ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 1, 2024

Comparative And Evaluation Of Dengue By Rapid Serological Card Test And ELISA Kit With Revealing Variation In Result Using Clinical Sample At Tertiary Care Hospital Udaipur, Rajasthan

Abdul Majid Khan[1], Dr. Jyoti Tomar[2]

[1]Ph.D. Scholar, Department of Microbiology, Pacific Institute of Medical Science, Udaipur, Rajasthan, India
[2]Associate Professor, Department of Microbiology, Pacific Institute of Medical Science, Udaipur, Rajasthan, India

Corresponding Author:
Abdul Majid Khan
Email: majidkhanbds@gmail.com

Received: 21/12/2023, Accepted: 25/01/2024, Published: 31/01/2024

Abstract

Background: Dengue fever and Dengue Haemorrhagic fever (DF/DHF) is an acute viral disease caused by Dengue virus.The infections is transmitted by the bite of an infected female mosquito-*Aedes aegypti*. The Dengue virus causes significant morbidity and mortality in many parts of the world, including India, where it was first isolated in Calcutta, West Bangal during 1945.This study was conducted to know comparative and evaluation of Dengue by rapid serological card test and ELISA kit with revealing variation in result using clinical Sample at tertiary Care Hospital Pacific Institute of Medical Science, Udaipur, Rajasthan

Aim and Objectives: Evaluation of Dengue by Rapid Test and ELISA Kit using Clinical Sample and comparison of these two tests.

Material and Methods: Blood for serological studies are carefully collected taking due universal precaution from suspected DF/DHF cases as soon as possible after hospital admission or attendance. All the patient were screened for anti-dengue IgM and IgG antibody By Enzyme Immunoassay.The study period was 12 month from 2021.

Reasult: From a total of 595 serum sample tested were screened for Dengue IgM and IgG among which 210(35%) were positive. 85(4047%) were only IgM positive and 45(21.4%) of the tested sample showed onlyI gG positive. 80(38.09%) of the tested samples revealed positive for both IgM and IgG antibodies.

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 and to timely preventive and control measures.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 1, 2024

Keywords: DF/DHF, Dengue fever and Dengue Haemorrhagic fever

INTRODUCTION:

Dengue is a mosquito borne viral infection that is common in warm, tropical climate. Infection is caused by one of four closely related dengue viruses called serotypes. Dengue can lead to wide spectrum of symptom; including some are extremely mile to those that may required medical intervention and hospitalization. The incidence of dengue has grown dramatically around the world in recent decades, with cases reported to WHO increased from 5,05,430 cases in 2000 to 5.2 million in 2019. According to the World Health Organization, dengue fever is one of the greatest 10 threats to public health worldwide.

Dengue fever has broken out in a number of states throughout India, and the disease has reached epidemic proportions in certain of those areas. Dengue is a disease for which there is no known treatment or cure at this time; however, earlier diagnosis of the disease and adequate medical care may help minimize the mortality rate associated with it.

To attain the target of lowering the mortality rate from dengue by at least 50%, each country must follow the criteria given by the WHO. Reducing dengue-related mortality by improving[1] case management and diagnosis and technical competence through capacity building at the organizational and individual levels. The World Health Organization (WHO) recommends that therapeutic therapy include rapid laboratory tests and an early response to dengue. These factors are also crucial for providing an effective diagnosis. Early detection in febrile patients as a symptom of severe dengue infection can be achieved by laboratory testing utilizing non-structural protein 1 (NS1), as well as antigen and Enzyme-linked immunosorbent assay (ELISA) The World Health Organization recommends a battery of diagnostic procedures to confirm a dengue infection. Dengue infection may be detected most reliably within the first six days of illness (febrile) by virus isolation, detection of viral nucleic acid or antigen, and testing for dengue infection. After the acute phase of a disease has passed, however, immunological tests remain the gold standard for diagnosis. Therefore, a physician must detect the febrile phase to choose the appropriate diagnostic test. The underlying source of the problem is that some people still have a low awareness of fever as an indication of dengue. Acute febrile illness is a problem in nearly every country due to the prevalence of infectious diseases including malaria and the flu. The death rate from dengue has dropped to below 1% in countries where early detection of the disease and such medical care are readily available.

Indian infrastructure of medical health, level of health care, awareness of dengue among general population, availability of laboratory investigation and treatment at periphery are some crucial factor responsible for high morbidity and mortality associated with dengue. To curtail morbidity and mortality associated with dengue, early diagnosis and starting of prompt treatment is required.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 1, 2024

Objectives: Evaluation of Dengue by Rapid Test and ELISA Kit using Clinical Sample and comparison of these two tests.

Material and Methods: A cross-sectional study was carried out at Department of Microbiology at the Pacific Institute of Medical Science (PIMS) in Udaipur, Rajasthan during October 2020 to September 2021. Sample size was calculated by Z^2PQ/L^2 where P was considered 31% and L was considered 12% of P. Based on formula, total sample size was calculated as 595. Patients reported with fever were assessed clinically and those who found suspected for dengue (based on clinical symptoms and signs such as feverish illness of 2-7 days duration, with symptoms such as headache, myalgia, arthralgia, rash, hemorrhagic signs) were further confirmed by RAPID DENGUE DUO CASSETTE METHOD and ELISA. Confirm cases of dengue were interviewed for collection of socio-demographic data, clinical history, co-morbidities, treatment history etc. collected data were recorded in individual patient information sheet.

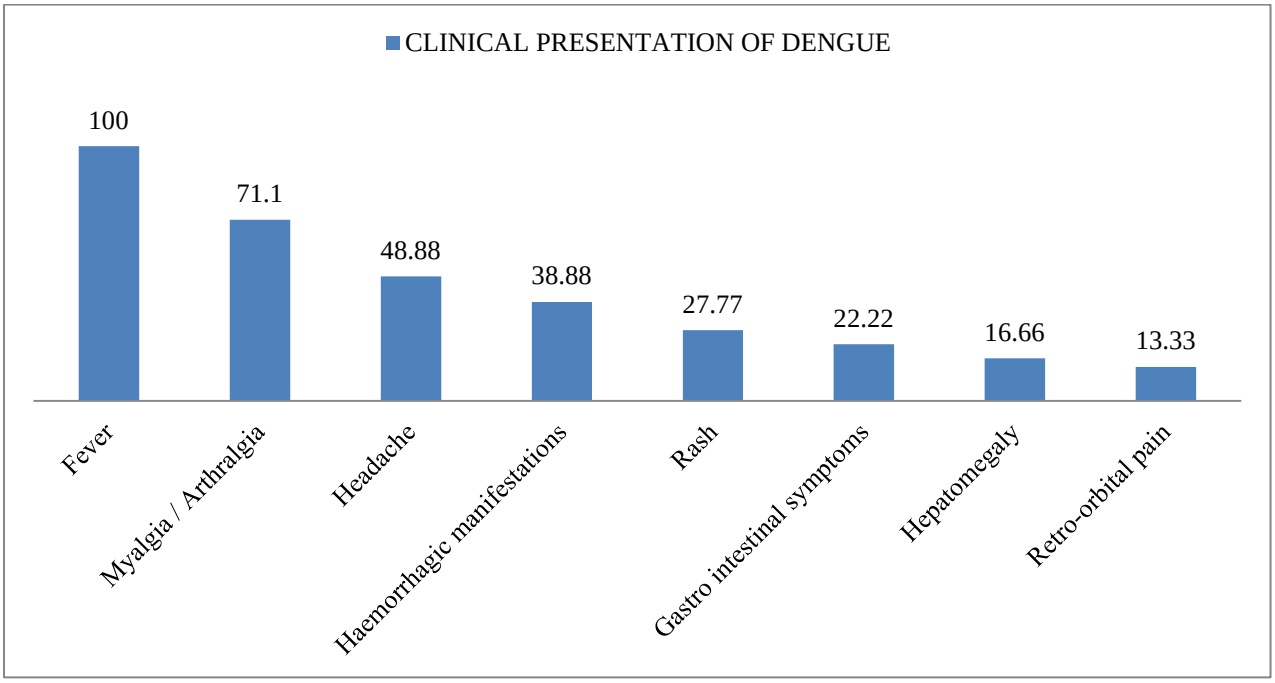
RAPID DENGUE DUO CASSETTE METHOD: The Dengue Test is a rapid immuno-chromatographic test that uses solid phase for the qualitative detection of dengue NS1 antigen and the differential identification of IgM and IgG antibodies to dengue virus in human blood or plasma. It is designed to help in the early identification of dengue illness and to offer a provisional diagnosis that distinguishes between primary and secondary dengue infection.
DENGUE SPECIFIC NS1 ANTIGEN and IgM, IgG ELISA (MICROLISA)- DENGUE NS1 Ag MICROLISA kit is a solid phase enzyme linked immunosorbent assay (ELISA) based on the "Direct Sandwich" principle. The microwells are coated with Anti-dengue NS1antibodies with high reactivity for Dengue NS1 Ag.

Ethical Clearance from Institute: Study was started after approval from Ethics Review Committee. Written consent was taken from each participant after explaining procedure and purpose of study. Confidentiality of data was promised to participants.
Statistical analysis: Statistical analyses were carried out using Statistical Package for Social Sciences (SPSS) and Epi-Info softwares. The data were represented as tables and figures. The proportional data of this cross-sectional study was tested using Pearson's Chi- Square analysis test.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 1, 2024

Results: During study period of one year, total ten thousand fever cases were examined and out of them, 595 were suspected for dengue, based on clinical grounds. Suspected cases were investigated for confirmation of dengue. Incidence of dengue was found 2% among febrile cases while sero -prevalence was 34% out of suspected 595 cases. Among 200 dengue cases, 150 (75%) were male while 50 (25%) were females. About 50% of dengue cases were in the age range of 21 to 40 years followed by 0 to 20 years (26.31%), >40 yrs old patient(12.50%). According to WHO guidelines dengue cases in the present study were categorized into dengue fever (DF) 158(79%), dengue haemorrhagic fever(DHF) 35(17.5%) and dengue shock syndrome(DSS) 7(3.5%).

FIGURE 01: CLINICAL PRESENTATION OF DENGUE (n=200)



As fever was considered as inclusion criteria, fever was present in 100% of cases followed by myalgia/arthralgia (71.1%), headache (48.88%), Haemorrhagic manifestations (38.88%), Rash (27.77%), Gastro intestinal symptoms (22.22%), Hepatomegaly (16.66%), Retro-orbital pain (13.33%).

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 1, 2024

TABEL-1: COMPARISION OF VARIOUS METHODS USED FOR DIAGNOSIS OF DENGUE(n-595)

Methods	Positive	Percentage(%)
Rapid test	200	33.61
IgM ELISA	85	14.28
IgG ELISA	45	7.56
IgM+IgG ELISA	80	13.44

By RAPID test 200 patients were found positive for dengue while with ELISA 210 patients were found positive. ELISA detection method was more sensitive than RAPID for the detection of dengue from clinically suspected cases.

TABLEB-2: CATEGORISATION OF DENGUE INTO PRIMARY AND SECONDARY INFECTIONSBASED ON IgM : IgG RATIO (n=200)

IgM : IgG Ratio	Number ofcases	Percentagee	Interpretation
≥1.78	85	42.5	Primary Dengue Infection
<1.78	115	57.5	Secondary Dengue infection

Secondary dengue infection (57.5%) is higher than primary dengue infection (42.5%).

Discussion: Department of microbiology conducted a cross-sectional study on 595 suspected cases of dengue found during one year. Suspected cases were confirmed by various test such as RAPID and ELISA test by using slandered protocol. Incidence of dengue was found 2% among ten thousand febrile cases while sero -prevalence was 34% out of suspected 595 cases. Fever was most common symptom (100%) followed by myalgia/arthralgia (71.1%) and headache (48.88%). Haemorrhagic manifestations were found in 38.88% of cases. ELISA detection method found more perceptive than RAPID for the detection of dengue from clinically suspected cases.

According to accounts originating from many other states in India, dengue is almost exclusively a disease that affects adults. Adults were disproportionately represented among those who contracted dengue fever during outbreaks that occurred in the states of Uttar

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 1, 2024

Pradesh (Kishore, 2006)[1], Maharashtra (Mehendale, 1991)[2], Chandigarh (Ratho, 2005)[3], Punjab (Kaur, 1997)[5], and Haryana (Kumar, 2001)[4]. On the other hand, when dengue outbreaks occurred in the states of Tamil Nadu (Paramasivan et, 2006)[6], Uttar Pradesh (Tripathi, 2008), West Bengal (Bhattacharjee, 1993), and Madhya Pradesh (Parida, 2002), the age range of 5 to 12 years old had the largest number of reported cases. Another conclusion from our research was that more male were affected than female with the dengue virus. Several research (Trravassos et al., 2000)[10], (Garcia-Rivera et al., 2003)[10], Gunther et al., 2009)[11] have concluded that there is either no difference in the prevalence of dengue between the sexes. In North America or that females make up a greater proportion of those who contract the disease.

The findings showed that IgG was present in 21.4% of all persons who were examined, indicating that they had either had a previous infection or a subsequent illness. This rate is lower than the one found in Kolkata, India, where 73.51% of those who were tested for IgG positivity between 2005 and 2007 (Hati, 2009)[12] came back positive.

Conclusion: The epidemiology of dengue fever in India has become exceedingly complex and has experienced continuous adjustments over the course of the last several decades. Early diagnosis of dengue can be facilitated by the collection of clinical information as well as the rapid detection of dengue infection. Males were three times more likely to be affected than females. Age group of 21 to 40 was more expose to dengue infection. ELISA is considered as more sensitive diagnostic test than RAPID test. It was discovered that the majority of patients had either original dengue (42.5%) or secondary dengue (57.5%).

Acknowledgement- Researchers acknowledge for contribution of patients and survey team.
Funding-No
Conflict of interest-None

REFRENCES-

1. Kishore J, Singh J, Dhole TN, Ayyagari A. Clinical and Serological Study of First Large Epidemic of Dengue in and around Lucknow, India, in 2003.
2. Ganeshkumar P, Murhekar MV, Poornima V, Saravanakumar V, Sukumaran K, Anandaselvasankar A, John D, Mehendale SM. Dengue infection in India: A systematic review and meta-analysis. PLoS neglected tropical diseases. 2018 Jul 16;12(7):e0006618.
3. Ratho RK, Mishra B, Kaur J, Kakkar N, Sharma K. An outbreak of dengue fever in Peri Urban slums of Chandigarh, India, with special reference to entomological and climatic factors. Indian Journal of Medical Sciences. 2005 Dec 1;59(12):518-26.
4. Babbar R, Kaur R, Rana P, Arora S, Behl T, Albratty M, Najmi A, Meraya AM, Alhazmi HA, Singla RK. The Current Landscape of Bioactive Molecules against DENV: A

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 1, 2024

Systematic Review. Evidence-Based Complementary and Alternative Medicine. 2023 Feb 10;2023.

5. Khormi HM, Kumar L. Modeling dengue fever risk based on socioeconomic parameters, nationality and age groups: GIS and remote sensing based case study. Science of the Total Environment. 2011 Oct 15;409(22):4713-9.
6. Paramasivan R, Thenmozhi V, Hiriyan J, Dhananjeyan KJ, Tyagi BK, Dash AP. Serological & entomological investigations of an outbreak of dengue fever in certain rural areas of Kanyakumari district, Tamil Nadu. Indian Journal of Medical Research. 2006 May 1;123(5):697.
7. Heu K, Gendrin M. Mosquito microbiota and its influence on disease vectorial transmission. Biologie Aujourd'hui. 2018;212(3-4):119-36.
8. Roy SK, Bhattacharjee S. Dengue virus: epidemiology, biology, and disease aetiology. Canadian journal of microbiology. 2021;67(10):687-702.
9. Da Rosa AT, Vasconcelos PF, Da Rosa ET, Rodrigues SG, Mondet B, Cruz AC, Sousa MR, Da Rosa JT. Dengue epidemic in Belém, Pará, Brazil, 1996-97. Emerging Infectious Diseases. 2000 May;6(3):298.
10. García-Rivera EJ, Rigau-Pérez JG. Dengue severity in the elderly in Puerto Rico. Revista Panamericana de Salud Pública. 2003 Jun;13(6):362-8.
11. Günther J, Ramírez-Palacio LR, Pérez-Ishiwara DG, Salas-Benito JS. Distribution of dengue cases in the state of Oaxaca, Mexico, during the period 2004–2006. Journal of Clinical Virology. 2009 Jul 1;45(3):218-22.
12. Hati AK. Dengue serosurveillance in Kolkata, facing an epidemic in West Bengal, India. J Vector Borne Dis. 2009 Sep 1;46(3):197-204.