

A cross sectional study to assess the prevalence of Dengue fever in a tertiary care hospital in West Bengal

*Dr. Sanjit Kumar Patra¹, Dr. Nandita Pal², Dr. Moumita Adhikary², Dr. Partha Sarathi Chakrabarty², Dr. Sumanta Chatterjee³

¹Associate Professor & Head of the Department, Microbiology, College of Medicine & Sagore Dutta Hospital, Kamarhati, Kolkata-58

²Assistant Professor, Department of Microbiology, College of Medicine & Sagore Dutta Hospital, Kamarhati, Kolkata-58

³Demonstrator, Department of Microbiology, College of Medicine & Sagore Dutta Hospital, Kamarhati, Kolkata-58

Corresponding author: *Dr. Sanjit Kumar Patra

Abstract: There was a Dengue outbreak in Kolkata in 2016. Objectives of the present cross sectional study were to assess the prevalence of Dengue amongst the patients attending a tertiary care hospital in Kolkata and to assess Dengue NS1 ELISA as an early diagnostic tool. Clinically suspected patients with less than five days of fever were tested by Dengue NS1 ELISA where as fever cases with ≥ 5 days of duration were tested by IgM Capture ELISA for detection of Dengue specific antibody. Dengue NS1 seropositive cases were requested to revisit after one week for follow up and test their Dengue specific IgM status. Source of the data was hospital records. A total of 3111 dengue suspected cases were tested for Dengue IgM MAC ELISA (IgM Antibody Capture ELISA); out of which, 1505 cases were found to be reactive (48.37%) where as 3881 clinically suspected cases were tested by Dengue NS1 ELISA and 1462 were found to be reactive (37.67%). 57 Dengue NS1 seropositive cases were followed up after one week and 49 of them were found to be Dengue IgM reactive (85.96%). Majority of the IgM reactive cases 879 out of 1505 i.e., 58.4% and 939 out of 1462 NS1 reactive cases i.e., 64.22% were male patients. Most of the Dengue IgM seropositive cases belonged to the age group 20 years to 40 years (63.2%) and similar was the finding in case of Dengue NS1 seropositive cases (67.3%). Onset of the outbreak started in June and the post monsoon peak was noted in September and October, 2016. Strict surveillance and compliance with the vector control programme are required to prevent Dengue outbreak.

Keywords: Dengue, Prevalence, NS1 ELISA, IgM ELISA

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I. Introduction

Dengue fever is a disease caused by Dengue virus, a member of Flaviviridae. It is an arbovirus transmitted by *Aedes spp.* mosquito. There are four serotypes DV-1, DV-2, DV-3 and DV-4. It is a single stranded RNA virus (positive sense) and is composed of three structural protein genes, which encode the nucleocapsid or core (C) protein, a membrane-associated (M) protein, an enveloped (E) glycoprotein and seven non-structural (NS) proteins¹. There are two potentially fatal complications of Dengue Fever (DF) - Dengue Haemorrhagic Fever (DHF) & Dengue Shock Syndrome (DSS). Complications are more common in extremes of ages and immunocompromised persons. Sequential infections by different serotypes have been implicated for contributing to complications especially if infection with DEV-1 is followed by DEV-2 or DEV-3². Recently fifth serotype has been reported³. In Kolkata (Calcutta) Dengue was first documented in 1824. Thereafter several epidemics of Dengue were observed in Kolkata in 1836, 1906, 1911 and 1923. This epidemic in 1923 was of severe degree affecting about 40% of people. In India, DHF was first reported in Kolkata in 1963-64 where 200 people expired. Another outbreak of DHF occurred in 1990 in Kolkata where 12 children died. In the recent past, there has been a large outbreak involving almost all districts of West Bengal with 6293 cases and 27 deaths in the year 2005. In Kolkata alone, 3967 persons were infected and 14 deaths were reported. This has been followed by smaller number of cases occurring in subsequent years⁴. With increasing global warming, urbanisation and emerging resistance to the insecticides used against the vectors, there are apprehensions about occurrence of an outbreak in coming years.

Present study aims at a comprehensive assessment of dengue outbreak occurred throughout Kolkata in 2016.

The objectives of this study were:

- (i) Assessment of Dengue prevalence amongst the patients attending a tertiary care hospital in Kolkata.
- (ii) Assessment of early detection of Dengue by Dengue NS1 ELISA.

Material & methods:

The epidemiological data were collected from hospital records of College of Medicine and Sagore Dutta Hospital, Kamarhati, Kolkata.

The cross sectional study was performed in the department of Microbiology, College of Medicine & Sagore Dutta Hospital, Kamarhati, Kolkata from January to December 2016 with all clinically suspected patients attending this tertiary care centre having fever with the clinical features as mentioned under the inclusion criteria. Blood was collected aseptically from suspected cases, serum was separated and analysed by ELISA technique to detect Dengue NS1 antigen when duration of fever was less than five days and Dengue specific IgM antibodies when duration of fever was for ≥ 5 days. Inclusion criteria were as follows:

Fever with two or more of the following symptoms –

- Rash
- Body ache
- Malaise
- Myalgia
- Arthralgia
- Retro orbital pain
- Eye congestion.

Known immunocompromised patients were excluded from the study. Statistical analysis was determined by parametric & non-parametric test(s). For comparison of means of two groups, student's t test (sample size <30) or z test (sample size >30) and for ≥ 3 groups, Analysis of Variance or ANOVA will be done. Qualitative data analysis was done by Chi-square test or Fischer's test (smaller sample size). Null hypothesis was rejected when p value <0.05 .

Results were presented as follows:

1. Qualitative data – pie diagram
2. Quantitative data – trend line

Standard statistical software packages like SPSS, SAS & R were utilised.

There was no ethical controversy and conflict of interest.

II. Results

A total of 3111 dengue suspected cases were tested for Dengue IgM MAC ELISA (IgM Antibody Capture ELISA); out of which, 1505 cases were found to be reactive (48.37%) where as 3881 clinically suspected cases were tested by Dengue NS1 ELISA and 1462 were found to be reactive (37.67%). 57 Dengue NS1 seropositive cases returned after one week for follow up and 49 of them were found to be Dengue IgM seropositive (85.96%). Majority of the IgM reactive cases 879 out of 1505 i.e., 58.4% and 939 out of 1462 NS1 reactive cases i.e., 64.22% were male patients.

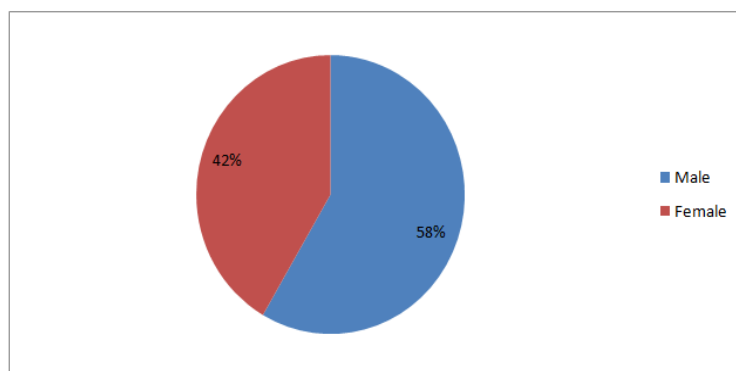


Fig 1: Pie diagram showing the sex wise distribution of Dengue IgM seropositive cases.

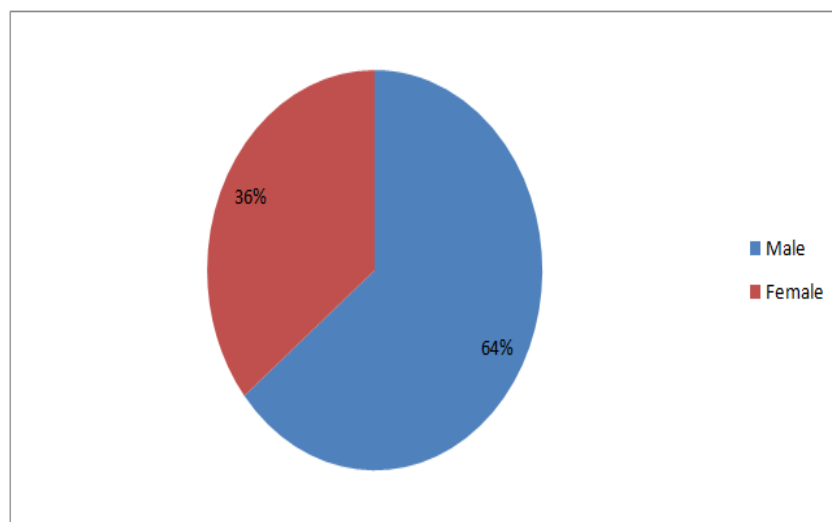


Fig 2: Pie diagram showing the sex wise distribution of Dengue NS1 seropositive cases.

Most of the Dengue IgM seropositive cases belonged to the age group 20 years to 40 years (63.2%) and similar was the finding in case of Dengue NS1 seropositive cases (67.3%). Onset of the outbreak started in June and the post monsoon peak was noted in September and October, 2016.

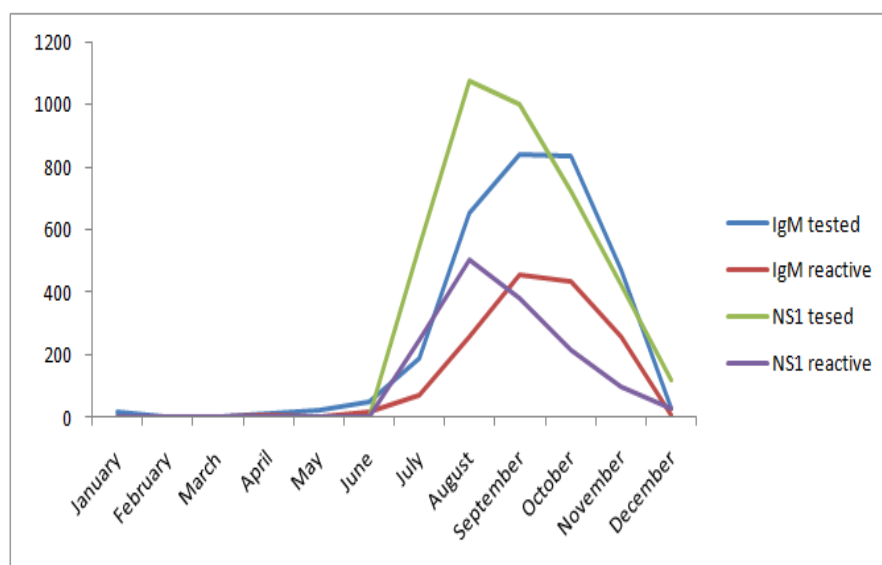


Fig-3: Monthly distribution of Dengue serology.

III. Discussion

The present study had concentrated on the epidemiology of Dengue fever in a tertiary care hospital of Kolkata in 2016. In this study, the highest number of Dengue IgM seropositive cases (63.2%) and Dengue NS1 seropositive cases (67.3%) were recorded in the age group 20-40 years with male preponderance. Findings of Gupta et al⁵ and Chakravarti et al⁶ were similar to our study i.e., maximum cases were in the age group (21-30 years) and in the finding that the male patients clearly outnumbering the female patients. However Sarkar et al⁷ reported that maximum cases were in the age group ≤ 10 years and there was female preponderance in their study.

The majority of the cases were reported during the post-monsoon seasons with a peak during September and October in accordance with the established findings by P. Reiter⁸. Our finding in this study corroborates with the findings of Hati⁹, Taraphdar et al¹⁰, and Sarkar et al¹¹. NS1 ELISA seems to be a promising tool for early diagnosis as reported in the study of Pal et al¹².

IV. Conclusion

Strict surveillance and compliance with the vector control programme are required to prevent Dengue outbreak especially in post monsoon months as no effective vaccine or chemoprophylaxis against Dengue is available till date.

Limitations of the study

Haemagglutination inhibition test or Complement Fixation test or genotyping with the preserved Dengue IgM reactive sera is to be performed for Dengue serotype identification. This will help to identify the predominant Dengue serotypes circulating in this geographical region in order to predict the occurrence of complications like Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS).

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References

- [1]. D. J. Gubler, "Dengue and dengue hemorrhagic fever," *Clinical Microbiology Reviews*, 1998. vol. 11, issue no. 3, pp. 480–496.
- [2]. Leysen, P., E. D. Clercq, and J. Neyts. Perspectives for the treatment of infections with Flaviviridae. *Clin. Microbiol. Rev.* 2000. 13:67–82.
- [3]. Lt Col M.S. Mustafa, Col V. Rasotgi, Col S. Jain Lt Col V. Gupta Discovery of fifth serotype of dengue virus (DENV-5): A new public health dilemma in dengue control. *MJAFI* 2015 Volume 71, Issue 1, Pages 67–70.
- [4]. A. K. Hati, "Studies on dengue and dengue haemorrhagic fever (DHF) in West Bengal State, India," *Journal of Communicable Diseases* 2006, vol. 38, no. 2, pp. 124–129.
- [5]. E. Gupta, L. Dar, G. Kapoor, and S. Broor, —The changing epidemiology of dengue in Delhi, India, *Virology Journal*, 2006, vol. 3, article 92.
- [6]. A. Chakravarti and R. Kumaria, —Eco-epidemiological analysis of dengue infection during an outbreak of dengue fever, India, *Virology Journal*, 2005, vol. 2, article 32.
- [7]. A. Sarkar, D. Taraphdar, and S. Chatterjee, —Molecular typing of dengue virus circulating in Kolkata, India in 2010, *Journal of Tropical Medicine*, 2012, vol. 2012, Article ID 960329, 5 pages.
- [8]. P. Reiter, —Climate change and mosquito—borne disease, *Environmental Health Perspectives*, 2001, vol. 109, supplement 1, pp. 141– 161.
- [9]. A. K. Hati, —Dengue serosurveillance in Kolkata, facing an epidemic in West Bengal, India, *Journal of Vector Borne Diseases*, 2009, vol. 46, no. 3, pp. 197–204.
- [10]. D. Taraphdar, A. Sarkar, M. K. Bhattacharya, and S. Chatterjee, —Sero diagnosis of dengue activity in an unknown febrile outbreak at the Siliguri Town, District Darjeeling, West Bengal, *Asian Pacific Journal of Tropical Medicine*, 2010, vol. 3, no. 5, pp. 364–366.
- [11]. A. Sarkar, D. Taraphdar, and S. Chatterjee, —Investigations of recurrent outbreaks of unknown fever, establish rural dengue activity in West Midnapore, a coastal district in West Bengal, India, *Archives of Clinical Microbiology*, 2010, vol. 1, no. 4.
- [12]. Pal S, Dauner AL, Mitra I, Forshey BM, Garcia P, et al. (2014) Evaluation of Dengue NS1 Antigen Rapid Tests and ELISA Kits Using Clinical Samples. *PLOS ONE* 9(11): e113411.

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