

Popular Article

Monkeypox: an evolving public health threat

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Abstract

Human Monkeypox is a rare viral zoonosis endemic to central and western Africa that has recently emerged outside endemic regions. It is a zoonotic Orthopoxvirus with a presentation similar to smallpox. A clear understanding of the virulence and transmissibility of human Monkeypox has been limited by inconsistencies in epidemiological investigations. There are no licensed therapies for human Monkeypox; however, the smallpox vaccine can protect against the disease. Effective prevention relies on limiting the contact with infected patients or animals and limiting the respiratory exposure to infected patients.

Introduction

Monkeypox is a viral zoonoses having symptoms similar to smallpox although it is clinically less severe. After the eradication of smallpox in 1980, the smallpox vaccination had been ceased which gave birth to the Monkeypox, the most important orthopoxvirus of public health. The disease is characterized by fever, intense headache, myalgia, lymphadenopathy, skin eruptions (within 1-3 days), etc. The virus is named Monkeypox as it was first reported in the monkeys kept for experimental/ laboratory purposes in 1958. The first human case of Monkeypox was recorded in 1970 in the Democratic Republic of Congo during the campaign for the smallpox eradication. It primarily occurs in central and west Africa, in the proximity of the tropical rainforests. Animal hosts include a range of rodents and non-human primates.

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Etiology

The etiology of Monkeypox disease is the Monkeypox virus, a double-stranded DNA that belongs to the genus Orthopoxvirus of the Poxviridae family. There are two distinct clades of the virus named the central African (Congo Basin) clade and the West African clade. The central African clade is more severe.

Natural host and reservoir

A number of rodents and non-human primates are found to be the natural host of the virus including squirrels (rope and tree), Gambian pouched rats, dormice, etc. The natural reservoir of the Monkeypox has not yet been identified, though rodents are the most likely.

Epidemiology

The first human case was reported in 1970 in the Democratic Republic of the Congo in a 9-year-old boy in recent smallpox eradicated region. Since then, most cases have been reported from rural, rainforest regions across central and West Africa. Since 1970, human cases of Monkeypox have been reported in 11 African countries. In 2003, the first Monkeypox outbreak outside of Africa was reported in the USA and was linked to infected pet dogs. From 2018- to 2021, the disease had been reported in the travelers from Nigeria to Israel, the U.K., Singapore, and the USA. Monkeypox endemic countries are Benin, Cameroon, the Central African Republic, the Democratic Republic of the Congo, Gabon, Ghana (identified in animals only), Ivory Coast, Liberia, Nigeria, the Republic of the Congo, Sierra Leone, and South Sudan. Recently, since 13 May 2022, cases of Monkeypox have been reported to WHO from 12 Member States that are not endemic to the Monkeypox virus. Epidemiological investigations for these cases are ongoing; however, reported cases thus far have no established travel links to endemic areas.

Transmission

Humans got the infection from host animals via direct contact with the blood, body fluids, and cutaneous or mucosal lesions of the infected animals. Eating inadequately cooked meat and other infected animal products is also a risk factor. Human to human transmission occurs through direct contact with respiratory secretions, skin lesions of the infected person, or recently contaminated objects. The droplet transmission in close contact with the infected persons is also reported. The transmission also occurs via the placenta from mother to fetus (congenital Monkeypox). The sexual transmission route is not established yet.

In Africa, serologic evidence of monkey pox infection has been observed in a wide variety of mammals, including non-human primates, rodents, and squirrels. The role of that or any other

particular species as a reservoir has not been established. The route of transmission from animal to animal may occur through respiratory droplets, inhalation of aerosolized virus or organic matter containing virus particles, skin abrasions, the eye, or through the ingestion of infected animal tissue.

Signs and symptoms

The incubation period of the Monkeypox varies from 5 to 21 days, usually 6 to 13 days. The infection is divided into two periods-

- a) **Invasion period:** It usually lasts between 0-5 days and is characterized by fever, intense headache, lymphadenopathy, back pain, myalgia, and intense asthenia. Lymphadenopathy is a distinctive feature of Monkeypox compared to other diseases (Weinstein R. A. *et al.*, 2005).



Fig.1: Cervical lymphadenopathy in a human patient with active Monkeypox infection (McCollum A. M. *et al.*, 2014).

- b) **Skin lesions period:** The skin eruption usually begins within 1-3 days of the appearance of fever. The skin lesions (rash) usually tend to be more concentrated on the face (95% of cases) and extremities (75% of cases) compared to the trunk (Fig.1). However, skin/mucosal lesions were also reported in oral mucous membranes, genitalia, conjunctivae as well as the cornea (Huhn G.D. *et al.*, 2005).
- c) Usually, the Monkeypox is a self-limiting disease (2-4 weeks). Severe cases occur more commonly among children. The case fatality rate of Monkeypox varies from 0-11% with a higher side among children, but, recently, it has been around 3-6%.



Fig.2: The Monkeypox skin lesions on extremities (WHO).

Diagnosis

The clinical differential diagnosis that must be considered includes other rash illnesses, such as chickenpox, measles, bacterial skin infections, scabies, syphilis, and medication-associated allergies. Lymphadenopathy during the prodromal stage of illness can be a clinical feature to distinguish Monkeypox from chickenpox or smallpox.

The diagnosis has been carried out by skin lesions, and other symptoms followed by confirmation by PCR. Real-time PCR is the preferred laboratory test. The sample of choice includes the roof or fluid from vesicles, pustules, and dry crusts.

Therapeutics

The clinical care has been provided symptomatically such as optimum fluids and food, and antibiotics to combat secondary bacterial infections. An antiviral agent named tecovirimat is also found to be effective but not yet widely available.

Vaccination

The smallpox vaccine was found to be 85% effective in preventing Monkeypox, but at present times, the smallpox vaccine is no longer available to the general public. So, a novel vaccine, *i.e.*, modified attenuated vaccinia virus (Ankara strain) has been approved. It is a two-dose vaccine, but its availability is also limited.

Prevention

- Raising awareness regarding risk factors is the main prevention strategy for the Monkeypox.
- For the prevention of human-to-human transmission, surveillance and rapid identification of new cases are critical.

- Avoid close contact with the infected persons, as it is the most significant risk factor for monkeypox.
- Proper isolation and treatment of the diagnosed human cases.
- For prevention of zoonotic transmission, avoid unprotected contact with wild animals, especially infected ones.
- Avoid the consumption of raw and improperly cooked meat.
- Avoid unprotected contact with the laboratory rodents and non-human primates.

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