Review Article

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Dengue Fever

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Abstract

Dengue virus is an acute febrile viral condition, is not transmitted from person to person but through the bite of an infected mosquito and it is caused by Flavivirus.Main symptom of dengue fever is body temperature more than 38°C, body pain and joint pain. In dengue fever Platelet count will decrease. Prevention of dengue fever is by Insecticide treatment and symptomatically manages the dengue fever.

Keywords: Dengue; Fever; Immunity; Mosquito; Shock; Vaccine.

Introduction

In the present scenario, where non-communicable disease is getting prime importance, there are some communicable diseases which take over the picture and affect a greater community and cause complications. Very many communicable diseases have a vector-mosquito, which pass on the disease. One of such vector-borne disease which is getting through the attention is dengue fever. Dengue is an acute viral infection with potential fatal complications. It was first referred as "water poison" associated with flying insects. The word "dengue" is derived from the Swahili phrase Ka-dinga pepo, meaning "cramp-like seizure". Dengue fever is an arthropod borne virus of the genus Flavivirus, and within the family Flaviviridae. Other flaviviruses include Japanese encephalitis and yellow fever.

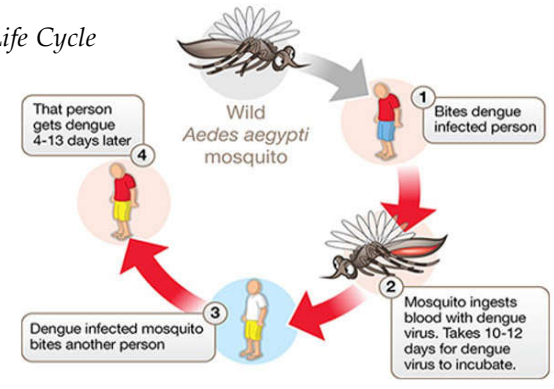
History

Dengue virus was isolated in Japan in 1943 by inoculation of serum of patients in suckling mice3 and at Calcutta (now Kolkata) in 1944 from serum samples of US soldiers. The first epidemic of clinical dengue like illness was recorded in Madras (now Chennai) in 1780 and the first virologically proved epidemic of DF in India occurred in Calcutta and Eastern Coast of India in 1963-1964. The first major epidemic of the DHF occurred in 1953-1954 in Philippines followed by a quick global spread of epidemics of DF/DHF. DHF was occurring in the adjoining countries but it was absent in India for unknown reasons as all the risk factors were present. The DHF started simmering in various parts of India since 1989. The first major wide spread epidemics of DHF/DSS occurred in India in 1996 involving areas around Delhi and Luck now and then it spread to all over the country.

Genome Structure of Dengue Virus

Its genome is about 11000 bases that codes for there structural protein [Capsidprotein C, membrane protein M, Envelope protein E] and seven nonstructural protein [NS1, NS2a,NS2b,NS4a, NS4b,NS5a,NS5b]. It also includes short noncoding regions on both the 5′ and 3′ ends. Further classification of each serotype into genotypes often relates to the region where particular strains and commonly found or were first found.

Life Cycle



Epidemiology

In World

Today about 2.5 billion people, or 40% of the world's population, live in areas where there is a risk of dengue transmission. Dengue is endemic in at least 100 countries in Asia, the Pacific, the Americas, Africa, and the Caribbean. The World Health Organization (WHO) estimates that 50 to 100 million infections occur yearly, including 500,000 DHF cases and 22,000 deaths, mostly among children.

In India

With 19,704 cases reported till September 6, the dengue cases in the country have already doubled this year. In 2014, the number of dengue cases stood at 10,097, with 37 deaths, through the year.

This year, however, 41 people had died, though the Health Ministry said in a statement that with a fatality rate of 0.20 per cent, casualties remained "very low". The highest fatality rate reported in India so far was during the 1996 outbreak, when it was more than 3 per cent.

In Kerala

Dengue fever was first reported in Kerala in 1997 in Kottayam district. First epidemic occurred in 2003 with 3546 cases and 68 deaths. Thiruvananthapuram was the worst affected district.

Dengue fever has become endemic in Kerala.in the year of 2011 with 1287 cases and 10 deaths has been reported. Officials point out that all figures show that there has been a steady increase in Dengue cases which may shoot in the three months when the state receives monsoon rains.

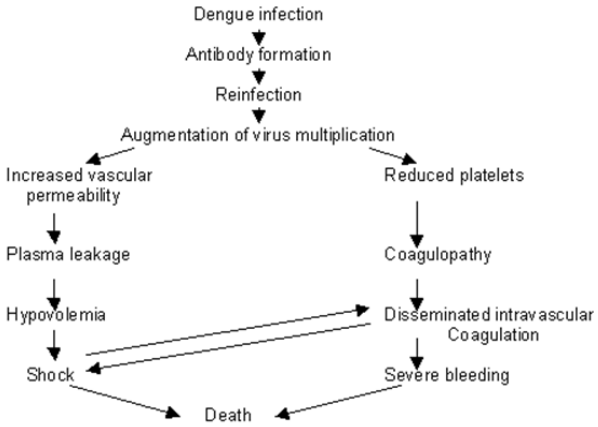
Mode of Transmission

Transmission cycle in dengue "Man to mosquito,Mosquito to man"

The vector Aedes argypti acquires the virus by feeding on a patient during the first 3 days [viralmic stage] of illness. After the period of 10-15 days the mosquito becomes infective and is able to transmit the infection to man.

Incubation Period

Incubation period in 4-10 days after bite of the mosquito.



Pathophysiology

Types

1. Dengue Viral fever (DUF)
2. Dengue Hemorrhagic fever (DHF)
3. Dengue shock syndrome(DSS)

Clinicalmanifestations

Dengue Fever (1-4 days)

- Body temperature more than 38 ^{o}C, which lasts up to 5-7 days.
- Headache and pain diretro-orbital (behind the eye).
- Pain in muscles and joints.
- Nausea and vomiting, loss of appetite.
- The presence of digestive disorders (constipation or diarrhea).
- Abdominal pain.
- The presence of rash (signs of redness) of the skin.

Dengue Hemorrhagic (4-7days)

- Spontaneous bleeding.
- Organ enlargement of the liver (liver) and spleen.
- The presence of thrombocytopenia, the platelet count is less than 100.000/mm^{3}.
- Plasma leakage marked with hematocrit values is increased or decreased by 20% or more of normal values.
- Pleural effusion and ascites.

Dengue Shock Syndrome (DSS)

- An impairment of consciousness.
- Very low blood pressure.

- Rapid and weak pulse.
- Hands and feet pale and cold.

The WHO, Divide into 4 Degrees of Clinical Manifestations,

- *DHF Grade I:* The signs of viral infection, the manifestation of bleeding that seemed only to test positive torniquet.
- *DHF Grade II:* Signs manifestations of viral infections with spontaneous bleeding (nosebleeds, red spots)
- *DHF Grade III:* Also called pre-shock phase, with signs of DHF grade II but the patient began to experience signs of shock; decreased consciousness, cold hands and feet, rapid and weak pulse palpable, pulse pressure was measured.
- *DHF degree IV:* Or the phase of shock (dengue shock syndrome also called / DSS), patients in shock with greatly decreased consciousness and coma, cold hands and feet and pale, the pulse is very weak to not palpable, pulse pressure can not be measured.

Diagnostic Tests

History Collection &Physical Examination

Lab Values

- *Platelet Count*

Value become less than 1, 00,000 cells/mm^3

- *Hematocrit Value*

Is increased by 20% or more The clinical criteria like high fever, spontaneous hemorrhagic manifestation associated with thrombocytopenia and rise in hematocrit value are sufficient to establish the diagnosis of DHF. Hypoproteinemia, pleural effusion and ascites constitute the supporting evidence of plasma leakage.

- *Real Time Polymerase Chain Reaction*

This is done to detect viral genome in serum. It is primary tool to detect virus early in the course of illness. It is a definite proof of current infection. But this test is not available.

- *NSI ELISA Test*

Detection of non structural protein (NSI antigen) in the serum of dengue fever patients is an useful tool for the diagnosis of acute dengue infections this is commercially available.

- *IG GELISA Test*

Samples with negative IgG in acute and positive IgG in convalescent phase of the infection are primary dengue infection. Sample with a positive IgG in the acute phase and a four fold rise in IgG titre in the convalescent phase, is secondary dengue infection.

- *Plaque Reduction and Neutralization Test*

The most specific serological tool for the determination of dengue antibodies is plaque reduction and neutralization test assay. This determines the level of antibodies.

Prevention

Personal

- Clothing to reduce exposed skin
- Insect repellent especially in early morning, late afternoon. Bed netting important
- Mosquito repellants(pyrethroid based) coils, sanitation measures

Environmental

- Reduced vector breeding sites
- Solid waste management
- Public education
- Empty water containers and cut weed/tall grass

Biological

- Target larval stage of Aedes in large water storage containers
- Larvivorous fish (Gambusia), endotoxin producing bacteria (Bacillus), copepod crustaceans (mesocyclops)

Chemical

Thermal fogging-malathion,pyrethrum

- Insecticide treatment of water containers
- Space spraying (thermal fogs)
- Indoor space spraying(2% pyrethrum), organophosphorus compounds.

Management

Antiviral Drugs

There are no specific antiviral drugs for dengue.

Oral Rehydration Therapy

However maintaining proper fluid balance is important. Treatment depends on the symptoms. Those who are able to drink, are passing urine, have no "warning signs" and are otherwise healthy can be managed at home with daily follow up and oral rehydration therapy.

Intravenous Hydration

If required, is typically only needed for one or two days. In children with shock due to dengue a rapid dose of 20mL/kg is reasonable. The rate of fluid administration is than titrated to a urinary output of 0.5–1 mL/kg/h, stable vital signs and normalization of hematocrit. The smallest amount of fluid required to achieve this is recommended.

Paracetamol

Acetaminophen is used for fever

NSAIDs

Discomfort while NSAIDs such as ibuprofen and aspirin are avoided as they might aggravate the risk of bleeding.

Blood Transfusion

Is Initiated early in people presenting with unstable vital signs in the face of a decreasing hematocrit, rather than waiting for the hemoglobin concentration to decrease to some predetermined "transfusion trigger" level

Recovery Phase

During the recovery phase intravenous fluids are discontinued to prevent a state of fluid overload. If fluid overload occurs and vital signs are stable, stopping further fluid may be all that is needed. If a person is outside of the critical phase, a loop diuretic such as furosemide may be used to eliminate excess fluid from the circulation

Vaccine

No vaccine is currently approved for the prevention of dengue infection. Because immunity to a single dengue strain is the major risk factor for dengue hemorrhagic fever and dengue shock syndrome, a vaccine must provide high levels of immunity to all 4 dengue strains to be clinically useful.

Immunogenic, safe tetravalent vaccines have been developed and are undergoing clinical trials. Candidate vaccines include a live-attenuated virus, recombinant envelope proteins, and an inactivated virus. The estimates of the time needed for further testing of candidate vaccines range from 5-10 years. Sanofi Pasteur has reported successful results of phase II trials of its tetravalent recombinant live attenuated vaccine. Registration is anticipated in 2012.

Nursing Management

- *For Hemorrhage* – Keep the patient at rest during bleeding episodes. For nose bleeding, maintain an elevated position of trunk and promote vasoconstriction in nasal mucosa membrane through an ice bag over the forehead.
- *For Melena*- Ice bag over the abdomen. Avoid unnecessary movement. If transfusion is given, support the patient during the therapy. Observe signs of deterioration (shock) such as low pulse, cold clammy perspiration, prostration..
- *For Shock* – Prevention is the best treatment. Dorsal recumbent position facilitates circulation.
- Adequate preparation of the patient, mentally and physically prevents occurrence of shock.
- Provision of warmth-through lightweight covers (overheating causes vasodilation which aggravates bleeding).
- Diet – low fat, low fiber, non-irritating, non-carbonated.

Complication

- High fever
- Damage to the lymphatic system
- Damaged to the blood vessel
- Bleeding from the gums
- Bleeding from the nose
- Liver enlargement
- Circulatory system failure

Conclusion

Dengue disease continues to involve newer areas, newer populations and is increasing in magnitude, epidemic after epidemic. Every aspect of dengue viral infection continues to be a challenge; the pathogenesis of severe dengue disease is not known, no vaccine is yet available for protection and the vector

control measures are inadequate. Even though dengue virus was isolated in India in 1944, but the scientific studies addressing various problems of dengue disease have been carried out at limited number of centres. Though clinical studies have reported on dengue disease in India, but these are largely based on diagnosis made by kits of doubtful specificity and sensitivity. A lot more remains to be achieved for creating an impact.

Acknowledgement

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