ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 03 | March - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

UNVEILING KYASANUR FOREST DISEASE: A REVIEW

Medical Microbiology

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ABSTRACT

Monkey fever is a rare, yet potentially severe, highly infectious tick. borne viral disease. It is familiarly known as Kyasanur Forest Disease and was first identified in mid twentieth century, has now re-emerged in recent years with certain outbreaks, which raises the concern towards potential global threat. This article discusses the origin, distribution, recurring spread and various treatment modalities, along with preventive measures.

KEYWORDS

Kyasanur Forest Disease, Monkey Fever, Viral infection.

INTRODUCTON

Kyasanur Forest Disease (KFD), also known as Monkey Fever, is a viral infectioncaused by the Kyasanur Forest disease virus (KFDV), which belongs to theFlaviviridae family and is classified in the genus Flavivirus. It is also known as Monkey Fever. It usually presents with haemorrhagic and neurological symptoms. Initially identified in laboratory monkeys, it has primarily been observed in the southern regions of India, although its geographical distribution has widened in recent years [1]. It is known to spread through transmitted through tick, small rodents and from forests.

Epidemiology

In India it was discovered in 1957, KFD was first documented in the Sagar and Sorab taluks within the Shimoga district of Karnataka. The recent surge in KFD cases in the Siddapur of Karnatka district and along the course of Western Ghatshas raised concerns and prompted urgent public health interventions. The statehas witnessed a significant increase in KFD cases, with two fatalities and 49 positive cases reported across Karnataka as of February 9th, 2024.

First re-emergence case of monkey fever in India was reported in 2022 in kerala. The most recent case documented on March 27, 2024. In India total 30 cases have been laboratory confirmed and affected individuals ranged between 15-64 years of age, with higher incidence among males[2].

Etiology

The primary transmission path of KFDV is through a bite from an infected Haemophysalis Spinigera tick. Flaviviruses include all necessary replication, transcription assembly and egress proteins in their genome. The animal reservoir for the disease is thought to include nonhuman primates and is known to affect two South Indian species; Macaca radiata and langurs. However, it does not spread via human-to-human transmission route [3]. The virus cycles between ticks and small mammals especially, rodents. Humans only get infected when they come in contact with tick-infested area such as forests or grasslands.

Pathophysiology

After entering the body, virus gets deposited into the human skin through tick bites is initially engulfed by the macrophages and other antigen-presenting cells (APCs). The APCs transport the virus to different organs of the body.

Additionally, the APCs stimulate the thymus cells and bone marrow cells which then initiate the production of T-lymphocyte subsets like CD4+T lymphocytes and antibodies, respectively. The antibodies react with the viral antigens and result in the neutralization and clearance of the virus. The viral entry into the host also stimulates the production of cytokines which could potentially result in complications like disseminated intravascular coagulation, haemorrhagic manifestations, and neurological complications [4].

Signs And Symptoms

- The incubation period of KFDV in humans is 3-8 days.
- The clinical presentation of KFD is usually described as biphasic (haemorrhagic and neurological), but can have four stages.
- In the first phase, patients usually present with sudden onset of fever, headache and generalized body pain, especially of the neck, upper and lower back and extremities. Conjuctival inflammation of both the sclera and palpebra is often noted. No specific skin lesion or rashes are observed.
- In the Early phase of illness, gastrointestinal symptoms including vomiting, abdominal pain and diarrhoea occur in majority of patients. Fever may subside, but patients can remain asthenic and listless for a long period. Dehydration may be aggravated due to poor intake of fluids.
- Haemorrhagic manifestations are part of initial phase and may begin 3-4 days after onset of symptoms.
- During the recovery phase, patients may present with muscle twitching, coarse tremors, paraesthesia and generalized shaking due to weakness. , most patients recover in 10-14 days.
- A few patients may have only febrile exacerbation without any neurological symptoms such as drowsiness, transient disorientation, confusion, rarely convulsion and loss of consciousness [5].

Diagnosis

- **Testing In Laboratories:** Viremia could be detected from 1st to 13th day in high dose group, with a peak on 3^{rd} to 4^{th} day. The viral RNA detection in rectal swabs ranged from 3^{rd} to 13^{th} day, in stool samples from 3^{rd} to 12^{th} day and in urine sample 7^{th} to 12^{th} day, respectively.
- **Examination Of Sera:** Testing for antibodies serologic testing can be done to detect IgM and IgG antibodies in macaques, could be detected from 6^{th} to 42^{nd} and 14^{th} day respectively.
- **Viral Culture**: Viral isolation specimens from wounds can be used to isolate and culture monkey viruses.
- **Electron Microscopy:** Is generally used for the morphological identification of the virus in the lesion.
- **Cytokine Analysis:** Cytokines are analysed, in stimulated splenocytes, only IL-6 could be detected. A clear pattern of IL-6 secretion was observed from 7^{th} to 14^{th} day in splenocytes.
- **Histopathology Finding**: Changes observed were minimal irrespective of the dose of inoculation, and majority of the changes were observed in the gastrointestinal tract. Mucosal ulceration and focal/mild mononuclear cell infltration were observed in stomach [6].

Differntial Diagnosis

- Dengue Fever
- Scrub Tyhpus Fever
- Malaria
- Crimean-Congo haemorrhagic fever

- Ebola virus Disease

Treatment

Timely hospitalization and supportive therapy are more important because no specific and well established antiviral treatment is available for KFD virus in humans currently.

- Some patients require maintenance of adequate fluid balance, haemodynamic support and supplemental oxygen or other respiratory Support.
- **Antiviral medications**, there are no targeted antiviral drugs, but Sofosbuvir and Dasabuvir cause inhibition of RNA-dependant RNA polymerase activity of NS5 protein of KFD [7].
- Recent advancements in KFD vaccination with formalin-inactivated tissue-culture the vaccine has been the primary strategy for controlling the transmission of the disease. It is administered as a single dose, this innovative vaccine not only reduced KFDV loads and pathology but also provided significant protection against KFD disease[8].The second dose of vaccine is 62.4% effective and third dose effectivity is 82.9% [9]. This vaccine demonstrated safe and robust immune response.
- For secondary infections antipyretics, pain reliefs, antimicrobial therapy and blood transfusion are carried out while for nervous disorders, anticonvulsants, and corticosteroids are available.

Prevention

The main objective in the prevention and control of Monkey fever should be to interrupt the multi-country outbreak and prevent its transmission at the human-animal interface. It should go through infection prevention and controlwhere vaccination should be considered as an additional measure.

At national-level, these strategies and proper KFD patient handling guideline can prevent the nosocomial and family cluster transmission of the infection.

Healthcare workers should follow the routine monitoring and screening to prevent spread infection. They must stay at home or in a government-provided quarantine facility for the incubation period. Strategies should be developed for proper investigation, surveillance, prophylaxis, treatment, and routine vaccination in endemic areas [10].

CONCLUSION

Monkey fever or KFD possess a significant threat to the human health, with high mortality rate and potential for endemic or even pandemic spread.

Understanding the clinical manifestations, diagnosis, treatment and prevention strategies is crucial for healthcare professionals and public health officials. While antiviral medication and development of newer vaccinations can improve the patient outcome, early detection and isolation are crucial for preventing the transmission. Continued and consistent research along with proper surveillance are necessary to stay ahead of this evolving and recurring virus so as to mitigate its impact on global health.

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