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Popular Article

Monkeypox: A Re- Emerging Zoonosis

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Abstract

Prior to April 2022, cases of monkeypox virus infecting humans outside Africa's endemic regions were infrequent. The ongoing 2022, outbreak is an extensive human-to-human transmission emerged outside Africa. By the end of July, the World Health Organization recorded almost 18,600 cases, and declared the outbreak as a Public Health Emergency of International Concern and reported its spread to at least 78 different countries, including India. While the reservoir host still remain unidentified, rodents from Africa are thought to be the intermediary hosts. In spite of decades of ongoing outbreaks, it is likely that the failure to stop the disease's spread in Africa's endemic regions is what led to the outbreak in non-endemic countries. To combat current and future outbreaks, a "One Health", globally driven approach must be taken to disease prevention and treatment.

Keywords: Monkeypox, One Health, Endemic, Public Health, Reservoir

Etiology

Monkeypox is a viral disease affecting mainly primates, including humans and monkeys that causes symptoms similar to smallpox, but milder in nature. Monkeypox virus belongs to family: Poxviridae, subfamily: Chordopoxvirinae, genus: Orthopoxvirus and species: Monkeypox virus. The genus Orthopoxvirus include vaccinia virus, cowpox virus, variola virus, and other animal - related poxviruses.

Orthopoxvirus are enveloped double stranded DNA virus, having relatively larger size (200-250 nanometers). They are brick-shaped and have a linear double-stranded DNA genome enclosed in a lipoprotein sheath. Poxviruses have all the assembly required for replication, transcription and proteins in their genome, in addition to relying on host ribosomes for mRNA translation. When compared to other enveloped viruses, poxviruses show exceptional resistance to drying as well as higher temperature and pH tolerance and long-lasting environmental stability. Materials from infected individuals (e.g., dermal crusts) or fomites (such as bed linen) may continue to be infectious for months to years. Despite these characterstics, they are sensitive to common disinfectants, although can be less sensitive to organic disinfectants, when compared to another enveloped virus.

Epidemiology

Monkeypox virus was first identified and isolated in 1958 in monkeys, while they were transported from Singapore to a Denmark research centre for polio vaccine related research. Although first identified in captive monkeys (hence the name), monkeys are the primary host but the available reports suggest native African rodents such as Gaambian giant rats and squirrels as the natural reservoir. The first human isolate of Monkeypox virus was discovered in a child in 1970, from the Democratic Republic of the Congo nine months after the eradication of smallpox.

Vaccination against the smallpox virus historically provided coincidental immunity against the monkeypox virus, but eradicating smallpox and subsequent lack of vaccination efforts allowed monkeypox to gain clinical importance.

Monkeypox was mainly considered an endemic in tropical rainforest regions of central and west Africa and is sporadically transported to other regions. The first monkeypox outbreak outside of Africa occurred in the United States of America in 2003, when infected captive prairie dogs have exposed humans to virus through imported African pets.

In May, 2021 three members of a family from UK who had visited Nigeria, become infected with the virus. The orderly onset of symptoms in each case within the family (day 0, day19, day 33) may indicate transfer from person to person. In July, 2021 a case occurred in a man who travelled from Nigeria to Texas following another case in November, 2021 in a man having travel history from Nigeria to Maryland.

In 2022, a more serious outbreak with widespread human-to-human transmission in nations outside of Africa emerged. The outbreak started in May, 2022 in the United Kingdom, when a man who returned from Canada to Massachusetts was confirmed for the virus. Following this, there were clusters of cases in the United Kingdom which quickly spread over the world within few months, thereby infecting nations in Africa, Asia, Australia, and the Americas.

With approximately 18,600 cases had been documented by the end of July, World Health Organization declared the outbreak a Public Health Emergency of International Concern. It has been reported by the World Health Organization that monkeypox virus has spread to at least 78 different nations.

The first case of monkeypox from India was reported on 15 July 2022, from a 35-year-old man who had travel history of Middle East. There have been nine confirmed cases in India so far and one mortality from Kerala has been reported. Following this, Indian government wrote to the WHO representatives in the

UAE to ensure that individuals exhibiting symptoms of monkeypox should not be permitted to board flights and strict guidelines should be issued.

Transmission

Humans can contract monkeypox virus by coming in contact with an infected animal or person or by handling contaminated objects. The respiratory tract, mucosal membranes, and damaged skin are also entry points for the virus into the body. Another potential risk factor is eating inadequately cooked meat. Sexual transmission of the virus has also been reported. There have been reports of other rare transmission routes such as mother-to-child transmission or nosocomial infection.

The incubation period follows two weeks and early symptoms include fever, headache, general malaise and fatigue and swollen lymph nodes. Few days later, rash develops on the face and body. The evolution of lesions progresses stages as - macule, papule, nodule, vesicle, to pustule –before scabbing over and resolving. The disease gradually takes its course in two to four weeks, and they eventually crust and peel off. Typically, monkeypox is a self-limiting illness but there may be severe cases. The case fatality ratio has recently been reported between 3 and 6 percent.

Diagnostics

Currently, Monkeypox virus real-time Polymerase chain reaction is used for diagnosis. Because viraemia only lasts a short time, swabs, scrapes, and aspirated lesion fluid are preferred to blood samples. The findings from these samples demonstrate the strongest association with both infectivity and the clinical course of illness.

IgM and IgG detection by Enzyme-linked immunosorbent assay (ELISA) or immunofluorescent antibody assay is also available in some laboratories for contact investigations and population surveys. Antigens in biopsy samples can be found via immunohistochemistry, which can also be used to find or rule out other suspect agents. A minimum of BSL-2 facilities should be available for diagnostic procedures and processing of specimens suspected to contain the virus. Monkeypox virus is categorized as a biological agent of group 3, therefore tasks involving the handling of Monkeypox virus should be carried out in working spaces that meet at least the requirements of level three confinement.

Treatment and management

There are currently no known, effective treatments for monkeypox infection. The treatment is supportive management symptom, as with most viral infections. However, there are precautions that can be taken to avoid an outbreak.

Until all lesion crusts have naturally fallen off and a new skin layer has grown, the infected person should stay in isolation, wear a surgical mask, and keep lesions covered as much as possible. For individuals exposed to the virus, temperature and symptoms should be monitored twice daily.

A modified vaccinia virus strain, Ankara vaccine (a live, non-replicating vaccine against smallpox and monkeypox) is sometimes advised as a post-exposure immunization. A "high risk" exposure that calls for prompt post-exposure vaccination is when broken skin or mucous membranes come into contact with an infected patient's bodily fluids, respiratory droplets, or scabs. Vaccination within four days of exposure may prevent disease start, and vaccination within 14 days may lessen disease severity, according to the Centers for Disease Control.

Public Health Control Measures

In order to prevent transmission to humans, public health initiatives include:

- Early recognition by expert evaluation and laboratory investigation
- Early detection of potential new cases by contact tracing in epidemic settings (standard, contact, and droplet precautions).
- Isolation of infected patients
- Implementation of suitable infection prevention and control measures in healthcare settings.

To reduce animal-human transmission, contact with potential animal reservoirs (such as rodents and non-human primates) as well as contaminated materials should be avoided. Additionally, meat should be cooked properly before eating. To stop the virus from spreading, potentially contaminated objects, such bed linens, should be properly disinfected in a safe manner to prevent the virus from establishing in local rodent populations.

Conclusion

The extent of this outbreak is a serious worry because the longer the virus spreads, the more it will extend its reach, and stronger the disease will take hold in nations where it is not endemic. Governments, health partners, and civil society are need to follow three key principles laid out by the World Health Organization in order to handle this pandemic includes

- Improved surveillance, contact tracing, and infection prevention and control should be done first.
- In-depth community involvement and improved communication in reducing transmission.
- The third step is genuine regional cooperation that is both immediate and long-term.

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