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EVALUATION OF RAPID IMMUNO-CHROMATOGRAPHY TEST NS1/ Ig M/Ig G, NS1 ANTIGEN AND Ig M CAPTURE ENZYME LINKED IMMUNO-SORBENT ASSAY FOR DETECTION OF DENGUE VIRUS

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ABSTRACT

Rapid diagnosis of Dengue virus infection is essential for the patient management. The rapid immuno-chromatography test (Rapid ICT) and enzyme linked immuno-sorbent assay (ELISA) for dengue NS1 antigen and Ig M antibody. ELISA is giving more accurate result as compared to Rapid ICT. The Objective is to evaluate and compare rapid ICT and both ELISA for dengue virus infection. The laboratory records of clinically suspected dengue patients from January to August 2014 were analyzed retrospectively and results of NS1 antigen and antibody of dengue virus tested by rapid ICT and ELISA respectively and we compared the accuracy of both the tests. Both the rapid ICT and ELISA (NS1 and IgM) tests were performed by following the manufacturer's instructions. The NS1 capture ELISA showed excellent sensitivity as compared to rapid ICT. The rapid test detected NS1 antigen and 258 serum samples were positive out of 1106(23.33%). The ELISA test detected NS1 antigen and 146 serum samples were positive out of 258(56.59%). The ELISA IgM captured and 223 serum samples were positive out of 1482(15.05%).The present study emphasizes the continuous sero-epidemiological surveillance for the effective dengue virus infection control programme. These tests should be a useful aid in confirming the clinical diagnosis of dengue virus infection. The rapid test will be particularly valuable in peripheral health setting while the ELISA has a place in central testing Laboratories.

INTRODUCTION

The Dengue viruses (Serotypes DEN 1, 2, 3 &4) are transmitted by blood sucking arthropods from one vertebrate host to another. The vector acquires a lifelong infection through the ingestion of blood from a viremic vertebrate host. The viruses multiply in the tissues of the arthropod without evidence of disease or damage.

The major arboviral diseases distributed worldwide are Yellow Fever, Dengue, Japanese B Encephalitis, Chikungunya, St. Louis Encephalitis, Western Equine Encephalitis, Eastern Equine Encephalitis, Russian Spring Summer Encephalitis, Westnile Fever and Sand Fly Fever. The dengue is a flue like viral disease characterized by fever, rash, muscle and joint pain. It is spread by the bite of infected Aedes mosquitoes [1].

The vector-borne disease and mosquitoes breeding sites are playing an important role in the transmission and propagation of dengue.

MATERIAL AND METHODS

The study was conducted at a tertiary care Hospital from January to August 2014. Serum samples from suspected dengue cases were included in our study. Aseptic precautions, two to five ml of blood samples were collected by venipuncture from dengue suspected cases and samples were transported to the Microbiology laboratory in vaccine carriers with duly filled requisition forms. The serum was separated by centrifugation of the whole blood sample and stored in the refrigerator at -20^{o}C [2]. The test kits used were Dengue Day1 rapid ICT by J Mitra and Co.Pvt Ltd Okhla Ind area Ph-1, New Delhi, India and Dengue NS1 Ag MICROLISA supplied by J Mitra and Co.Pvt Ltd Okhla Ind area Ph-1, New Delhi, India and Dengue Ig M antibody capture ELISA supplied by Group leader, Arbovirus Diagnostics, National Institute of Virology, Pune, India. Three tests were performed strictly as per the manufacturers' instructions.

RESULTS

During eight months of study period, 1106 dengue suspected serum samples were analyzed by dengue NS1 rapid ICT, out of these 258 (23.33%) samples were positive for dengue NS1 antigen[Table No:1]. Similarly 258 dengue suspected serum samples were analyzed by dengue NS1capture ELISA, out of these 146(56.59%) samples were positive for dengue NS1 antigen[Table No: 2]. Similarly 1482 dengue suspected serum samples were analyzed by dengue IgM capture ELISA, out of these 223(15.05%) samples were positive for dengue Ig M antibody [Table No: 3].The percentage of positivity is more in dengue NS1 capture ELISA(56.59%) followed by Rapid ICT(23.33%) and next dengue Ig M capture ELISA(15.05%) [Table No: 4].

Table 1. Dengue NS1 Rapid Immuno-chromatography test (Rapid ICT NS1/Ig M/Ig G)

Samples Tested	Positive	Percentage	Negative
1106	258	23.33	848

Table 2. Dengue NS1 capture enzyme linked immuno-sorbent assay (NS1-ELISA)

Samples Tested	Positive	Percentage	Negative
258	146	56.59	112

Table 3. Dengue Ig M capture enzyme linked immuno-sorbent assay (Ig M-ELISA)

Samples Tested	Positive	Percentage	Negative
1482	223	15.05	1259

Table 4. Dengue NS1/IgM/IgG -Rapid ICT, NS1-ELISA and Ig M-ELISA Tests

NS1/IgM/IgG-Rapid ICT			NS1-ELISA			Ig M-ELISA		
Positive	Negative	Percentage	Positive	Negative	Percentage	Positive	Negative	Percentage
258	848	23.33	146	112	56.59	223	1259	15.05

DISCUSSION

During an epidemic diagnosis of dengue fever is essential for proper management of the patients. Clinically the dengue virus infection may remain asymptomatic or become symptomatic as dengue fever, dengue hemorrhagic fever or dengue shock syndrome [3]. The relatively benign dengue fever present with high grade fever accompanied by headache, retrobulbar pain, muscle& bone pain and generalized peticheal rash[3]. Some studies have tested the diagnostic accuracy of various commercially available dengue NS1 antigen capture ELISA, dengue Ig M antibody capture ELISA and Rapid ICT [2-9]. Our study is similar to previous studies in concerned to Both ELISA (NS1 antigen and Ig M antibody) and rapid tests.

CONCLUSION

The arboviral infections mainly Dengue, Chikungunya and Japanese B Encephalitis are most common in tropical and subtropical regions. The vector (mosquitoes) control is important preventive measure in community. The results of our study are important in diagnosing dengue infection as early as possible by rapid ICT detecting NS1 antigen and further confirmed by dengue NS1-ELISA/Ig M- ELISA. The serological results (Rapid ICT and NS1-ELISA tests) clearly establish the etiology.

Key message: The prevention is better than cure.

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