Clinical, microbiological profile of dengue cases reported at a tertiary care hospital in Telangana, India

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Abstract

Introduction: Dengue is the most common disease among all the arthropod borne viral diseases. Dengue viruses (DV) belong to the family Flaviviridae, and there are four serotypes of the virus referred to as DV-1, DV-2, DV-3, and DV-4 Dengue is the most common and widespread arboviral infection in the world today. It is an increasingly prevalent tropical arbovirus infection with significant morbidity and mortality. **Materials and Methods**: The study was carried out in the department of microbiology at Ronald Ross Institute of Tropical Diseases for a period of 6 years i.e. from January 2011 to December 2017. Blood was collected from each patient suspected to be suffering from dengue, at least 5 days after onset of fever. Serum was tested for the presence of dengue NS1 antigen and antihuman IgM antibodies using Panbio Dengue Early enzyme-linked immunosorbent assay (ELISA) kit and National Institute of Virology. **Results**: A total of 5181 samples were tested over a period of 7 years i.e. from 2011-2017. Out of which 1440 (27.79%) were sero-positive for dengue with symptoms of classical dengue fever. IgM in 1033(19.9%) NS1- 320(6.2%). A male preponderance was observed (905, 62.8%). **Conclusion**: As, during epidemic and nonepidemic years, dengue infections are mostly seen in post-monsoon season, hence preventive measures should be in full swing at the very onset of the monsoons

Keywords: Dengue, IgM Antibody, Dengue Early enzyme-linked immunosorbent assay, Flaviviridae

Introduction

Dengue is the most common disease among all the arthropod borne viral diseases [1]. Dengue viruses (DV) belong to the family Flaviviridae, and there are four serotypes of the virus referred to as DV-1, DV-2, DV-3, and DV-4 [2]. DV is a positive-stranded encapsulated RNA virus 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 nonstructural (NS) proteins.

It is transmitted mainly by Aedes aegypti mosquito and also by Ae. albopictus. All four serotypes can cause the full spectrum of disease from a subclinical infection to a mild self-limiting disease, the dengue fever (DF), a severe disease that may be fatal, and the dengue haemorrhagic fever/ dengue shock syndrome (DHF/DSS) [2]. Dengue viruses are disseminated in nature simply by a man-mosquito-man cycle. The domestic mosquito ***Ae. aegypti*** is the principal vector of the disease. No extra human reservoir is required for the maintenance of these viruses in the environment. The vector thrives in urban and semi urban localities congested with human population. The mosquito breeds usually during rains or in any waterlogged containers. The disease has usually affected malnourished persons specially males. For these reasons the epidemics of dengue infections occurred in the congested urban and semi-urban places in India [3].

An evident dengue infection was generally encountered in India during or after rains, as an outcome of rise in vector population. The febrile phase normally commenced during July or August and perpetuated till September or October [3].

Dengue is the most common and widespread arboviral infection in the world today. It is an increasingly prevalent tropical arbovirus infection with significant morbidity and mortality [4]. Dengue infection has been known to be endemic in India for over two centuries as a benign and self-

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limited disease. In recent years, the disease has changed its course manifesting in the severe form as DHF and with increasing frequency of outbreaks [5]. Dengue infection in a previously non-immune host produces a primary response of antibodies characterized by a slow and low-titer antibody response. IgM antibody is the first immunoglobulin isotype to appear. In a suspected case of dengue, the presence of anti-dengue IgM antibody suggests recent infection. Anti-dengue IgM detection using enzyme-linked immunosorbent assay (ELISA) represents one of the most important advances and has become an invaluable tool for routine dengue diagnosis [6]. Specifically, MAC ELISA (IgM antibody capture ELISA) diagnosis is based on detecting dengue-specific IgM [7].

Materials & Methods

The study was carried out in the department of Microbiology at Ronald Ross Institute of Tropical Diseases for a period of 6 years i.e. from January 2011 to December 2017 after taking institutes ethic committee approval. Fever cases of all age groups and either sex was included as per the following inclusion criteria

Inclusion criteria: All age groups with fever and other features suggestive of Dengue fever according to WHO criteria (headache, retro orbital pain, myalgia/arthralgia, rash, haemorrhagic manifestations, thrombocytopenia and leukopenia).

Exclusion criteria

- Those with other viral fevers with thrombocytopenia.
- Those with positive for Malaria parasite (All species).
- Those with acute and chronic liver disease.
- Those with blood dyscrasias.

For the detection of dengue-specific IgM antibodies, blood was collected from each patient suspected to be suffering from dengue, at least 5 days after onset of feverand age and sex of each patient were recorded. an informed consent was obtained from all patients who met the inclusion criteria.

Sample collection: The blood was allowed to clot at room temperature (20°C–25°C) and then centrifuged at 3300 rpm for 10 min. If not tested within 2 days, the separated serum was transferred to a sterile vial and stored frozen at -70 °C.

Enzyme-linked immunosorbent assay: Serum was tested for the presence of dengue NS1 antigen and antihuman IgM antibodies using Panbio Dengue Early enzyme-linked immunosorbent assay (ELISA) kit (Standard Diagnostics, Inc., Republic Korea) and National Institute of Virology (NIV) DEN IgM capture ELISA kit supplied by NIV, Pune, respectively, by ELISA as per the manufacturer's protocol. The Panbio Dengue Early ELISA is a dengue NS1antigen capture Elisa. It is for qualitative detection of NS1 Ag in human serum.

Statistical analysis: Based on age, patients were divided into five groups. Normally distributed continuous variables were summarized by mean and standard deviation. Remaining variables were summarized as median (interquartile range). All categorical variables were summarized as percentages. For data analysis, statistical software SPSS Statistics 24.0was used.

Results

A total of 5181 samples were tested over a period of 7 years i.e. from 2011-2017. Out of which 1440 (27.79%) were seropositive for dengue with symptoms of classical dengue fever. IgM was found in 1033 (71.73%) and NS1 – 320 (20.83%) (Table 1). A male preponderance was observed (905, 62.8%) while females (535, 37.2%). Maximum number of cases were reported in post-monsoon season august, September (35.2%, 1832). The predominant age group affected were children in the age group of 6-12 years (569, 10.9%) (Table 2). Fever was the most common presenting symptom (50.49%, 2616) followed by body pains and rash.

Table-1: Year- wise distribution of dengue positives.

Year	Total number tested	Number of positives	IgM positive	Ns1 positive
2011	305	27	15	8
2012	515	135	33	24
2013	229	30	26	4
2014	388	80	49	6
2015	1372	456	349	107
2016	1428	550	432	118
2017	944	162	129	53
Total	**5181**	**1440**	**1033**	**320**

Table-2: Age and sex- wise distribution of cases.

Year	Age 0-5		Age 6-12		Age 13-20		Age 21-30		Age 31-40		Age >40	
	M	F	M	F	M	F	M	F	M	F	M	F
2011	1	1	8	5	4	2	0	4	0	0	0	3
2012	7	5	32	13	15	9	21	7	14	19	2	0
2013	1	1	11	0	4	2	1	0	6	1	2	4
2014	1	1	14	2	11	5	9	4	21	2	9	3
2015	9	14	143	77	40	22	48	20	31	29	15	9
2016	1	3	116	94	60	39	60	50	76	23	17	5
2017	1	0	28	26	20	10	20	10	19	7	7	4

Discussion

Dengue is emerging as a major public health problem in India. India witnessed widespread dengue fever outbreaks. According to published reports, all four serotypes of the dengue virus are cocirculating in India [8]. Among 5181 cases tested 1033 (48.2%) were found to be positive for IgM antibodies to dengue by IgM capture.

ELISA method. In present study the ratio of positive cases among the males and females was 1.69:1. Similar results were found in studies conducted by Ira shah et al (48.44%), S.L. Hoti et al (50.6%), B. Mustafa MEH et al (36.9%) respectively [9,10,11]. In this study Ns1Ag test was positive 29.2% cases, Similar observation were seen in study by B. Mustafa MEH et al (31.2%) [11].

In the present study there was a strong correlation present between NS1Ag positivity and Dengue hemorrhagic fever and dengue shock syndrome complications. Mean age of presentation reported by different authors are as follows- Ira Shah et al - 6.1 years [9], Hoti et al 1-15 years [10], Raju BJ and Rajaram G -0-10 age group [12]. In the present study also most of the reported cases were from the age group of 1-6 years.

The majority of the cases were reported during the monsoon and post monsoon seasons, in accordance with the reported patterns of dengue transmission [13].

In the present study the most common clinical presentation along with fever were pain abdomen, vomiting, arthralgia, body pains, poor intake facial puffiness and abdominal distention. Similar observations were made in study conducted by Neeraja et al, Gurdeep et al, Manjith Narayana et al, Agarwal et al [14-17].

In the present study, the frequency of dengue fever was found to be 50.49% which correlates with the reports of Parida et al and Raja et al. have reported a higher frequency of dengue fever (64.10% and 46.84%, respectively [18,19] while Bandyopadhyay et al (25.6%), Patankar et al (21%) and Chakravarti et al (31.1%) [20-22].

The complex epidemiology of dengue fever in the Indian subcontinent has substantially changed over the past six decades regarding prevalent strains, affected geographical locations and severity of disease. The upward trend is due to increase in long-distance travel, population growth and urbanisation, lack of sanitation, ineffective mosquito control and increases in the surveillance and official reporting of dengue cases. The limitations of the study were we could not do the serotyping to know the prevalent strain.

Conclusion

As, during epidemic and non-epidemic years, dengue infections are mostly seen in post monsoon season, hence preventive measures should be in full swing at the very onset of the monsoons. Dengue cases appear mostly in the post-monsoon period.

Hence, the appropriate preventive measure should be initiated during the monsoon season only. In the absence of a licensed vaccine or specific drugs, the containment of spread of the vector and the disease is still important.

What the study adds to the existing knowledge?

The present study aims to highlight the epidemiology of dengue at a tertiary care hospital in Telangana, India.

Author's contribution

Dr. S.L. Annapoorna: Concept, study design

Dr. M.L. Kavitha Latha: Statistical analysis, manuscript preparation

Dr. Shanker: Guidance

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