

EDITORIAL

Dengue and Its Prevention

Introduction:

Over the past three decades, there has been dramatic global increase in the frequency of dengue fever, dengue haemorrhagic fever and dengue shock syndrome and their epidemics. It is found tropical and subtropical regions around the world, predominantly in urban and semi-urban areas, and is now spreading to rural areas.

Dengue, an infection caused by the dengue virus, is transmitted through the bite of infected *Aedes* mosquitoes. Dengue infection can range from mild to severe, with symptoms including high fever, severe headache, joint and muscle pain, rash, and bleeding tendencies in severe cases.

Infants and elderly, obesity, pregnancy, peptic ulcer disease, woman have abnormal bleeding, haemolytic disease, congenital heart disease, chronic disease, patients on steroid or NSAID treatment contribute to more severe disease and its complication.

About 3.9 billion people in 128 countries are at risk of infection with dengue viruses.¹ Worldwide, annually about 500,000 people with dengue haemorrhagic fever requires hospitalization. Approximately 90 percent of them are children aged less than five years, and about 2.5 percent of those affected die.

Dengue and dengue haemorrhagic fever is endemic in more than 100 countries in the WHO regions of Africa, the Americas, Eastern Mediterranean, South-East Asia and Western Pacific. The South-East Asia and Western Pacific regions are most seriously affected.²

Dengue virus:

There are four serotypes which are designated as DENV-1, DENV-2, DENV-3 and DENV-4. Infection with any one serotype confers lifelong immunity to that virus serotype.³ Secondary infection with dengue serotype 2 or multiple infection with different serotypes lead to severe form of dengue (dengue haemorrhagic fever/dengue shock syndrome).² The first infection probably sensitizes the patient, while the second infection with different serotype appears to produce immunological catastrophe.

Aedes Mosquito:

Aedes aegypti and *aedes albopictus* are the two most important vectors of dengue. *Aedes aegypti* is responsible

for clustering of dengue cases in the cities, on the contrary, *Aedes albopictus* partly invades peripheral areas of urban cities.

Once the mosquito becomes infective, it remains so for life. The genital tract of the mosquito gets infected and transovarian transmission of dengue virus occurs when virus enters fully developed eggs at the time of oviposition.

Due to climate change, temperature remains favourable for the breeding of *Aedes* mosquitoes all year round. The population of *Aedes aegypti* fluctuates with rainfall and water storage. Its life span is influenced by temperature and humidity, survives best between 16°C- 30°C and a relative humidity of 60-80 per cent. A 2°C increase in temperature more infected mosquitoes are available for a longer duration and thus increase man-mosquito contact.^{2,4}

Prevention:

There is no specific treatment for dengue, however early detection and proper clinical management can lower case fatality below 1%. Prevention of dengue primarily involves mosquito control measures, including the reduction of mosquito breeding sites and the use of insecticides. In near future vaccination can often be a potential preventive measure.

The vectors of dengue fever breed in artificial collection of water in and around houses. In principle it can be controlled by individual and community action, using antiadult and antilarval measures. The environmental measurements are detection and elimination of mosquito breeding places, management of roof tops, porticos and sunshades, proper covering of stored water, observation of weekly dry day. Isolation of the patient under bed-nets during the first few days prevents dengue transmission. The personal protective measures are wearing of full sleeves shirts and full pants; use of mosquito repellent creams, liquids, coils, mats etc.; use of bed nets for sleeping infants and young children during day time to prevent mosquito bite as they bite chiefly during the day.

Mineral oils, paris green and synthetic insecticides are the commonly used larvicides. DDT is the insecticide of choice for adult mosquito. In areas where DDT resistance is encountered, malathion and propoxur, and to a lesser extent lindane are recommended.

Some fish such as *Gambusia affinis* and *Lebister reticulatus* can be used in ornamental ponds, cisterns and farm ponds as they feed readily on mosquito larvae.

Many countries including Singapore, Sri Lanka, Indonesia, Malaysia, Thailand, Vietnam and Brazil are opting for the Wolbachia method for dengue control. Under the method, lab-grown male *Aedes aegypti* mosquitoes infected with the naturally occurring Wolbachia bacteria are released into the wild. The bacteria compete with viruses inside the mosquito, thus hindering viral replication and transmission of diseases like dengue, Zika, chikungunya and yellow fever.⁵

Till now two Dengue vaccines, Qdenga and Dengvaxia have been approved and implemented in some countries. One more vaccine, TV005 is under clinical trial and shown some promising result.⁶

Conclusion:

The failure of urban authorities to provide civil amenities and poor public health infrastructure raises the potential for the vector to breed at high level and makes the environment transmission conducive. The rural spread of the vector is relatively recent occurrence associated with the development of rural water supply schemes, improved transport systems, scarcity of water and life style changes.

Dengue is a global threat that requires a global response. A well-coordinated surveillance system, robust vector control measures and a strong & resilient management system is paramount to contain this public health threat.

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