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# Japanese Encephalitis Fact Sheet

## Japanese Encephalitis - the disease

### *Causative agent:*

Japanese encephalitis is an infection of the Central Nervous System (CNS) caused by a virus (Flavivirus) transmitted to the man by a mosquito. This virus primarily affects animals and man is infected incidentally.

### *Transmission:*

Humans become infected when they are bitten by mosquitoes infected with JE virus. Culicine mosquito species such as *Culex tritaeniorhyncus*, *Cx. gelidus*, *Cx.vishnui*, *Cx. pseudovishnui* and *Cx fuscocephala* are the prominent vectors. These mosquito species prefer to feed outdoors primarily on vertebrate animals other than humans. The JE natural cycle is maintained in these mosquitoes, vertebrate animals and wading birds such as herons, egrets etc. However, when the conditions are favourable, humans are subject to mosquito bites and infected incidentally.

These mosquito vectors generally breed in ground water habitats, particularly in paddy fields, irrigation canals, ground pools and shallow ditches. Mosquito breeding increases during rainy seasons. When the vectors are abundant, the absolute number of infected mosquitoes is high and man – vector contact is adequate, humans are at risk of being infected. Infected mosquito density rises when amplifying hosts such as pigs are available in peri-domestic areas. Human behaviours such as outdoor roaming in bare bodies also increases the risk. In the wet zone of the country, coir production as a cottage industry has also facilitated the spread of the disease due to increased mosquito breeding.

Not all individuals bitten by infected mosquitoes develop the disease (encephalitis). However, all infected humans develop anti JE antibodies. According to estimates the ratio of manifested disease to inapparent disease is in the range of 1:20 to 1:1000.

## Clinical manifestation:

The course of the disease is conveniently divided into three stages namely:

1. Prodromal
2. Acute encephalitic
3. Late

**Prodromal stage:** This stage starts before the involvement of the CNS. The onset of the disease is acute and heralded by fever and often with rigors. Severe frontal or generalized head ache, nausea and vomiting are common. This period is variable as short as 24 hours to as long as 14 days.

**Acute encephalitic:** This stage is characterized by altered sensorium, convulsions, stiff neck, muscular rigidity, mask like face, abnormal movement, dehydration and weight loss. Altered sensorium includes symptoms such as clouding of consciousness, excitement and confusion.

Continuous fever, nuchal rigidity, focal CNS signs, convulsions and altered sensorium are predominant. In many cases, the conditions may be worsened by coma.

**Late stage:** This stage is marked by recovery or persistence of signs of CNS. Increased deep tendons reflexes, thick and slow speech, aphasia and paresis are other signs and symptoms which may be present. Convalescence is usually slow.

#### **Laboratory criteria for diagnosis of JE :**

**Presumptive diagnosis** of JE is made based on four fold or greater rise in JE virus specific Ig G antibodies in paired sera (acute and convalescent), ELISA, haemo-agglutination Inhibition test, Virus Neutralization test in a patient with no history suggestive of either vaccination against or cross reactions to other flaviviruses. Otherwise, it is done by demonstrating JE virus specific IgM antibodies in a single blood sample in late acute phase or early convalescence

**Confirmatory diagnosis** of JE is made by demonstrating JE virus specific IgM antibody in the CSF by IgM capture ELISA or the JE virus , antigen or genome in brain, spinal chord by immunochemistry , immunofluorescence or Polymerase Chain Reactions ( PCR).

#### **Clinical management of JE:**

There is no specific treatment for JE but supportive and symptomatic management is crucial.

#### **Consequences of contracting JE:**

Despite the fact that only a small proportion of the large number of JE virus infected individuals develops overt manifestations of encephalitis, the case fatality ratio is around 30%. Nearly 50000 to 100000 patients die annually in the world due to JE. Nearly half of the survivors suffer long term neuro-psychiatry sequelae. The most commonly observed sequelae in patients are mental impairment, severe emotional instability, personality changes, and paralysis. Cognitive function is impaired by the disease ensuing poor intellectual capacity.

## **Preventive and control measures:**

Isolation of patients and disinfection of secretions of patients are not required as JE is not transmissible from person to person.

**Vector control:** This may be useful as a short term measure, in high risk areas that are relatively small and where there is clear seasonality. Transmission can be minimized with vector control measures timed to coincide with the rise in vector. Larviciding is impractical due to wide spread breeding. Adulticiding by space spraying /fogging/ULV is carried out around peridomestic areas (vegetations and piggeries) to achieve maximum knock down, particularly in outbreak situations and to ensure residual insecticide activity.

As a long term measure, vector control measures are used to sustain low vector densities. Among these measures, most reasonable ones are:

1. Water management that entails periodic drying in paddy fields.
2. Selection of paddy plants with minimum water requirements
3. Promotion of larvivorous fish in streams, canals and paddy fields
4. Environmental manipulations such as drainage , filling and weeding

However, it is essential to bear in mind that vector control cannot be expected to achieve a significant impact on overall disease burden as a single strategy.

### ***Health Education and communication for behavioural change:***

There should be simple information for general public on how to avoid exposure to mosquito bites and means and ways to encourage and motivate communities to engage in vector control activities

### ***Control of amplifying hosts:***

Despite the suggestion as a control measure, segregation of pigs is practically impossible. Although pigs are immunized, they are slaughtered at 6-8 months and as a result maternal antibodies may interfere with immune response. Even pig control is made 100% effective, existence of the virus among wadding birds will ensure the circulation of the JE virus in enzootic cycle making humans vulnerable to the infection

### ***Immunization against JE:***

Immunization against JE is the most cost effective strategy to control and prevent JE. Immunization against JE was initiated in Sri Lanka in 1989 following the outbreak in the North Central Province on phase basis. Over the years, incidence of JE was reduced dramatically. However, as it re appeared in endemic areas where immunization was not carried out, gradually the programme was expanded to these potentially vulnerable areas and currently, since 2011 the programme is covering entire country.

According to the current schedule all the children will be immunized with the LJEV at the completion of one year.

***Current immunization programme:***

- **Type of vaccine used:** Cell culture derived live JE vaccine (LJEV)
- **Approach:** all the children will be immunized with the LJEV at the completion of one year under National EPI programme.
- **Target group :** All children at completion of 1 year of age
- **Dosage:** The recommended dosage is 0.5ml of reconstituted vaccine administered sub cutaneously to the outer upper arm of the child.
- **Schedule:** Single dose at completion of 1 year of age