was a mindray micro plate reader (model

MR-96A) manufactured by Shenzhen Mindray BioMedical Electronics, located in Shenzhen, China.The test results were analyzed in accordance with the literature that was supplied, and the information gathered was used to determine the dengue seroprevalence in the district of Chandrapur.

RESULTS

In total, 4970 samples from patients suspected of having dengue were processed in the microbiology laboratory Table 1 shows that 1105 of the examined samples were found to be reactive for IgM capture dengue ELISA.There were 449 females and 652 males that were positive among them. Examining the monthly distribution, October saw the bulk of probable cases 1066 in total observed. Given the current situation, the district of Chandrapur's dengue prevalence could be computed as follows:

Prevalence of Dengue = total number of positive cases / sample size under observation × 100.

Therefore, the three year period prevalence of dengue (also known as period prevalence) is 22.23%. Conversely, it was discovered that 27.53% of Chandrapur's male residents had dengue at that time. whereas 27.37% of females were found to have a period.

Table 1. Monthly Distribution Of Dengue Suspects In Males And Females (2021):

Sr. No	Month	Total tested samples			Total tested positive samples		
		Tested	Negative	Positive	Total positive	Males	Females
1.	Jan 21	20	14	06	06	04	02
2.	Feb 21	22	20	02	02	00	02
3.	Mar 21	24	21	03	03	03	00
4.	Apr 21	16	14	02	02	01	01
5.	May 21	07	06	01	01	00	01
6.	Jun 21	23	20	03	03	00	03
7.	Jul 21	326	234	92	92	53	39
8.	Aug 21	892	655	237	237	137	100
9.	Sept 21	545	384	161	161	104	57
10.	Oct 21	294	233	61	61	45	16
11.	Nov 21	88	73	15	15	10	05
12.	Dec 21	44	38	06	06	02	04
	Total:	2301	1712	589	589	359	230

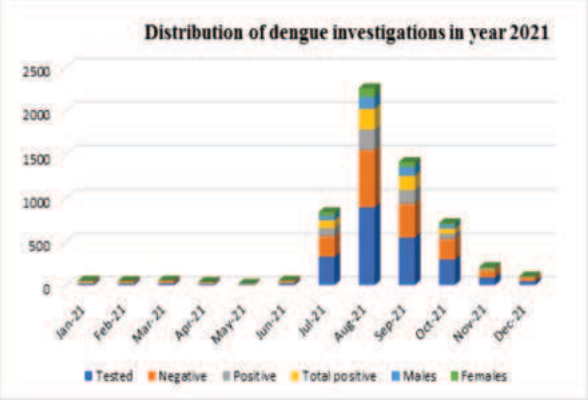


Table 2. Monthly Distribution Of Dengue Suspects In Males And Females (2022):

Sr. No	Month	Total tested samples			Total tested positive samples		
		Tested	Negative	Positive	Total positive	Males	Females
1.	Jan 22	10	08	02	02	00	02
2.	Feb 22	04	03	01	01	01	00
3.	Mar 22	04	04	00	00	00	00
4.	Apr 22	05	04	01	01	00	01
5.	May 22	20	20	00	00	00	00
6.	Jun 22	05	05	00	00	00	00
7.	Jul 22	43	37	06	02	00	02
8.	Aug 22	108	93	15	15	07	08
9.	Sept 22	124	96	28	28	15	13
10.	Oct 22	86	68	18	18	13	05
11.	Nov 22	133	108	25	25	14	11
12.	Dec 22	65	57	08	08	06	02
	Total:	607	503	104	100	56	44

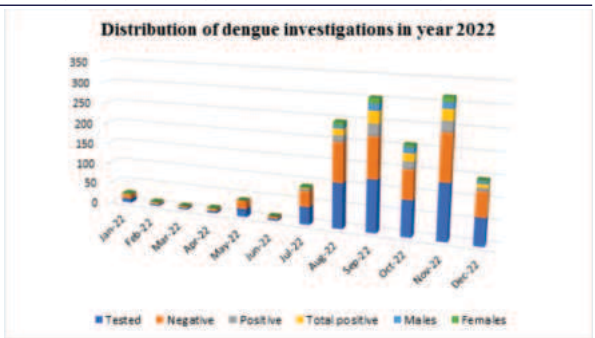
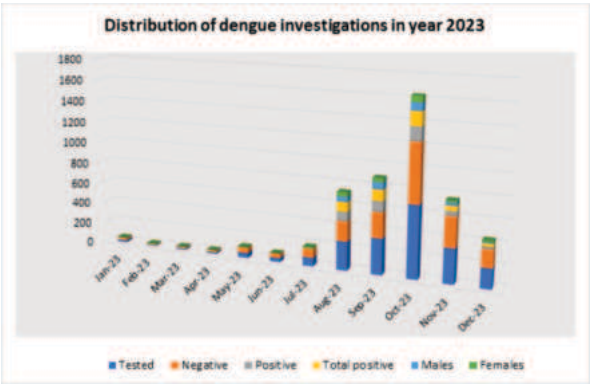


Table 3. Monthly Distribution Of Dengue Suspects In Males And Females (2023):

Sr. No	Month	Total tested samples			Total tested positive samples		
		Tested	Negative	Positive	Total positive	Males	Females
1.	Jan 23	20	17	03	03	03	00
2.	Feb 23	09	08	01	01	00	01
3.	Mar 23	13	12	01	01	01	00
4.	Apr 23	16	15	01	01	00	01
5.	May 23	49	45	04	04	02	02
6.	Jun 23	40	39	01	01	00	01
7.	Jul 23	84	77	07	07	02	05
8.	Aug 23	277	188	89	89	49	40
9.	Sept 23	343	240	103	103	66	37
10.	Oct 23	686	555	131	131	73	58
11.	Nov 23	332	286	46	46	29	17
12.	Dec 23	193	168	25	25	12	13
	Total:	2062	1650	412	412	237	175



DISCUSSION

In the present study, 22.23% patients were serologically positive for dengue infection. The dengue infection from Chandrapur was reported earlier in 2020.[9] These findings are consistent with the dengue outbreaks from Parbhani, Dhule as well as from Nagpur districts In Maharashtra, the dengue outbreak was reported from Parbhani and Dhule.[10,11] In India, the outbreak of dengue was reported from Bangalore, Punjab, and Delhi.[12,13,14] The present dengue cases occurred during the postmonsoon season, i.e., from September to November only, which is similar to most of the previous outbreaks in India.[13,14] It may be because this season is very favourable for high breeding of the vector, i.e., Aedes aegypti. This seasonal outbreak of disease transmission is very important at local level for effective control measures.

This time of year is favourable for the development and reproduction of the Aedes aegypti vector, which may account for the current finding. Thus, preventing disease outbreaks through the implementation of a vector control program during these times may be a major step towards preventing the spread of the illness, particularly in the isolated, heavily forested districts of Chandrapur.[14,15]

By taking these precautions, the infections will not only spread but also the likelihood of bleeding disorders brought on by thrombocytopenia will be decreased.[15] The recent study found that 22.39% of males had dengue throughout that time. Mehendale SM observed similar outcomes over a roughly five-year period among the male and female residents of the Nagpur region.[16] Additionally, PM Ukey noted that of the patients living in Nagpur city and district, almost 31% were seropositive.

A higher number of instances were observed in the months of October and November; these results are in line with the study's observations.[17] The current study's seropositive individuals had a virtually same sex ratio, which is consistent with T. Arun observations that more males than females were afflicted.[18] Thus, based on the current findings, it can be concluded that the highest number of dengue cases occurred in September and October, towards the end of the monsoon season. This information can be used to develop specific preventive strategies, such as vector control and surveillance, enhanced disease surveillance, waste management priorities, and community education.[19] The study highlights the fact that dengue infection is more common in central India than in other regions, with a prevalence of nearly 27%, resulting in a devastating epidemic, particularly in Chandrapur district.

Reduced mortality and dengue transmission can be achieved via pertinent research, strict oversight, and quick comforting care; this might be a first step toward an India free of dengue.

CONCLUSION

The current study indicates that dengue fever primarily affects adult males who are actively involved in their lives. Dengue is more common during and after the rainy season, which could be caused by the large number of vectors and quick urbanization. To keep an eye on the dengue status in a given area, discover outbreaks early, and implement efficient control measures, epidemiological studies must be conducted on a regular basis. For the people to actively participate in addressing the issue, it is imperative. Moreover, the creation of a vaccine that is efficacious against each of the five dengue virus serotypes is imperative.

The study highlights the fact that dengue infection is more common in central India, particularly in Chandrapur district, where it is approximately 27% more common than in other places. This has resulted in a devastating epidemic. Reduced mortality and dengue transmission can be achieved via pertinent research, strict oversight, and quick comforting care; this might be a first step toward an India free of dengue.

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