

- ❖ Person should frequently check for the presence of ticks on the body and clothing's
- ❖ If ticks are found attached to the body, they should be removed using a forceps or tweezers by holding the part which is close to the place of attachment with firm pulling force (Figure 3). Care should be taken not to crush the tick

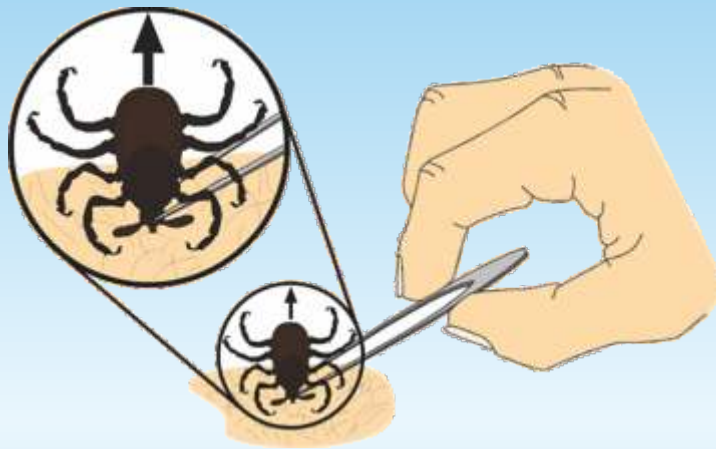


Figure 3. Proper way to remove ticks from the body

- ❖ After removing the tick clean the bite areas with soap and water
- ❖ After returning from tick infested areas it is advised to wash clothes and body with hot water
- ❖ Don't handle dead carcasses of monkeys and inform either forest department, animal husbandry or public health department regarding monkey deaths in the area
- ❖ If clinical symptoms resembling KFD appear in humans, the person should immediately consult a physician/health officer of nearby health center
- ❖ People living in endemic areas should cooperate with health department to undergo KFD vaccination when need arises

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**Source of pictures :**

- [http://creatures-of-the-world.wikia.com/wiki/Gray\\_Langur](http://creatures-of-the-world.wikia.com/wiki/Gray_Langur)
- <https://lakesideindia.wordpress.com/tag/bonnet-macaque/>
- Dr. A.R. Desai, Principal Scientist, ICAR-CCARI, Goa
- National Institute of Virology, Pune
- Indian Council of Medical Research, New Delhi
- Virus Diagnostic Laboratory, Shivamogga
- <http://www.lymeticks.org/bitten>

# KYASANUR FOREST DISEASE (MONKEY FEVER)



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Kyasanur forest disease (KFD) also called as monkey fever is a tick-borne zoonotic disease. KFD was first reported during 1957 from Shivamogga district of Karnataka state. In the initial years the disease was restricted to Karnataka state. Later on human KFD cases have been reported from adjacent states viz., Kerala, Tamil Nadu and more recently from Goa and Maharashtra. The disease mostly occurs in dry months of the year between November and June.

### Etiology

KFD is caused by Kyasanur forest disease virus (KFDV) - an RNA virus of the genus *Flavivirus* belonging to Flaviviridae family.

### Risk group

The person who frequently visits forest like hunters, farmers, wood cutters, forest workers are at high risk of acquiring the disease.

### Life Cycle and Transmission

The natural hosts of KFD virus are shrews, rodents, bonnet monkeys and langurs (Figure 1). The virus gets transmitted to humans by the bite of the infected nymphal stage of the tick *Haemaphysalis* spp. Humans may also pick up the infection by coming in contact with sick or dead monkeys. The tick has four stages in its life

cycle viz., egg, larva, nymph and adult. Female tick lay eggs which hatch to larvae. The larvae pick up the infection while feeding on the host infected with KFD virus. Subsequently larvae become nymph. The nymphal stage when bites humans and other animals lead to transmission of KFD virus (Figure 2). There is no evidence of human to human transmission of KFD virus.

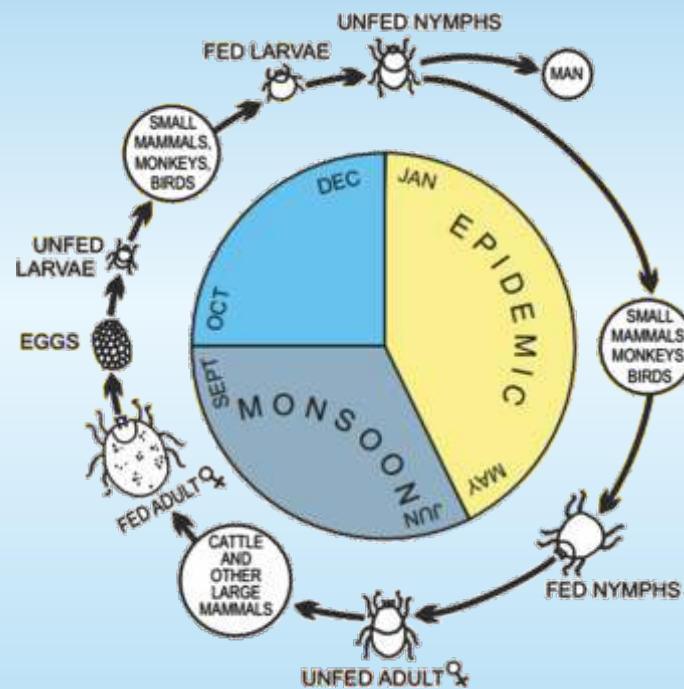


Figure 2. Life cycle of *Haemaphysalis* spp tick and transmission of KFD virus

### Clinical symptoms in humans

Symptoms of the disease start appearing 3-8 days after the tick bite. Initially patients suffer from fever, chills and frontal headache. Patients may also experience body pain, diarrhea and vomiting. As the disease progress there may be hemorrhagic manifestation such as blood in the vomitus, sputum and stools. Most of the patients recover with in one to two weeks. However, in some of the patients symptoms may relapse after a brief period of 1-2 week which includes severe headache, mental disturbance, tremors and vision problems.

### Clinical symptoms in monkeys

The monkeys infected with KFD virus suffer from severe disease and eventually most of them succumb to death. Thus sudden death of monkeys in a geographical area may point towards KFD virus activity.

### Diagnosis

The clinical symptoms along with history of tick bite and or travel to KFD endemic area are important information in suspecting the case as KFD. The laboratory diagnostic tests include reverse transcription polymerase chain reaction to detect KFD virus RNA in humans, monkeys and ticks. The isolation of virus can be achieved by employing cell culture or inoculation of clinical material into suckling mice. Detection of IgM against KFD virus in human patients using ELISA is also helpful.

### Treatment

There is no specific anti-viral treatment available against KFD in humans. However fluid replacement and other supportive therapy are given to alleviate the symptoms.

### Prevention and control

- ❖ Humans' and livestock must avoid entering those forests where monkey deaths have been reported
- ❖ In unavoidable circumstances before entering into the forest following measures must be taken
  - Wear long sleeved shirts, trousers, shoes to avoid ticks bites
  - Tick repellents such as Dimethyl phthalate (DMP) oil and NN-Diethyl-meta-Tolumaide (DEET) or similar products should be applied on exposed skin
  - Wear light colored clothing since it will facilitate easy spotting of ticks

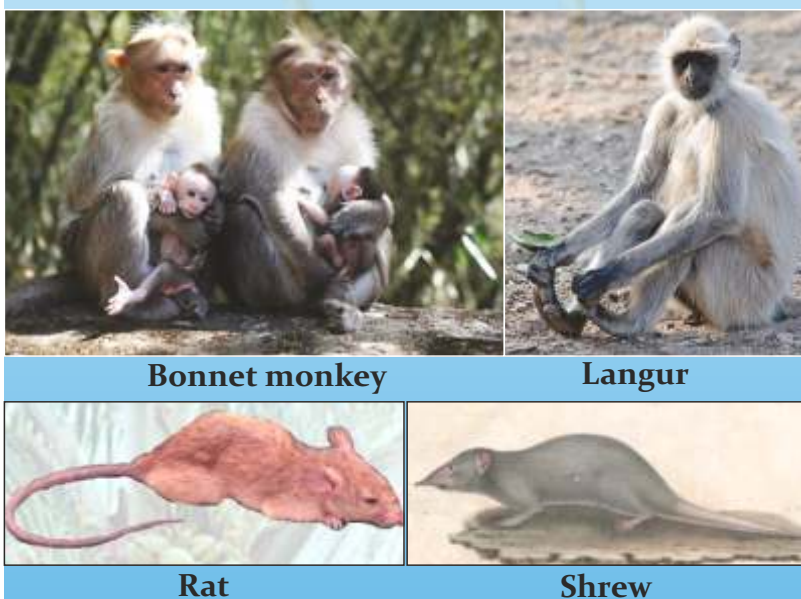


Figure 1: Major hosts involved in the life cycle of KFD virus