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DENGUE EPIDEMIOLOGY

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ABSTRACT

Dengue is one of the mosquito borne diseases. This disease is transmitted by person to person by *Aedes* mosquito. Dengue virus belongs to the family of Flaviviridae and it has 4 serotypes. DENV (1-4) transmits due to bite of infected female *Aedes* mosquito. This causes wide spectrum of illness from mild asymptomatic to severe fatal Dengue hemorrhagic fever/Dengue shock syndrome DHF/DSS. Approximately 2.5 billion people are in the risk of dengue. Recently, 390 million yearly dengue infections have been estimated in which 96 million cases had occurred apparently. Development of dengue vaccine is a challenging task due to existence of 4 DENV serotypes.

Keywords: Dengue, *Aedes*, Epidemiology, DHF/DSS,Dengue Hemorrhagic Fever/Dengue Shock Syndrome.

INTRODUCTION

Dengue is a mosquito borne infectious or communicable disease due to which high fever, severe body aches or headache occurs. It's a common disease which occurs time to time as epidemic. In 1996, 2003 & 2006 majorly dengue cases were found in Delhi & North India (Prevention Of Seasonal Disease: Causes, Treatment & Prevention). This disease is caused by 4 dengue virus serotypes and this disease transmits via female Aedes mosquito. In tropical or sub-tropical region, this disease is present in high proportion due to which there is high risk of worldwide infection. (Chen *et al*., 2011). Pathological statuses of DENV contagion leads to modest symptomless dengue fever (DF) to dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) too and also happens which is fatal sometimes (Murphy *et al*., 2011) Occurrence of DENV is due to urbanization, globalization and international travel. (Gubler, 2006).

EPIDEMIOLOGY OF DENGUE

Throughout the world dengue is a fast spreading mosquito born disease. In this past 50 years this disease has been multiplied to 30 times due to geographic expansion to new countries, in present era from urban to rural circumstances. In 50 million people yearly dengue infection occurs & 2.5 billion people lives in danger of dengue endemic countries (WHO 2009). Currently dengue is epidemic in 128 developing countries and there is risk of danger in approximately 3.97 billion people yearly. Recently dengue infection is estimated to be 390 million yearly, in which 96 million cases had occurred apparently (Bhatt *et al*., 2013; Bardy *et al*., 2012).

TRANSMISSION OF DENGUE VIRUS

This disease is caused due to anyone nearly linked dengue viruses (DENV1, DENV2, DENV3 & DENV4) (Henchal *et al*., 1990). Dengue virus belongs to family of Flaviviridae and this virus transmits due to bite of infected female Aedes mosquito. Dengue virus contains 11,000 nucleotide bones. DENV contains three dissimilar macromolecules (C, prm and E) & seven different macromolecules (NS1, NS2a, NS2b, NS3, NS4a, NS4b and NS5). It is found in infected host cells and is required for the replication of virus. Humans are primary host of dengue which is transmitted by female Aedes mosquito. Female Aedes mosquito sucks the blood of infected person and this mosquito gets infected due to this dengue virus. After 8-10 days this virus reaches salivary gland of mosquito. This virus can be transmitted through dengue infected blood products or through infected organ donations and also there is vertical transmission from mother to child during pregnancy(Srinivaset al., 2015).

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CLINICAL FEATURES OF DENGUE FEVER

Dengue fever symptoms are like sudden fever, joints pain, muscle pain and rashes. Dengue's alternative name is "break bone fever" because in this case there is joints pain & muscle pain along with fever. Dengue infection is divided into 3 phases febrile, critical & recovery.

Febrile phase: In this phase there is fever of 40 ºC (104 ºF), severe headache which sustains for atleast 2-7 days. In this flushed skin & red spots on skins appears which is called petechiae and this occurs due to broken capillaries in skin.

Critical phase: In this phase there is high fever which typically lasts for almost 1-2 days. In this phase there is significantly fluid accumulation in chest & abdominal cavity. In this phase organ doesn't works properly and there is severe bleeding, especially from gastrointestinal tract.

Recovery phase: In this phase there is reabsorption of leaked liquid (fluid) in bloodstream. Improvement in this phase is noticeable but there is sometimes severe itching. If liquid (fluid) surcharge occurs in this phase and if it affects the brain then unconsciousness may happen. (Srinivas *et al*., 2015).

DENGUE HEMORRHAGIC FEVER (DHF)

In few patients this dengue fever turns to develop DHF, which is sometimes severe & sometimes fatal and after 3-7 days of fever it becomes dangerous. Warning signs of this disease are severe abdominal pain, hypothermia, vomiting, hemorrhagic manifestations or changes in mental health like irritability, confusion or cold clammy skin & narrowing systolic blood pressure and diastolic blood pressure.

WHO'S 4 criteria of DHF

WHO has currently defined 4 criteria of DHF as follows:

- Fever enduring for 2-7 days.
- Any hemorrhagic demonstration.
- Thrombocytopenia (platelets count <100000/mm3).
- Proof of increased vascular permeability.

Most usual hemorrhagic demonstration is mild skin hemorrhage (petechiae hematomas), gingival bleeding (gum bleeding), epistaxis (nose bleeding) and microscopic hematuria. Intracranial bleeding, vaginal bleeding, melena & hematemesis are serious form of hemorrhagic demonstration.

WHO revaluated clinical case of Dengue fever & DHF. After studying different countries, report has been made that except one or two Dengue criteria, all is life threatening. Dengue fever can't be hemorrhagic until there is plasma leakage from increased vascular permeability.

DENGUE SHOCK SYNDROM (DSS)

DSS depends on the 4 criteria of DHF & has proof of circulatory failure demonstrated by:

1. Rapid, weak pulse and narrowing systolic blood pressure & diastolic blood pressure.
2. Restlessness, hypotension for age and cold, clammy skin.

Patients' suffering from dengue very soon develops into DSS and if they didn't get treatment on time then can result into severe complications & death too (Dengue and Dengue Hemorrhagic Fever).

PREVENTION OF DENGUE FEVER

Aedes aegypti is a common vector of dengue virus in India followed by *Aedes* albopictus. A larval index indicates that *Aedes* aegypti are well established in peri-urban areas. Breeding habitat of *Aedes* aegypti are water holding container like plastic drums, metal drums, cement tanks etc. (Shriram *et al*., 2009; Sharma *et al*., 2008). Risk of dengue infection is due to urbanization, transport development & changing habitat (Fulmali *et al*., 2008). Dengue vector control is good way for prevention from dengue fever. In several reports of India it has been demonstrated that to reduce dengue vector, anti-larval substance like DDT & deildrin has been used but malathione is more susceptible (Dash *et al*., 2001). Plant based repellent are useful in decreasing/controlling mosquito born disease or mosquito population (Rajkumar *et al*., 2010). Flavonoid compounds are present in Poncirus trifoliate which performs various activities against different stages of Aedes aegypti (Kumar *et al*., 2010). Benzene, hexane, ethyl acetate, methanol & chloroform leaf extracts of Eclipta alba controls Aedes aegypti larvicidal & ovicidal activities (Govindarajan *et al*., 2011).

VACCINE

Dengue vaccines are under development since 1940s but tetravalent vaccine provides long term protection against four serotypes of dengue virus (Guy *et al*., 2011).

CONCLUSION

Dengue is a highly infectious deadly endemic disease. In India dengue epidemiology is consistently & continuously increasing and has been seen in urban & rural areas of India. DENV (1-4) serotype transmits via female Aedes aegypti mosquito vector and spreads more in large urban areas. Each phase of dengue viral infection is becoming a continuous challenge. Pathogens of severe dengue disease are still unknown and no vaccine is available to control dengue vectors till time (Nivedita *et al*., 2012).

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