ORIGINAL RESEARCH

Evaluation of the NS-1 antigen detection test for early diagnosis of dengue infection

Dr.Ashish Kumar Joshi

Assistant Professor, Department of Biochemistry, Index Medical College, Indore, Madhya Pradesh, India

Corresponding Author
Dr.Ashish Kumar Joshi
Assistant Professor, Department of Biochemistry, Index Medical College, Indore, Madhya Pradesh, India

Received: 03July, 2023 Accepted: 06july, 2023

ABSTRACT

Background: Acute febrile dengue fever is an arbo-viral illness that mostly affects tropical and subtropical regions worldwide. Over the past 50 years, the disease's incidence has grown, and 2.5 billion people now live in dengue-endemic areas. This study aims to assess the NS1 Ag test as a novel diagnostic tool for dengue virus infection early detection in a tertiary care setting. **Materials and Procedures:** From January 2023 to June 2023, this study was carried out in a tertiary care centre at Index Medical College Indore. Serum samples from 500 patients collected. **Result:** 500 suspected dengue fever samples were collected, of which 80 patients were found to be NS1 antigen positive. **Conclusion:** An intensive laboratory-based disease surveillance strategy that can offer early warning of approaching epidemic transmission is necessary for the effective prevention and control of the dengue outbreak.

Key words:NS1 antigen, dengue fever

INTRODUCTION

Acute febrile dengue fever is an arbo-viral illness that mostly affects tropical and subtropical regions worldwide. Over the past 50 years, the disease's incidence has grown, and 2.5 billion people now live in dengue-endemic areas[1].Up to 100 million people may be impacted annually; there are 500,000 instances of dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) and about 30,000 fatalities, the majority of which are in children[2].

Non-structural protein 1, or NS1, is a highly conserved glycoprotein that the virus produces in both membrane-associated and secretory forms and is necessary for the survival of DV[7].Early in the disease's clinical course, DV-infected patients' sera have shown significant amounts of NS1 antigen (NS1 Ag), according to enzyme-linked immunosorbent tests (ELISA) targeting it[7].A novel method for identifying acute DV infection is the measurement of secretory NS1 protein[3].

This study aims to assess the NS1 Ag test as a novel diagnostic tool for dengue virus infection early detection in a tertiary care setting.

MATERIAL METHOD

From January 2023 to June 2023, this study was carried out in a tertiary care centre at Index Medical College Indore. Serum samples from 500 patients who attended various outdoor causality services and indoor patients who were clinically suspected of being probable cases (defined as any acute febrile illness with one or more of the following symptoms: myalgia, headache, retro-orbital pain, bleeding, altered sensorium, shock, or low platelet count) were received and registered in the study. A thorough physical examination, baseline investigations, and a clinical history were conducted.

Every suspected patient had five millilitres of blood drawn, and the serum was separated and subjected to an Immunochromatography (ICT) based RDT lateral flow assay (J Mitra & Co Pvt Ltd, New Delhi) to test for the presence of NS 1Ag and IgM and IgG anti-dengue antibodies. Tests were run, and the results were read in accordance with the available literature.

RESULT AND DISCUSSION

RESULTS OF SAMPLE SCREENED FOR DENGUE SEROLOGY

Total sample	NS1 positive	Antibody positive	IgM positive	IgG positive
500	80	45	35	10

The isolation of the virus in cell culture, the detection of virus-specific antibodies, or the identification of viral antigens or nucleic acid are typically required for laboratory confirmation of dengue infection [4]. During the acute phase of the disease, direct virus detection may be utilised to identify dengue infections early, conclusively and specifically by serotype. Serum, plasma, whole blood, and infected tissues can contain live viruses or virus components (RNA or antigens) from 0 to 7 days after the onset of symptoms, which roughly corresponds to the duration of fever. Laboratories rarely carry out direct virus detection techniques, and there aren't many commercially validated kits to help with dengue diagnosis in this location Compared to methods like cell culture or RNA detection, serological tests are easier to perform and are therefore more frequently utilised to diagnose dengue infections [5].

Viability of the virus depends on NS1, a highly conserved nonstructural glycoprotein released by virus-infected cells during the acute phase of dengue [6]. All DENV serotypes have uniform circulation of NS1 Ag, which is highly circulated during the initial few days of sickness [7]. Its increased detection rate in acute phase sera is due to this. The diagnostic method for acute infections, which still involves the detection of specific IgM by MAC-ELISA, has the drawback of causing antibodies to take longer to manifest-5-10 days for primary dengue virus infections, and 4-5 days for secondary infections [8].

CONCLUSION

An intensive laboratory-based disease surveillance strategy that can offer early warning of approaching epidemic transmission is necessary for the effective prevention and control of the dengue outbreak. Consequently, in comparison to IgM antibody detection, NS 1Ag detection is a more useful method for the early diagnosis of DEN infection. Additionally, our research supports the conclusions of other authors who recommend using quick tests for diagnosis and surveillance following appropriate national agency validation for the detection of DEN NS1 Ag in addition to antibody assays.

SOURCE OF FUNDING: None.

CONFLICTS OF INTEREST: None declared.

REFERENCES

1. Smith AW, Chen LH, Massad E, Wilson ME. Threat of dengue to blood safety in dengue-endemic countries. Emerg Infect Dis 2009;15:8-11.
2. Guzman MG, Kouri G. Dengue: an update. Lancet Infect Dis 2002;2:33-42.
3. Dussart P, Labeau B, Lagathu G, Louis P, Nunes MRT, Rodrigues SG, *et al*. Evaluation of an Enzyme Immunoassay for detection of dengue virus NS1 antigen I human serum. Clin Vaccine Immunol 2006;13:1185-9.
4. Guzman, M G. & Kouri, G. Dengue diagnosis, advances and challenges. Int J Infect Dis.2004 Mar;8(2):69-80. Doi:http://dx.doi.org/10.1016/j.ijid.2003.03.003.
5. Vaughn, DW,Green S, Kalayanarooj S, Innis BL, Nimmannitya S, Suntayakorn S *et al*. Dengue viremia titer, antibody response pattern and virus serotype correlate with disease severity. J Infect Dis.2000 Jan;181(1): 2–9. Doi:10.1086/315215.
6. Hang VT, Nguyet NM, Trung DT, Tricou V, Yoksan S, Dung NM *et al*. Diagnostic accuracy of NS1 ELISA and lateral flow rapid tests for dengue sensitivity, specificity and relationship to viraemia and antibody responses. PLoSNegl Trop Dis 2009,3:e360. Doi:10.1371/journal.pntd.0000360.
7. Bessoff K, Delorey M, Sun W, Hunsperger E. Comparison of two commercially available dengue virus (DENV) NS1 capture enzyme-linked immunosorbent assays using a single clinical sample for diagnosis of acute DENV infection. Clin Vaccine Immunol. 2008 Oct 15(10);:1513-8. doi:10.1128/CVI.00140-08.
8. Datta S, Wattal C. Dengue NS1 antigen detection: A useful tool in early diagnosis of dengue virus infection. Indian J Med Microbiol 2010;28(2):107-10. Doi:10.4103/0255-0857.62484