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Review Article

Epidemiology and preventive strategies of monkey pox virus with emphasis in Delta State, Nigeria

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ABSTRACT

Monkey pox is an emerging and re-emerging viral zoonotic infection occurring in different part of the globe with the potential of assuming a public health emergency of international concern. Deforestation and human intrusion into the habitats of the monkey pox animal hosts were suggested as probable causes of monkey pox outbreaks. Review of previous literatures were done using google scholar, Mendeley reference library, and Pubmed search engines. The key words used includes; monkey pox, epidemiology of monkey pox, Mpox and reservoirs of Monkey pox. Monkey pox virus was first isolated from Cynomolgus macaques in 1958 and also in a nine months old baby in the Democratic Republic of Congo in 1970. In 2020, there were more than 6300-suspected cases of monkey pox infection, of which 95% were in the Democratic Republic of the Congo. From January 1, through August 7, 2022, a total of 27, 814 laboratory confirmed cases of monkey pox and 11 deaths were reported to WHO from 89 countries. From 2017 to 2022, there were 249 confirmed cases across Nigeria, with a notable resurgence in recent years. In June 2022 alone, there were 23 confirmed cases and one death. The monkey pox virus can spread from human to human as well as from animal to human. The most effective way to prevent viral zoonosis is to maintain the barriers between natural reservoirs and human society, in mind of the "one health" concept.

Keywords: Monkey, Pox, Virus, Reservoir, Infection

INTRODUCTION

Monkey pox is a viral infection that is comparable to smallpox. The first cases of monkey pox in Nigeria were recorded in 2017. Contact with infected animals or humans is thought to spread the virus.[1] Monkey pox is an emerging and re-emerging viral zoonosis in different part of the globe with the potential of assuming a public health emergency of international concern (PHEIC).[2,3] Monkey pox virus is an orthopox virus that is in the same genus as variola (causative agent of smallpox) and vaccinia viruses (the virus used in smallpox vaccine). The Monkey pox virus (MPXV) is a 200 to 250 nm brick- shaped enveloped double stranded DNA virus (genus-Orthopoxvirus and family-Poxviridae) with characteristic surface tubules and a dumbbell-shaped core component.[4] The virus shares an antigenic ancestor with the variola and vaccinia viruses and has a linear double-stranded DNA genome. There are two distinct genetic clades of the monkeypox virus: the Central African (Congo Basin) clade and the West African clade.[5] The former has historically caused more severe disease and was thought to be more transmissible than the latter. The geographical division between the two clades has so far been in Cameroon, the only country where both virus clades have been found.[3,6] The MPXV has been found to be susceptible to several animal species. This includes non-human primates, rope squirrels, tree squirrels, dormice, Gambian pouched rats, and other

species. Non-human primates like the monkey and other animals like rodents are the reservoir hosts and animal vectors of the virus.[7] Most cases of monkey pox have occurred in Central and West Africa.[8] There appears to have been a recent change in the epidemiologic characteristics of monkey pox in Africa, where cases are now occurring in new geographic areas, perhaps facilitated by climate change and deforestation leading to changes in the environmental interface between humans and the animal reservoir (or reservoirs).[9]

Historically, MPXV (monkey pox virus) was first isolated from an animal (Cynomolgus macaques) in 1958 and also in a nine months old baby in the Democratic Republic of Congo (DCR) in 1970 with most cases reported in the rainforest and rural areas.[5,10] Only a few cases were irregularly reported for several years since 1970. Then, in 2017, there was a sharp increase, with over 2800 suspected cases recorded in seven African nations (The Democratic Republic of the Congo, Nigeria, Cameroon, Liberia, Sierra Leone, Gabon, and Sudan).[11] This increase persisted, reaching a peak in 2020 with more than 6300-suspected cases, 95% of which were in the Democratic Republic of the Congo. However, the number of probable cases then decreased to about 3200 in 2021. Although, the causes of these spikes are unknown, deforestation and human intrusion into the habitats of the monkey pox animal hosts may be responsible.[3]

From January 1, through August 7, 2022, a total of 27, 814 laboratory confirmed cases of monkey pox and 11 deaths were reported to WHO from 89 countries/territories/ areas.8 The virus has hit parts of the population where people have been in close contact with each other and also travel internationally.[12]

Routine immunization against smallpox stopped in the early 1970s in places like the US and UK. As smallpox vaccines can be 85% effective at preventing its related virus, monkeypox. Many people born after that time are not immune anymore.[12,13]

The WHO declared on 23 July, 2022 that the multi-country outbreak of monkeypox is a public health emergency of international concern (PHEIC). A coordinated response can stop transmission and protect vulnerable groups.8 This review aimed at exploring the aetiology, distribution and preventive strategies against future monkey pox outbreaks with emphasis in Delta State, Nigeria.

This followed a non-systematic review approach. The search and evaluation of published literatures globally, in sub-Saharan Africa and in Nigeria was done through search engines including PubMed, google scholar using Mendeley reference library for citation. The published literatures were searched using the key words such as monkey pox, epidemiology of monkey pox, Mpox and reservoirs of Monkey pox. The references were also screened for relevant articles and reviewed appropriately for important information.

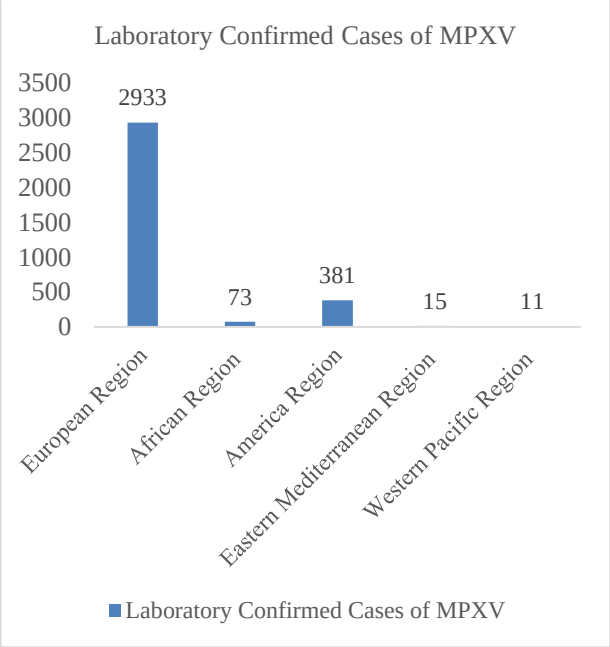

Figure 1: Outcomes of laboratory confirmed cases of monkey poxvirus.

The first reported case of monkeypox in Delta State, was a part of a larger outbreak that began on September 22, 2017.[14] This outbreak spread across multiple states, including Delta, Bayelsa, Rivers, Ekiti, Akwa Ibom, Lagos, Ogun and Cross River, where laboratory-confirmed cases were identified.[15] As of December 2017, Delta state was among 14 with confirmed cases of monkey pox. From 2017 to 2022, there were 249 confirmed cases across Nigeria, with a notable resurgence in recent years. In June 2022 alone, there were 23 confirmed cases and one death. Unfortunately, the country appears not to be doing enough to stop or arrest this public health monster after the disease was first reported in the country.

Laboratory confirmed 3413 cases and 1 death were reported to WHO from 50 countries/territories from January 1 to June 22, 2022. The majority of laboratory confirmed cases were reported from the WHO European Region. Other regions reporting cases include: the African Region, Region of the Americas, Eastern Mediterranean Region and Western Pacific Region (Figure 1).[8] One death was reported in Nigeria in the second quarter of 2022, and over 10,000 confirmed cases in the U.S.[16]

DISCUSSION

Clinical characteristics of MPXV

Since the start of the monkeypox outbreak and as of 22 August 2022, 16 750 confirmed cases of monkeypox (MPX) have been reported from 29 EU/EEA countries. Two deaths have been reported by Spain in July 2022.17 According to WHO, cases in the Americas accounted for 60% of cases in the past month, while cases in Europe comprised about 38%. The number of monkey pox cases

reported globally dropped by 21% in the mid-August, 2022, reversing a month- long trend of rising infectious outbreak.[18]

The clinical presentation of MPXV is atypical and unusual, characterized by anogenital lesions and rashes that relatively spare the face and extremities. The most prevalent sign and symptom reported was fever (in 54.29% of cases) followed by inguinal lymphadenopathy (45.71%) and exanthema (40.00%).[8]

The viral infection (with an incubation period of 7-14 days) is characterized with fever, chills, headaches, body pains, weakness, weariness, swollen lymph nodes (glands), and a rash. The rash appears after one to three days of fever, first appearing on the face and then spreading to other parts of the body, with the face and palms and soles being most commonly affected. Usually, it is a self-limiting condition that lasts between two and four weeks. Skin lesions featuring macules, papules, vesicles, pustules, and scabs are the distinguishing features of the infection.[3,19]

Recent epidemic of MPXV differs from previous outbreaks in terms of age (54.29% of individuals in their thirties), gender (most cases being males), risk factors, and transmission route, with sexual transmission being highly likely.[8] The majority of reported cases, over 97% are among men who have sex with men (MSM), especially those with multiple sexual partners.[20,21] While the disease is not a sexually transmitted infection like syphilis, which spreads nearly exclusively through sex, monkey pox transmission requires close physical contact, and sex appears to be a major opportunity for the virus, and 95 percent of the transmissions documented in the study occurred during sexual relations.[8]

Human-to-human transmission of MPXV can result from close contact with respiratory secretions, skin lesions of an infected person or recently contaminated objects. Transmission via droplet respiratory particles usually requires prolonged face- to-face contact, which puts health workers, household members and other close contacts of active cases at greater risk.[22]

The virus can spread from human to human as well as from animal to human (which is the initial occurrence before the diagnosis of cases in humans). Direct contact with the blood, bodily fluids, skin, or mucosal lesions of infected animals (e.g., monkeys, squirrels, and rodents) can result in animal to human transmission. A bite, scratch, handling of infected bush meat, or consumption of improperly prepared or other products of infected bush meat can cause animal to human transmission. When a person comes into touch with the virus from an infected individual or via contaminated objects like clothing or bedding, human-to-human (person-to-person) transmission takes place.

Consequently, there is a higher risk of infection for family members or healthcare professionals.[3] The respiratory system, mucous membranes of the eyes, nose, and mouth, as well as any obvious or hidden breaks in the skin allows the virus to enter the body. Aerosols and droplets can cause human-to-human transmission during prolonged face-to-face or close contact. It is still unclear if infected people with no symptoms can transmit the MPXV, making it important for anyone attending gatherings to exert additional care.[23]

Prevention strategies of MPXV

There has been a global failure of public health systems and practice, operational coordination and transparency. Governments have been lackadaisical in its approach to face the challenges of recent pandemics. Most vulnerable groups were ignored resulting in millions of preventable deaths and adversely affecting sustainable development.[24] The most effective way to prevent viral zoonosis is to maintain the barriers between natural reservoirs and human society, in mind of the "one health" concept.[8] Practical actions to minimize the impact of future pandemics include. Better surveillance of pathogen spill-over and development of global databases of virus genomics and serology. Better management of wildlife trade. Substantial reduction of deforestation. Sustainable vaccination strategy. Strengthening health systems and widening health services coverage. Addressing the global climate crisis, a better-prepared architecture driven by shared responsibility, integrating the global response to the risk of the future pandemics with appropriate and definitive actions is critical for protecting populations.

Effective immunity can be obtained with the use of the smallpox vaccine. Some antivirals, such as tecovirimat and brincidofovir, have efficacy against the virus.[8] The first line of defense against any emerging pathogen is its rapid detection and identification. Surveillance needs to be global, especially considering the unprecedented rates of international travel and trade that can allow new infectious diseases, to spread around the world over time scales of days or weeks.[8]

These primary pandemic prevention actions cost less than 1/20th the value of lives lost each year to emerging viral zoonoses and have substantial cobenefits.[25]

CONCLUSION

Although, monkey pox virus is a zoonotic infectious disease that can spread from human to human as well as from animal to human, physical distancing between people infected with monkeypox and domestic pets; proper waste management to prevent the disease from being transmitted from infected humans to susceptible animals at home are appropriate measures of preventing outbreaks.

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