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Dengue Fever: A Case Study

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Abstract

Dengue is a pandemic that is brought on by the Dengue Virus (DENV), which is a single-stranded RNA (ribonucleic acid) virus. Dengue is also brought on by the bite of species in the Aedes family. Dengue, which is caused by the Dengue Virus, is the most common arboviral illness in the world and is a member of the Flaviviridae family. I present a study based on Dengue as a pandemic which outbreak on City Hospital of Delhi in the year 2010. Examining the clinical characteristics of dengue positive cases, the prevalence of dengue diagnosis among patients with suspected dengue, and the effects of the aforementioned on the environment and infectious illnesses. 4480 blood samples from clinically probable dengue fever patients were used in an enzyme-linked immunosorbent test (ELISA) to find dengue virus-specific IgM antibody protection. On 55 samples of C6/36 cell monolayers, virus isolation was carried out. The patient's application or the doctor might provide medical and public information about the patient. Results: Of the 4,480 blood samples tested, 1,800 blood samples (40.17%) were detected to be positive for the DENV with particular antibodies known as IgM antibodies. The most common group of single species of microorganism detected was DENV type 2. The conditions which were profusely detected were thrombocytopenia in which the blood platelet count observed is low and along with this Myalgia was also detected in which pain in the muscles is observed. In 32.4% and 17.9% of the 1,800-dengue fever IgM positive patients, respectively, low platelet count (thrombocytopenia) and muscle discomfort (myalgia) were noted. Together, these conditions accounted for 3% of the cases. Additionally, dengue hemorrhagic fever (DHF), which affects 10.3% of the 1,800 persons, has a fatality rate of 0.08%. Conclusions: Increased reporting due to changes in disease outbreaks, unprecedented rainfall, major infrastructure developments and improved medical facilities contributed to the shortage of dengue patients in 2010.

Keywords

Dengue hermorrhagic fever, Flavivirus, Vetor-borne disease

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1. Introduction

In many regions of India, dengue fever is endemic. The first dengue diagnosis in India appears to have been recorded in Chennai in 1781. Beginning in the years 1963 to 1964, when dengue fever outbreaks were a frequent occurrence in different regions of the nation, was the dengue fever outbreak in India. The dengue cases last reported were in the year 1967 but since then approximately eight dengue cases with high frequency were recorded in Delhi, India. The most recent report of this disease was in the year 2007. We report the experience of a City Hospital located in Delhi during the dengue epidemic in the year 2012.

The most prevalent arboviral illness in the world is DENV, which has single-stranded RNA. Dengue virus types 1-4 are the four different serotypes that make up the virus. Aedes aegypti and Aedes albopictus bites are the primary means of transmission. More than three-fourths of the world's population lives in areas that are more vulnerable to the dengue virus, or dengue fever. The frequency of dengue fever and dengue hemorrhagic fever has significantly grown worldwide in recent years and is now considered a public health issue, particularly in tropical and subtropical countries.

2. Case Study

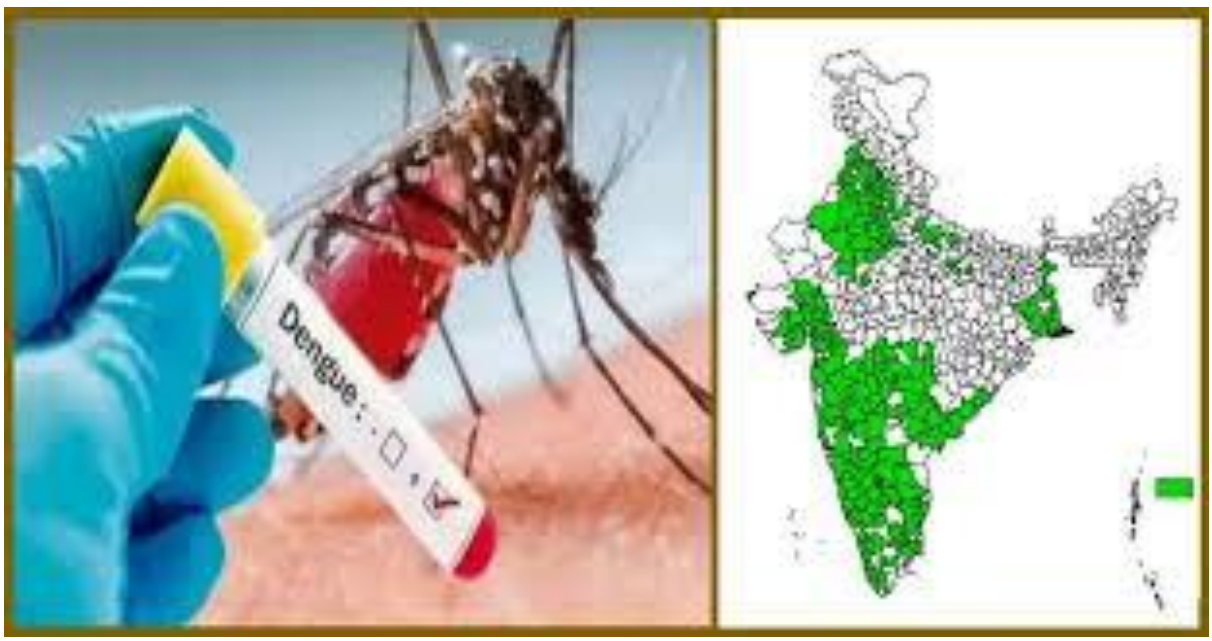

Figure 1. A sample of blood for the testing of the Dengue

3. Material and Methods

3.1 Serotype Identification

This study includes clinical samples from suspected dengue patients in the virology laboratory between May 1, 2010, and December 31, 2010. The sera were classified as patient sterile and stored at – 70°C until further processing.

To identify serotypes, virus isolation was performed using indirect fluorescent antibody (IFA) analysis. As isolation is only possible from severe cases that retain viable influenza virus throughout transport, only 55 specimens were retained and shipped to Virology for ice testing within 6 days of fever onset in suspected dengue fever. The Aedes albopictus cell line's clone C6/36 was utilized for virus isolation, as previously described. Monoclonal antibodies that target dengue virus were utilized for IFA.

3.2 Diagnosis of Dengue Infection

Dengue- Blood samples taken from individuals (n = 4370) who had a fever for 5 days revealed specific IgM antibodies. Use the ELISA kit provided by the National Institute of Virology, Pune, to capture Dengue IgM as a part of the National Vector Borne Disease Control Plan. Following the manufacturer's instructions to the letter, run the test and analyze the findings. Utilizing an ELISA reader, determine the optical density (OD) at 450 nm.

3.3 Recording Clinical and Demographic Details of Patients

The patient's medical and demographic information is obtained from the patient's application or, if necessary, from his doctor. Patients with positive IgM ELISA results for dengue fever had their data entered and evaluated in a Microsoft Excel spreadsheet.

4. Result

Prevalent dengue serotype

Of the 55 isolated samples, 33 (60.0%) were positive for dengue virus 1 and 1 (1.8%) was positive for dengue virus 2. Therefore, serotype spread (97.1% of 34 strain for Dengue Fever which are culture positive) is DENV Type 1.

Profile of the dengue IgM antibody positive cases' demographics:

The dengue cases which are positive for IgM antibodies have demographic profile. A total of 4,800 samples underwent testing for the detection of Dengue IgM antibodies; 1800 of the specimens (or 40.17%) tested positive for the aforementioned antibodies. The male is to female ratio among the 1,800 dengue cases having serological verification was 1.6:1. Groups between the age of 2 to 30 showed the highest proportion of positive samples. The youngest patient is a male baby, whereas the oldest is a male patient that is 87 years old.

Table 1. Age distribution of patients confirmed with Dengue

Patient's Age (IN YEARS)	ELISA Positive Patients (%)
12-22	350(12.6)
23-32	400(25.1)
33-42	500(38.8)
43-52	310(17.1)
53-62	150(5.7)
>60	150(5.7)
TOTAL	1800(100)

158 (9.3%) of the 1800 serologically confirmed cases of dengue have DHF, accounting up to 175 (10.3%). Grade I/III, includes 17 (1%) DHF ratings, (Dengue Shock Symptoms) III/I. A total of only one confirmed mortality due to dengue (0.06%). Platelet count 100,000cells/l in blood termed as thrombocytopenia was present in 311 (18.3%) myalgia patient and 393 (23.1%) dengue IgM positive individuals.

The first dengue IgM seropositive patient was a 5-year-old boy from Jharkhand in central-eastern India in the last week of May. Around the third week of June, local activities in Delhi began to take place. The month of September has the largest number (n=1745; 39.9% of 4,800 patients), followed by the month of October (1400; 29.16% of 4,800 patients). The month of September has the most confirmed cases (n=780; 43.33%, 1800 people) followed by the month of October (n=450; 25% of 1800 people). In September and August, respectively (45.8% and 46.7%), the percentage of success increased.

5. Discussion

After a break of four years from the last outbreak of Dengue Fever in 2006, India experienced a threatening wave of dengue fever in the year 2010 which affected nearly every state in India excluding the northern and northeast areas.

Dengue cases were officially confirmed in 28,066 instances in all of India in 2010, setting a new record. The total number of dengue patients with IgM antibodies positive that were reported from Delhi was 6,500 (28% of 29,785 cases), which was more instances than were recorded in the years prior (548, 1312, and 1153 in 2007, 2008, and 2009). The prevalence of dengue fever is reportedly higher than any previous record, and the pandemic is much worse than anticipated.

In the last five years, epidemics and epidemics have been caused by different types of dengue fever. The 1996 outbreak was mostly caused by dengue virus 2. During the 2003 outbreak, all four DENV serotypes were found to coexist. Dengue-3 was identified as an epidemic in Delhi in 2005.

Dengue 1 was the virus that was found to be most often in 2010, and it appears to have displaced earlier viruses. It is known that exposure to the dengue virus results in long-lasting immunity but only transient protection from other illnesses. Many dengue patients should be aware of the shift in viral load since DENV Type 1 is more likely to harm infected people who have impaired immune systems.

The people of every age group are affected by the DENV. The highest record of patients reported in the year 1997 was from the age group of 6-21 and now in the year 2003 the highest recorded patients were enlisted under the age group of 21-30. In this study most of the cases (525; 32.6% of 1800 cases) were found to be in the age group of 22-31. Transition from children/adolescents to adults for the presence of adults with reduced immunity to dengue serotypes.

Classic DF is characterized by a febrile onset with headaches, retroorbital pain, muscle pain (myalgia) and low platelet count known as thrombocytopenia in 24%. Therefore, most of the records of DF are clinically similar to other febrile disorders and may go undiagnosed if not promptly monitored and treated.

India reported a 5% mortality rate. In 2010, the total number of deaths in India was 110 (0.4% of 28,066 cases), 8 of which were in Delhi (0.13% of 6,259 cases). Only one person died in AIIMS, and the death rate was less (0.00006%). In addition, 10.3% of patients had DHF and only 1.0% of this was DSS. This indicates that the scale of dengue fever is large but low in threat.

In diseases which are infectious the role played by environmental factors is familiar. Many countries suffer from dengue during the hot, humid, rainy seasons, which attracts mosquitoes and causes short-term infections.

In line with the original investigations, the post-monsoon period in our study saw the largest number of seropositive individuals. The high number of dengue fever victims might also be attributed to Delhi, which saw one of the greatest rainfalls ever recorded in 2010. A total of 997.2 millimeters of rain fell in Delhi between July 1 and September 30. Only higher than the previous 4 years (412.1 mm, 408.2 months in the year 2006, 2007, 2008 and 2009) but also well above 26-year average of 538.8 months

Extensive infrastructure development work ahead of the Commonwealth Games (October 2010) will also create a favorable environment for mosquitoes. The rise in the number of reported cases as a result of improved diagnosis may also be contributing to the rise in dengue fever cases.

6. Conclusion

The scale of the situation is large, but also small. The evolution of major diseases, unprecedented rainfall, massive infrastructure improvements, and increased publicity due to the development of medical facilities are responsible for people's experiences.

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