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Dengue

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Why is in news? Dengue vaccines under development in India: a status report

With the expanding geography of dengue infections — in India as well as the world — an increasing need has been felt for an effective vaccine that can protect against all four serotypes. Nearly half the population of the world lives at risk of the disease at present.

About the disease:

Dengue is a **mosquito-borne viral infection**, found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas.

The virus responsible for causing dengue, is called dengue virus (DENV).

Dengue virus belongs to the **family Flaviviridae**, having four serotypes that are spread by the bite of infected Aedes mosquitoes.

These mosquitoes are also vectors of chikungunya, yellow fever, and Zika viruses.

Dengue **cannot be spread directly from person to person**.

Most cases occur in tropical areas of the world, including the Indian subcontinent, Southeast Asia, Southern China, Taiwan, the Pacific Islands, the Caribbean, Mexico, Africa, and Central, and South America.

Symptoms include fever, headache, muscle, and joint pain, and a characteristic skin rash that is similar to measles. There is a drop in platelets.

Most will also get better in 1–2 weeks but in severe cases it can be fatal

There are four types of dengue strains, and type II and IV are considered to be more severe and normally require hospitalization.

The **Aedes mosquito breeds in clean stagnant water**.

The diagnosis of dengue infection is done with a blood test.

WHO estimates 39 crore dengue virus infections per year, of which 9.6 crore show symptoms.

There is **no specific medicine** to treat dengue infection.

Factors responsible for spread of dengue in India:

Unplanned urbanisation: Urbanisation, poor town planning, and improper sanitation are the major risk factors for the multiplication of such mosquitoes. The open sewerage, improper handling of wastage, urban slums, open drains are providing breeding ground for dengue.

Kamaraj IAS Academy

Plot A P.127, AF block, 6 th street, 11th Main Rd, Shanthi Colony, Anna Nagar, Chennai, Tamil Nadu 600040

Phone: **044 4353 9988 / 98403 94477** / Whatsapp : **09710729833**

Climate change: Slight increases in temperature increase the dengue risk by increasing the mosquito development rate and the virus, thereby increasing the rate of transmission.

Poor control measures: Inadequate vector (mosquito) control measures have created favourable conditions for dengue virus transmission and its mosquito vectors. Lack of proper planning to control the vector has led to the spread of dengue. Lack of funding, interrupted fumigation campaigns, and poor management of mosquito eradication programs contribute to the mosquito resistance.

Favourable climate: Dengue is a **tropical disease** that occurs in the countries around the Equator. Hot weather, monsoon and intermittent rainfall favour the sustenance of the vector transmitting the dengue virus.

Lack of manpower: The number of skilled workers available for preventing spread of dengue is low. Many posts in government departments remain vacant. Due to this deficiency of manpower, active surveillance against dengue is not being done in India.

Under-reporting: Dengue cases are often under-reported due to political reasons and also to avoid spreading panic among the common people. This increases the risk of dengue spreading.

Lack of coordination: There is a lack of coordination between the local bodies and health departments in the delivery of public health measures. This leads to an unplanned approach to deal with the dengue epidemic.

Dengue Vaccines:

Dengvaxia: The dengue vaccine **CYD-TDV or Dengvaxia** was approved by the US Food & Drug Administration in 2019, the first dengue vaccine to get the regulatory nod in the US.

Dengvaxia is basically a **live, attenuated dengue virus** which has to be administered in people of ages 9 to 16 who have laboratory-confirmed previous dengue infection and who live in endemic areas.

Indian Immunologicals Limited (IIL): IIL is developing India's first Dengue vaccine and has received permission for a Phase-1 trial. The vaccine is being produced in collaboration with the National Institutes of Health in the US.

Panacea Biotec's Vaccine: The vaccine is based on **live weakened versions** of all four dengue serotypes. It has been developed by the National Institute of Allergy and Infectious Diseases in the United States. It has shown promise in phase I/II trials in adults and is moving toward a larger phase III trial.

Serum Institute of India's Vaccine: It also uses weakened virus strains from the United States. Phase I trials have been completed and plans for phase II and large-scale studies in children are in progress.

One of **the main challenges** of developing a dengue vaccine is **antibody-dependent enhancement** (ADE) — a person with low levels of antibodies against one serotype of dengue, may end up getting a more severe infection with another serotype of dengue.