ORIGINAL ARTICLE

Seropositivity of Dengue in and around Akola, Maharashtra

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ABSTRACT

Background: Dengue, also known as "tropical flu," is a viral disease transmitted to humans by Aedes mosquito. Dengue fever is a deadly arboviral disease caused by any of the five serotypes DENV1, DENV2, DENV3, DENV4 and DENV5 which are placed in the Family Flaviviridae and genus Flavivirus.Each serotype of the virus produces a specific, lifelong immunity, but it provides only a short term cross-immunity. **Aim and Objective:** To determine the seropositivity of Dengue in suspected cases in and around Akola, Maharashtra. **Materials and Methods:** This study was done on the samples received for dengue testing at Department of Microbiology, Government Medical College Akola Maharashtra. Study was carried out from January 2015 to April 2024. Blood samples were collected from 13,554 patients with dengue like clinical illness and serum was separated. All the samples were subjected to IgM antibody detection by dengue MAC ELISA. **Results:** Seropositivity of dengue in dengue suspected cases was found to be15.43% (2092/13554). Maximum number of positive cases, 628(30.00%) were in the age group of 11-20 years. Males 1209(57.80%) were affected more than females 883(42.20%). Peak was observed in the months of November followed by October followed by September followed by August. Common presenting features were fever followed by myalgia, arthralgia, headache, and bleeding manifestations. **Conclusion:** Surveillance is prerequisite for monitoring the dengue situation in the area and should be carried out regularly for early detection of an impending outbreak

KEY WORDS: Dengue, IgM ELISA, Arbovirus, Seropositivity.

Introduction

Dengue, also known as "tropical flu," is a viral disease transmitted to humans by Aedes mosquito.[1] Dengue fever is a deadly arboviral disease caused by any of the five serotypes DENV1, DENV2, DENV3, DENV4 and DENV5 which are placed in the Family Flaviviridae and genus Flavivirus.[2] Each serotype of the virus produces a specific, lifelong immunity, but it provides only a short term cross-immunity.[3] This illness ranges from a mild asymptomatic form to severe dengue hemorrhagic fever (DHF) with or without dengue shock syndrome (DSS).[4]

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An estimated 50 million dengue infections occur worldwide annually, the South-East Asia Region (SEAR) and Western Pacific regions are most seriously affected with detection of all four serotypes of dengue.[5] Between 2006 and 2012, National Vector Borne Disease Control Programme (NVBDCP), in India, reported an average annual number of 20,474 dengue cases while in 2019 Maharashtra state alone reported 19034 dengue cases[6,7] however estimates of the average annual number varies to an apparent case of 33 million.[8] The National Vector Borne Diseases Control Program (NVBDCP) is an integral part of the National Rural Health Mission (NRHM) of India and aims for prevention & control of vector borne diseases like Malaria, Dengue, Chikungunya, Japanese Encephalitis (JE), Kala-azar and Lymphatic filariasis. The GoI plans to ensure right diagnostics and treatment of the aforementioned vector borne diseases to all people living in rural/urban/tribal areas via this program.

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Dengue was reclassified by WHO in 2009 according to levels of severity as, dengue without warning signs, dengue with warning signs like abdominal pain, persistent vomiting, fluid accumulation, mucosal bleeding, lethargy, liver enlargement, increasing hematocrit with decreasing platelets, and severe dengue which included dengue with severe plasma leakage, severe bleeding, or organ failure.[9] Hence, there is a need for early diagnosis of dengue infection since it can prevent fatal cases.

The primary objective of this retrospective analytic study was to determine the seropositivity of dengue and to observe the changing trend of the disease over the past 10 years in and around Akola district.

Materials and methods

This hospital based retrospective study was carried out in the Department of Microbiology, at a tertiary care hospital in Akola, Maharashtra from January 2015 to April 2024 after ethical approval from the Institutional Ethical Committee. Study group consisted of clinically suspected cases of dengue infection admitted in this hospital, those who attended outpatient department (OPD) and various primary health centres of Akola, Buldhana and Washim districts of Maharashtra. A detailed history was obtained of all the suspected cases in a written format.

As IgM antibody starts appearing after 5 days of infection,[9] instructions were given at the hospital and the peripheral centres to collect the blood sample of suspected patients after 5 days of onset of fever and send to Department of Microbiology for further processing and testing, where serum was separated as per the standard guidelines.[10,11] The serum samples were subjected to dengue IgM antibody detection by ELISA technique (NIV DEN IgM Capture ELISA kit, NIV-Pune, India). Testing as well as OD cutoff value was determined as per manufacturer's instructions.

All the testing was performed as a sentinel surveillance hospital/laboratory under the National Vector Borne Disease Control Programme (NVBDCP).

Data was analysed using statistical package for social sciences version 16 (SPSS V16). Observations were presented as frequency and percentage distribution.

Results

Total 13,554 serum samples from suspected dengue cases were collected and subjected to dengue IgM antibody detection by MAC ELISA technique. Out of the total samples tested, 2092 (15.43%) samples were positive for dengue IgM antibody. Prevalence of dengue in suspected cases was found to be 15.43% as shown in the following Table 1.

Table 1: Positivity of Dengue by MAC ELISA

	MAC ELISA (n= 13554) (%)
Positive	2,092 (15.43%)
Negative	11,462 (84.57%)
Total	**13,554**

Maximum number of MAC ELISA positive cases, 628 (30.00%) were in the age group of 11-20 years followed by 519 (24.80%) cases in the age group of 21-30 years as depicted in following Table 2.

Table 2: Age wise distribution of dengue MAC ELISA positive cases

Age (yrs)	No. of MAC ELISA positive cases n=2092 (%)
0-10	381 (18.21%)
11-20	628 (30.00%)
21-30	519 (24.80%)
31-40	231 (11.00%)
41-50	167 (07.98%)
51-60	92 (04.39%)
61-70	53 (02.53%)
71-80	19 (0.1%)
81-90	02 (0.09%)
Total	**2092 (100%)**

Out of the 2092 MAC ELISA positive dengue cases, 1209 (57.80%) were males and 883 (42.20%) were females as shown in Figure 1.

Maximum number MAC ELISA positive cases were reported in the months of November followed by October followed by September followed by August as depicted in following Table 3.

Year wise distribution

In our study, Maximum number of suspected dengue cases were reported in year 2021 followed by 2023; however maximum MAC ELISA positive cases were reported in year 2023 followed by 2019 as depicted graphically in Figure 2.

Common presenting features were fever followed by myalgia, arthralgia, headache, and rash as depicted

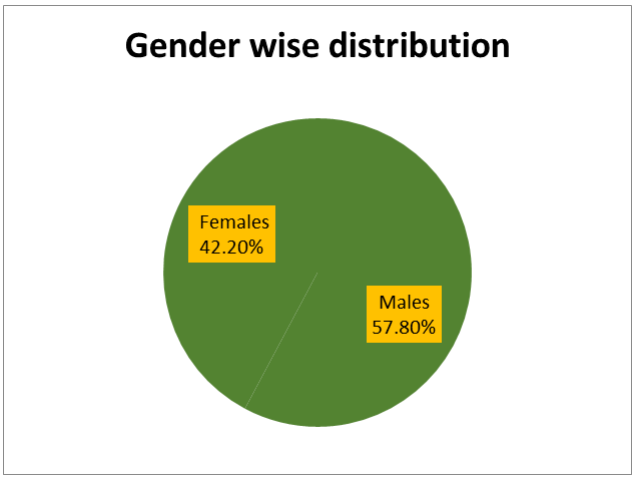

Figure 1: Gender wise distribution of MAC ELISA positive cases (n=2092)

Table 3: Month wise distribution of MAC ELISA positive cases (n=2092)

Months (2016 to 2024)	No. of MAC ELISA Dengue positive cases n=2092 (%)
January	66 (3.15%)
February	65 (3.10%)
March	59 (2.82%)
April	85 (4.07%)
May	50 (2.40%)
June	15 (0.71%)
July	147 (7.02%)
August	217 (10.37%)
September	237 (11.32%)
October	478 (22.84%)
November	498 (23.80%)
December	175 (8.40%)
Total	**2092**

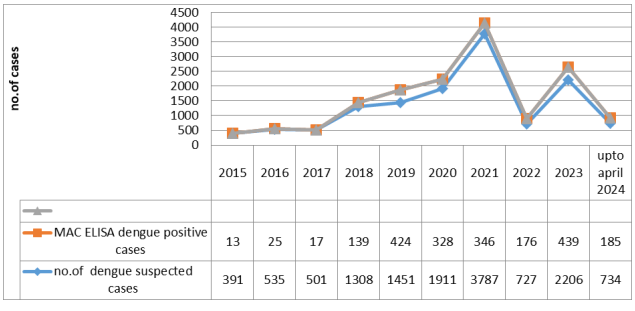

Figure 2: Year wise distribution of dengue suspected cases and MAC ELISA dengue positive cases

in Table 4.

Table 4: Clinical presentation of suspected dengue and MAC ELISA positive cases

Clinical presentation	No. of suspected dengue cases (n=13,554) (%)	No. of MAC ELISA positive cases (n=2092) %
Fever	13554 (100%)	2092 (100%)
Myalgia	9615 (70.93%)	1341 (64.13%)
Arthralgia	9216 (68%)	1278 (61.54%)
Headache	8472 (62.15%)	1108 (53%)
Rash	2501 (18.45%)	185 (8.84%)
Bleeding manifestation	1086 (8%)	227 (10.85%)

Discussion

Seropositivity of dengue infection

In the present study, out of 13,554 dengue suspected cases, 2,092 cases were positive for dengue IgM antibody by ELISA. Seropositivity in dengue suspected cases during our study period was thus found to be 15.43%. Seropositivity in Study by Rao MS et al.[12] from Andhra Pradesh, South India was 17.7% and Sood S et al. from Rajasthan were 18.99%. Higher seropositivity of 24.49% by Deshkar ST et al.[13]

Age wise distribution

In the present study, out of 2,092 MAC ELISA positive cases, maximum i.e.628 (30.00%) cases were in the age group of 11-20 years, followed by 519(24.80%) cases in the age group of 21-30 years. Study report by Kale et al (2014), commonest age group affected was (34%) was between11-15 years.[14] however Mahesh Kumar et al in their study observed maximum dengue cases in age group 10to20yrs (31.58%) and 21to 30 yrs. (15.78%).[15]

The risk of infection in children could be due to a lack of appropriate anti-mosquito preventive measures by children and more outdoor activity. More number of cases in the paediatric population signifies the endemicity of dengue where there is a decline in adult infection and an increase in rate of infection in children.[1,2,16]

Gender wise distribution

In present study, we observed that males 1209 (57.80%) were affected more than females 883 (42.20%) The ratio of male to female in MAC ELISA

positive cases was found to be 1.36: 1. Karoli R et al reported 58% male patients and 42% females with M:F of 1.38:1.[17] many studies have observed higher prevalence of dengue infection among males than females.[14,18–20]

This might be because of difference in sociocultural behaviour where males are involved in more outdoor activity and their body is covered less as compared to females.[16,17]

Month wise distribution

In our study we observed maximum number MAC ELISA positive cases in the month of November followed by October then September followed by August. During post monsoon period, stagnant water pool collected during rainy season acts as favourable breeding sites for Aedes Aegypti and along with lower temperature during this period, there is an increase in transmission of dengue infection.[5,21]

Clinical presentation

Out of total 2092 MAC ELISA positive cases, fever was present in all (100%) cases, followed by myalgia in 1341 (64.13%), arthralgia in 1278 (61.54%) and headache in 1108 (53%) cases. Rash was observed in 185 (8.84%) cases and bleeding manifestations were seen in 227 (10.85%) cases. Similar findings were reported by Turbadkar D et al who observed that fever was the major presenting complaint followed by icterus in 25.8%, myalgia in 25% and headache in 13.9% in the suspected cases of dengue.[22]

Conclusion

From our study we conclude that over the past decade, dengue positivity has increased in this area and post-monsoon months specifically show an overall rise in cases. As far as clinical scenario is concerned, a high suspicion of dengue should be considered in cases with high grade fever, myalgia, and arthralgia. Vigilant Surveillance as well as timely laboratory testing is prerequisite for early detection of an impending outbreak and initiate timely preventive and control measures. Active participation of both public and private sector with rapid response will help in reducing the disease burden in the area.

Limitations of the study

All the samples tested were of patients who visited OPD, PHCs and got admitted to the hospital, there would have been many others who would not have visited the aforementioned sites or would not have got access to the testing facility, hence active surveillance in the post-monsoon months would further help in diagnosis of infections. Molecular diagnosis and typing of the virus would have given further insights on the prevalent serotype in the area of investigation.

Disclosures

Source of Funding

National Vector Borne Disease Control Programme (NVBDCP).

Conflict of Interest

The authors declare that there is no conflict of interest.

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References

1. Tchuandom SB, Tchadji JC, Tchouangueu TF, Biloa MZ, Atabonkeng EP, Fumba MI, et al. A cross-sectional study of acute dengue infection in paediatric clinics in Cameroon. BMC public health. 2019;19:1–7. Available from: https://doi.org/10.1186/s12889-019-7252-9.
2. Lakshmi SD, Devi PN, Saikumar C. The seroprevalence of dengue in a tertiary care hospital. International Journal of Current Microbiology and Applied Sciences. 2018;7(9):43–51. Available from: https://www.ijcmas.com/7-9-2018/S.%20Dhivya%20Lakshmi,%20et%20al.pdf.
3. Abrol A, Dewan A, Agarwal N, Galhotra A, Goel NK, Swami HM. A Clinico-Epidemiological Profile of Dengue Fever Cases in a Peri-Urban Area of Chandigarh. The Internet Journal of Epidemiology. 2006;5(1). Available from: https://ispub.com/IJE/5/1/5335.
4. Garg A, Garg J, Rao YK, Upadhyay GC, Sakhuja S. Prevalence of dengue among clinically suspected febrile episodes at a teaching hospital in North India. Journal of Infectious Diseases and Immunity. 2011;3(5):85–89. Available from: https://academicjournals.org/article/article1379601302_Garg%20et%20al.pdf.
5. W S. Comprehensive Guideline for Prevention and Control of Dengue and Dengue Haemorrhagic Fever. Revised and expanded edition. World Health Organization. 2011. Available from: https://iris.who.int/bitstream/handle/10665/204894/B4751.pdf?sequence=1&isAllowed=y.
6. National Vector Borne Disease Control Programme. Dengue Cases and Deaths in the Country since 2007. 2013. Available from: http://www.nvbdcp.gov.in/den-cd.html.

7. Dengue Situation in India. Dengue Cases and Deaths in the Country since 2019. . Available from: https://ncvbdc.mohfw.gov.in/index4.php?lang=1&level=0&linkid=431&lid=3715.
8. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, Moyes CL, et al. The global distribution and burden of dengue. Nature. 2013;496(7446):504–507. Available from: https://www.nature.com/articles/nature12060.
9. Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control. WHO Guidelines Approved by the Guidelines Review Committee. 2009. Available from: https://pubmed.ncbi.nlm.nih.gov/23762963/.
10. WHO guidelines on drawing blood: best practices in phlebotomy. 2010. Available from: https://www.who.int/publications/i/item/9789241599221.
11. Dengue. Centers for Disease Control and Prevention. . Available from: http://www.cdc.gov/dengue/resources/dengueCaseReports/DCIF_English.pdf.
12. Rao MSS, Pavani K, Dass M, Kareem MA, Vinayaraj EV. Seroprevalence of dengue virus in a tertiary care hospital, Andhra Pradesh, South India. International Journal of Research in Medical Sciences. 2017;1(4):448–450. Available from: https://www.msjonline.org/index.php/ijrms/article/view/2647.
13. Deshkar ST, Raut SS, Khadse RK. Dengue infection in central India: a 5 years study at a tertiary care hospital. International Journal of Research in Medical Sciences. 2017;5(6):2483–2489. Available from: https://doi.org/10.18203/2320-6012.ijrms20172433.
14. Kale AV, Haseeb M, Reddy CS, Khan S, Golwalkar A, Badaam KM. Clinical Profile and Outcome of Dengue Fever from a Tertiary Care Centre at Aurangabad Maharashtra India: An Observational Study. IOSR Journal of Dental and Medical Sciences. 2014;13(9):14–19. Available from: http://dx.doi.org/10.9790/0853-13971419.
15. Kumar M, Sharma R, Parihar G, Sharma M. Seroprevalence of dengue in central Rajasthan: a study at a tertiary care hospital. International Journal of Current Microbiology and Applied Sciences . 2015;4(9):933–940. Available from: https://www.ijcmas.com/vol-4-9/Mahesh%20Kumar,%20et%20al.pdf.
16. Patel P, Bhatnaga R. Seroprevalence of dengue infection: A hospital based study from Udaipur, Rajasthan. The Journal of Community Health Management. 2018;5(1):10–12. Available from: https://doi.org/10.18231/2394-2738.2018.0003.
17. Karoli R, Fatima J, Siddiqi Z, Kazmi KI, Sultania AR. Clinical profile of dengue infection at a teaching hospital in North India. The Journal of Infection in Developing Countries. 2012;6(07):551–554. Available from: https://doi.org/10.3855/jidc.2010.
18. Ahammad SF, Manohar B, Basha SM, Prasad TD, Hakeem RB, Sripraharshita G. Clinico-demographic profile of dengue fever in a south indian tertiary care teaching hospital. World journal of pharmacy and pharmaceutical sciences. 2015;5(1):1602–1609. Available from: https://www.wjpps.com/wjpps_controller/abstract_id/4486.
19. Jyothi P, Metri BC. Correlation of serological markers and platelet count in the diagnosis of Dengue virus infection. Advanced biomedical research. 2015;4(26):1–4. Available from: https://doi.org/10.4103/2277-9175.150396.
20. Sood S. A Hospital Based Serosurveillance Study of Dengue Infection in Jaipur (Rajasthan) , India. Journal of clinical and diagnostic research: JCDR. 2013;7(9):1917–1920. Available from: https://doi.org/10.7860/JCDR/2013/5562.3357.
21. Nimmannitya S. Clinical management of dengue fever/dengue haemorrhagic fever/dengue shock syndrome. Dengue Bulletin. 1996;20:13–19. Available from: https://iris.who.int/bitstream/handle/10665/147906/dbv20p13.pdf.
22. Turbadkar D, Ramchandran A, Mathur M, Gaikwad S. Laboratory and clinical profile of dengue: A study from Mumbai. Annals of Tropical Medicine and Public Health. 2012;5(1):20–23. Available from: http://dx.doi.org/10.4103/1755-6783.92873.

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