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A Review on Acute Encephalities Syndrome

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ABSTRACT

- Acute encephalitis syndrome (AES) poses challenges to physicians owing to acute presentation, often rapid neurologic deterioration, myriad causes including noninfective imfammatory disorders of central nervous system and low microbiological yield
- It is also known as the Japanese encephalitis (JE)
- Japanese encephalitis is clinically similar to neurological manifestation caused by several different virus, bacteria, fungi, parasites, spirochetes, chemicals, toxins etc……..

KEYWORDS : Acute encephalitis, Encephalitis mimics, Etiology, Neuroimaging.

- Pediatric Infectious Disease (2019): 10.5005/jp-journals-10081-1210

DEFINITION :

it is the clinical diagnosis of children with acute onset of symptoms and signs of inflammation lesions in the brain

WHO IS EFFECTED

- Predominantly affects population below 15y
- There is seasonal and geographical variations in the causative organism
- JE has its endemic zones running along genetic plain including states of bihar west Bengal and assam and parts of tamilnadu

ETIOLOGY

- Dengue virus
- Scrub typhus
- Influenza A virus
- Herpes simplex virus
- Parvo virus B4
- Epstein-bar virues
- Chandipura virues

EPIDEMIOLOGY ANALYSIS (2008-2013 IN STATES)

- Age group between 1-5y followed by 5-10 and 10-15y in order
- Least JE infection in infants (0-1y)
- Due to circulation of entero-virus particularly in eastern uttar Pradesh
- In india acute encephalitis syndrome outbreaks in north and eastern india have been linked to children eating unripe litchi fruit on empty stomach
- Unripe fruit contain the toxins hypoglycin A and the methylenecyclopropylgycine (MCPG),which cause vomiting in ingested in large quantities
- Hypoglycin A is naturally occurring amino acid found in the unripe litchi that cause severe vomiting while MCPG is a poisonous compound found in litchi seeds that cause a sudden drop in blood sugar vomiting , altered mental states leading to lethargy, unconsciousness , coma and death
- These toxins cause sudden high fever and seizures serious enough to require hospitalization in young , severely malnourished children

RISK FACTORS

- Weakened immune system
- Age
- Season

SIGNS AND SYMPTOMS

- Acute on set of fever
- Mental confusion
- Disorientation
- Delirium/coma
- Viral encephalitis ,severe form of leptospirosis and toxoplasmosis can cause acute encephalitis

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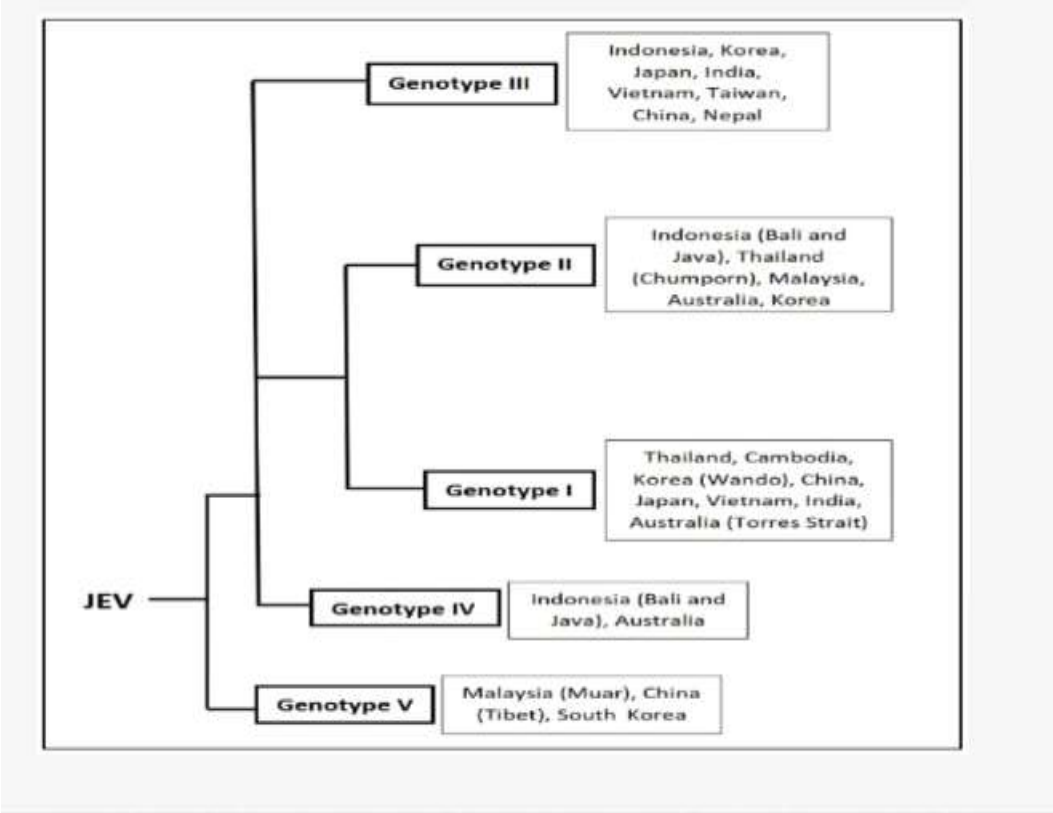
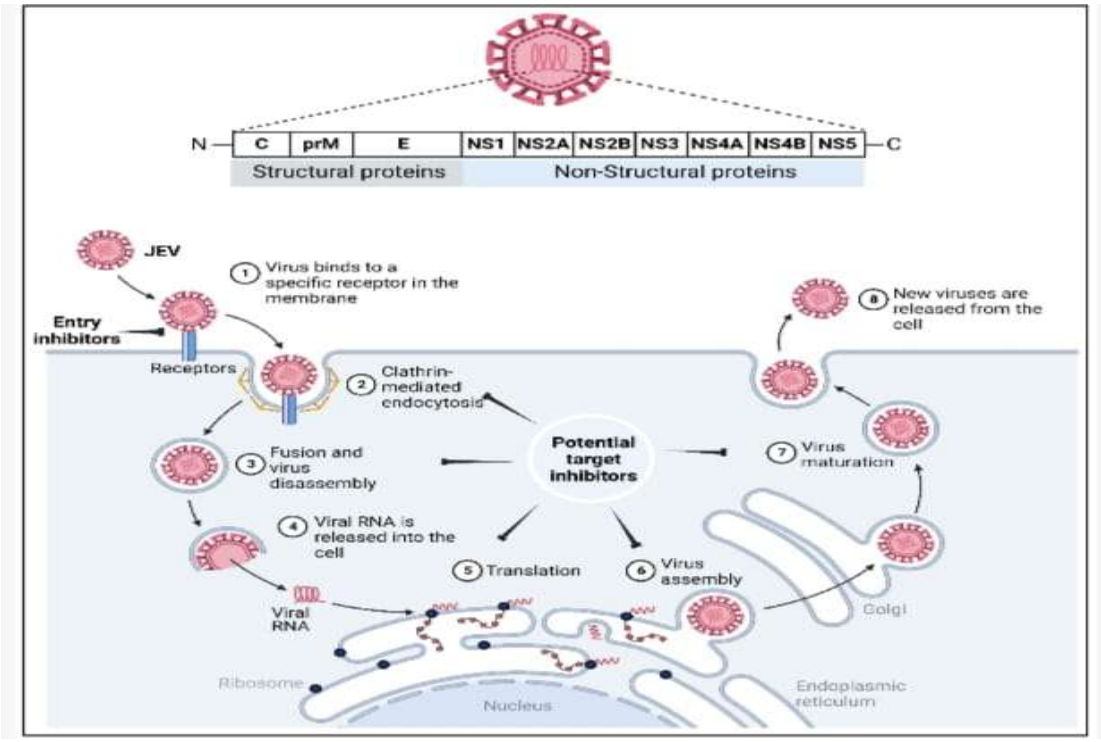
TYPES OF JEV



PATHOPHYSIOLOGY



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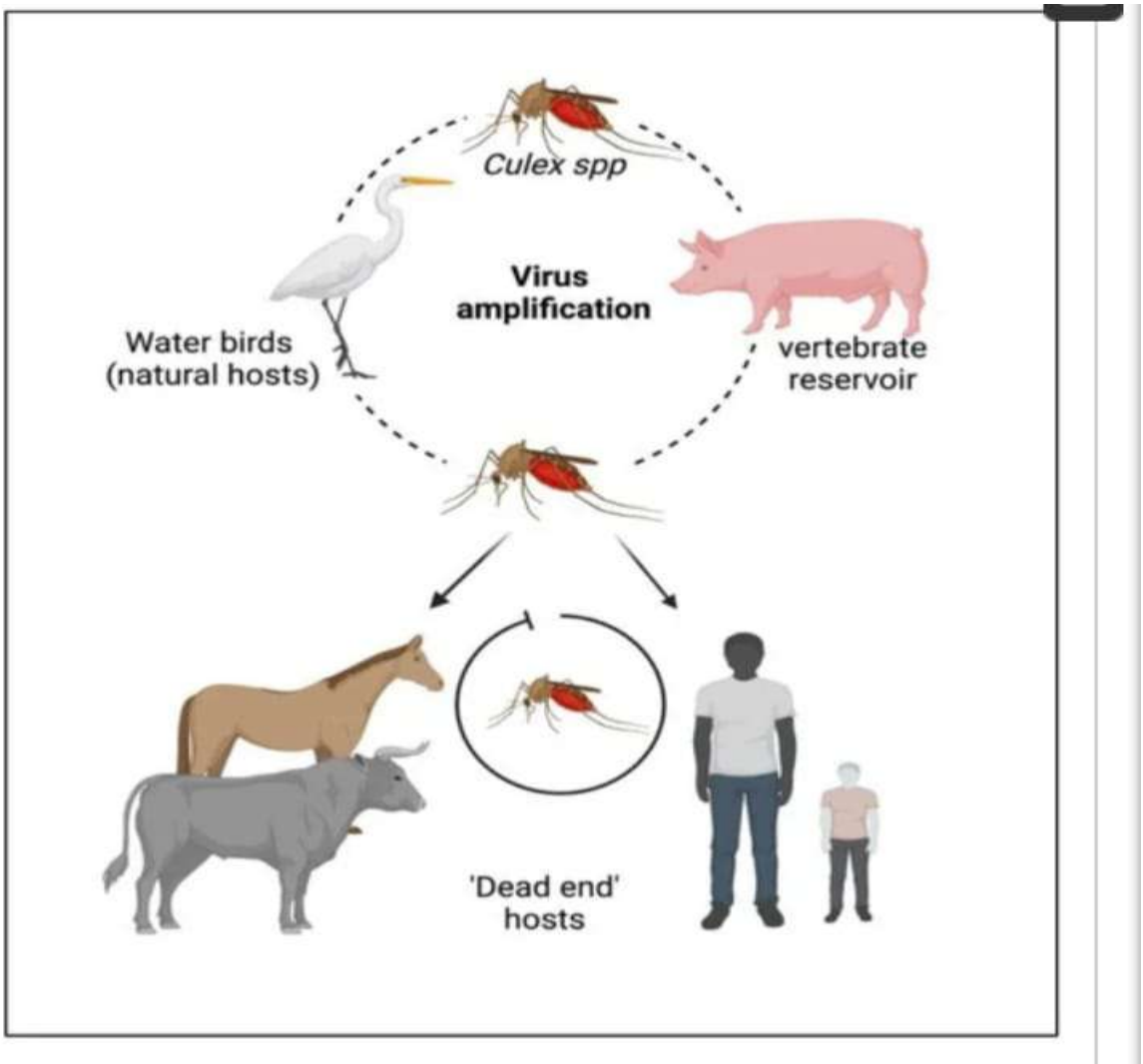
TRANSMISSION

The disease principally occurs in rural agricultural areas where vector mosquitoes breed in the close proximity with pigs, wading birds and ducks. The natural transmission cycle involves multiple mosquito species from genus Culex whereas pigs, birds and bats are the susceptible reservoir hosts. Humans as well as equines are considered as dead-end host since the viremia in peripheral blood is low and transient. The most important vector Culex tritaeniorhynchus is associated with agricultural practices like rice cultivation or irrigated crop fields [5]. The increase in JEV activity in newer areas has been attributed to the increase in human population, rice fields and pig farming [6]. Moreover, ardeid birds are considered responsible for the long-distance propagation of JEV and act as a reservoir for the disease [7]. Domestic pigs serve as key virus-amplifying host as they develop high viral as well as and long-lasting viremia after natural infection with JEV and facilitate transmission to humans living in their close proximity [8]. Horses and other non-avian vertebrates are the incidental dead-end hosts as they do not develop sufficient level of viremia to infect new mosquitoes [9]. Transmission is principally associated with the rainy season in Southeast Asia, however, can happen throughout the year in tropical regions. In the temperate regions of China, Japan, the Korean peninsula and eastern parts of the Russian Federation, transmission occurs primarily during the summer and autumn. Two vital determinants of vector density viz. precipitation and temperature influence the disease burden of JEV [10].



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COMPLICATIONS

- Brain damage
- Neurological issues
- Emotional and psychological problems

DIAGNOSIS

Clinically, it is difficult to distinguish JE from other cases of encephalitis; cases of acute encephalitis syndrome (AES), therefore laboratory confirmation is necessary in such circumstances. In JE cases, viremia is transient and infection is asymptomatic. Several assays have been developed for detection of antibodies induced by natural infection or vaccination [39]. Serological tests comprise of plaque reduction neutralization test (PRNT), the hemagglutination inhibition (HI) test, an indirect immunofluorescence assay (IFA) and an enzyme-linked immunosorbent assay (ELISA). A multitude of tests based on nucleic acid detection have been explored for JEV detection in humans as well as swine population [40 - 42]. However, for laboratory-based surveillance following markers are used for confirmation of the disease.

- CT – scan
- MRI – scan
- CSF examination
- EEG
- Urine and blood test
- Plaque reduction neutralization test
- Virus isolation.
- Nucleic acid amplification.

TREATMENT

NON PHARMACOLOGICAL

- Life style changes
- Get enough rest
- Eat healthy
- Exercise regularly
- Eat antioxidant food
- Avoid refined food
- Use healthy oils
- Ketogenic diet

PHARMACOLOGICAL TREATMENT

- ANTIVIRALS - zovirax
  Ganciclovir
  Foscarnet

- ANTIBIOTICS - doxycycline
  Azithromycin
  ceftriaxone
- CORTICOSTERIODS
- BREATHING ASSISTANCE
- ENTERAL NUTRITION
- IMMUNE GLOBULIN
- IV FLUIDS
- MENTAL HEALTH SUPPORT
- PHYSICAL THERAPY
- SPEECH THERAPY

OTHER TREATMENT

- Brainrehabilitation- **to increase the memory**
- **Physical therapy – to increase flexibility of the body**
- **Occupational therapy - to improve the skills**
- **Speech therapy – for the muscle control**
- **Psychotherapy – to develop the strategies**

VACCINE

Vaccination is the most cost-effective therapeutic intervention. Elimination of the virus is not possible, since, it is maintained in an enzootic cycle involving mammals and birds. Therefore immunization is most effective for prevention and achieving long-term protection.

- JENVAC VACCINE– single dose
- Lxiaro vaccine – 2 doses, spaced 28 days apart

- ✓ As per govt of india guidelines 2dosesof JE vaccine have been approved to be including in UIP to be give one along with measles at the age of 9 months and the second with DPT booster at the age of 16-24 months w.e.f 2013
- ✓ JENVAC vaccine vero cell derived vaccine is prepared from an indian strain (kolar-821564xy)
- ✓ Lxiaro vaccine (2009) an inactive vero cell derived alum – adjuvanted JEvaccine (JE-VC ;Lxiaro)was licensed in europe, the us and Australia JE-VC is prepared from the JEV strain SA14-14-2
- ✓ The first licenced JE vaccine was developed in the 1930s by BIKEN and marketed by sanofi pasteur as JE-VAX the vaccine was made from an inactive mouse brain-derived virus
- ✓ The first JE vaccine introduced in india in the year 2005 &2006 after a large out breake

TYPES OF JEV

1. Inactivated Mouse Brain-Derived Vaccine

JE-VAX is a mouse-brain derived inactivated virus vaccine manufactured in Japan (1930s) that was internationally distributed by Sanofi-Pasteur in the US and Europe [47]. Purified mouse brain-derived wild-type Nakayama or Beijing-1 strains were used for vaccine preparation.

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2. Inactivated Vero Cell Vaccine

P3 strain of JEV grown in Primary Hamster Kidney cells was used for the preparation of inactivated JE vaccine. This vaccine was solely manufactured in China and was the principal JE vaccine till 2000. At peak production, approximately 70 million doses were distributed annually. This has decreased since the late 1990s to about 13 million in 2004 due to the availability and accessibility of live attenuated SA 14-14-2 vaccine [50].

3. Live Attenuated Vaccines

SA 14-14-2 strain propagated in Vero cells as well as in primary hamster kidney (PHK) cells were used for the manufacture this vaccine in China [47] in order to get wider licensure and compliance with the WHO production standards. An enhanced screening for the presence of adventitious agents in the vaccine was done

4. Chimeric Vaccine

Licensed in China, Thailand and India, ChimeriVax™-JE is a single dose lyophilized formulation of a recombinant, attenuated, chimeric virus that consists of structural genes (Pre-membrane and E) from SA 14-14-2 strain. These structural genes were incorporated into the backbone of attenuated strain of yellow fever (YF) virus YF 17D. It is effective in the pediatric population in endemic zones and can be in integrated into the national immunization program [51]. The new collection of safer and effective JE vaccines like, SA 14-14-2, IXIARO® , and IMOJEV™ can considerably decrease the burden of the disease. Since the availability of these vaccines for the population at-risk remains inadequate, there was an urgent requirement for the development of newer vaccines against JEV infection