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Dengue fever- a life threatening disease

Dr. Anamika Gogoi
Ph.D. Scholar, Dept. of Microbiology, College of Veterinary Science
Khanapara, Ghy-22, Assam, India

Introduction:

Owing to the availability of a wide range of arthropod vectors, vector borne diseases are widely prevalent in India. Dengue, a vector borne disease, is now-a-days considered as one of the most important emerging viral diseases of human and in the recent past it has become a major international public health concern. Dengue fever is transmitted by infected *Aedes* mosquitoes, especially *Aedes aegypti*, an endophilic mosquito, as a prime vector and *A. albopictus* as a co-vector. Geographical position, demographic and social changes such as temperate, climate, population growth, urbanization, etc. greatly contribute to the increased incidence and spread of dengue virus. Annually it causes 50-100 million human infections, posing a threat to 2.5 billion people of the world. Dengue fever (DF) is an ancient disease. It was first recorded as a disease in a Chinese Encyclopedia of diseases,. The first major outbreak in India was reported from Tamil Nadu in the year 1961. During 1963-64, the first virologically proved epidemic of DF was confirmed in Calcutta and eastern coast of India, after which the disease was reported almost across the country.

TRANSMISSION:

The Virus:

Dengue virus (DEN) belonging to the Family Flaviviridae and Genus Flavivirus is a small single-stranded, positive- sense RNA virus (10.8 kb), which comprises of five distinct serotypes (DEN- 1,2,3,4 and 5). The mature viral particle is spherical, containing multiple copies of three structural proteins. The genome is cleaved by host and viral proteases in three structural proteins capsid (C), prM, the precursor of membrane protein (M) and envelope (E) and seven non-structural proteins (NS).

The Vector:

Different serotypes of the dengue virus are transmitted to human through the bites of infected *Aedes* mosquitoes, mainly *Ae. aegypti.* This mosquito is widely distributed in tropical and subtropical area around the world. The vector mosquitoes mainly multiply during the summer month and they do not survived in the winter. They feed almost entirely on human blood and they prefer to bite during the day time.

SYMPTOMS OF DENGUE FEVER:

Febrile phase:

In febrile phase patient usually develop high grade of fever, which lasts for 1-7 days and is accompanied by anorexia, vomiting, skin erythema, headache, myalgia (muscle pain), body pain, etc. In this phase, it is very difficult to differentiate between dengue and non-dengue febrile manifestations. Sometimes, mild petechial hemorrhages on mucous membrane are also seen. A progressive leucopenia (decrease in total white cell count) may suggest dengue fever.

Critical phase:

In this phase, usually on days 3-7 of illness, an increase of capillary permeability with increasing haematocrit levels may occur, which may last for 24-48 hours. Temperature drops down to 37.5-38^{0}C. Due to plasma leakage, there is progressive leukopenia and decrease in platelet count. The plasma leakage varies from patient to patient and may lead to shock. During the initial stage of shock, there is trachycardia and peripheral vasoconstriction with reduced skin perfusion, which results in cold extremities.

Recovery phase:

Patients surviving 24-48 hours after the critical phase show reabsorption of extravascular fluid. The health status of the patient improves gradually and the normal haemodynamic status resumes within few days.

DIAGNOSIS:

Clinical signs and symptoms:

Altered haemodynamic status, tachypnea, hepatomegaly, haemorrhages, skin rash, rise in body temperature, body ache, vomiting, diarrhoea, etc. are some important clinical manifestations of Dengue.

Current dengue diagnostic methods:

Confirmatory diagnosis of the dengue can be done using the following methods:

a) Virus isolation

b) Serological tests such as MAC-ELISA (IgM antibody- capture by enzyme-linked immunosorbent assay), IgG ELISA, IgM/IgG ratio, IgA and Haemagglutination- inhibition tests (HI).

c) Molecular techniques:

RT-PCR (Reverse Transcriptase- Polymerase Chain Reaction), Real-Time RT- PCR and isothermal amplification methods are the principal molecular techniques used for Dengue diagnosis.

PREVENTION AND CONTROL:

In 2016, a partially effective vaccine for dengue fever, named Dengvaxia was launched in Phillipines and Indonesia,. Even though the vaccine is not 100% protective, World Health Organisation (WHO) has recommended use of this vaccine in highly endemic countries. As none of the available anti-viral drugs are fully effective, symptomatic treatment is the only way of Dengue management.

It has been claimed that papaya leaves can help in early recovery of patients with dengue. The available organic compounds and nutrients in papaya leaves may probably help in increasing the platelet count and the high level of vitamin C present may also stimulate immune system.

Vector Control Measures:

Chemical control:

Chemical control method is now a days in restricted use because of its negative impact on environment, possibility of getting incorporated in food chain and associated health hazard. Some of the common insecticides used for larval control are organophosphates (Pirimiphos-methyl, Temephos), insect growth regulators (Diflubenzuron, Novaluron), *etc*.

Biological control:

It is relatively safer for health and environment, so a preferred method for mosquito control.. It involves environmental release of the organisms that prey upon different developmental stages of mosquito. Variety of fish species such as *Gambusia affinis, Lebister spp.* have been found to be helpful in reducing mosquitoe burden as they prey on the larval stage of mosquitoes. ..

Different predatory copepod species have also been proved to be effective against dengue vector.

Personal protection:

Environmental or biological measures alone cannot fully control dengue virus infection and personal cares, *viz*. wearing full body covering clothes, using wire mesh on windows and doors, mosquito repellent coils, creams or liquid to kill or to repel mosquitoes *etc*. may play important role in reducing the disease burden, significantly. Health awareness programmes to sensitize and educate people about prevention and control of the disease has also proved to be of high value in controlling the disease.

CONCLUSIONS:

Dengue is one of the most important vector-borne viral diseases, which in recent past is getting spread to new areas affecting new populations. The management of the disease has become a complicated issue for several reasons including non-availability of anti-viral drug, lack of protective efficacy of the available vaccine and inadequacy of the vector control measures. So, a comprehensive strategy involving all possible measures as mentioned above including community awareness can be helpful in prevention and control of the disease in the long run.