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A review on monkey pox

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Abstract

Monkey pox a vesiculo pustular rash illness was initially discovered to cause human infection in 1970 through the world health organization (WHO) -sponsored efforts of the commission to certify small pox eradication in western Africa and the Congo basin. The virus has been discovered to cause a non human primate rash illness in 1958 and was thus named monkey pox. The causative agents of small pox and monkey pox disease both are species of orthopox virus, monkey pox when it affects human as an epizootic produces a similar clinical picture to that of ordinary human smallpox. Since 1970 extensive epidemiology, virology, ecology, and public health research has enabled better characterization of monkey pox virus and the associated human disease. We conducted a systematic review of peer-reviewed and grey literature on how monkey pox epidemiology has evolved, with particular emphasis on the number of confirmed, probable, and possible cases, age at presentation and geographical spread. The number of human monkey pox cases has been on the rise since the 1970s, with the most dramatic increases occurring in the DRC. The median age at presentation has increased from 4 (1970s) to 21 years (2010-2019). There was an overall case fatality rate of 8.7% with a significant difference between clades -central African 10.6% (95% CI: 8.4%-13.3%) VS West African 3.6% (95% CI: 1.7%-6.8%). Your review shows an escalation of monkey pox cases, especially in the highly endemic DRC, a spread to other countries, and a growing median age from young children to young adults. These findings may be related to the cessation of small pox vaccination, which provided some cross-protection against monkeypox, leading to increased human-to-human transmission. Increased surveillance and detection of monkeypox cases are essential tools for understanding the continuously changing epidemiology of this resurging disease.

Keywords: Monkey pox, HIV, Syphilis, semen, viral detection, hepatitis A, seminal.

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Introduction

Due to the current, rapid and wide spread monkey pox virus, the WHO declared this multi-country outbreak a public health emergency of international concerns.

Evidence from monkey pox outbreaks shows that the disease is characterized by the wide spread of characteristic rash with multiple lesions affecting different body parts, including the legs, arms and face and less commonly, in the soles, palms. In relation to the epizootiology of monkey pox several important

questions arise regarding its origin. On the other hand, evidence from the current outbreak shows that the rash shows a typical pattern to the previously reported one, spreading mainly on the genital and perineal region. The transmission of monkey pox virus has been recorded in different ways, including close contact with monkey pox cases, contacting animals directly or infected materials, and prolonged contact with infected individuals by droplet transmission(2).

Moreover, there have been concerns about the potential viral transmissions among seminal fluids since most cases were reported. However, no cumulative evidence was found in literature to indicate this hypothesis, on

data is scattered among single reports with insufficient highlights regarding positive monkey pox virus DNA in seminal specimens. We aimed to conduct the current systematic review to understand better the potential presence of monkey pox virus in the seminal fluids of infected patients, while comparing it to the presence of monkeypox virus in other specimens.

Methods

1) Initial identification

Monkeypox, a vesiculo-pustular rash illness, was initially discovered to cause human infection in 1970 through the WHO sponsor effects of the commission to certify small pox eradication in western Africa and the Congo basin. From 1969 to 1971 of 1177 specimens sent to WHO collaborating centers in Atlanta or Moscow, 182 were positive for variola, and 9 were positive for monkeypox virus. Most of the studies through 1987 on this virus and associated disease have been summarised in a monograph co-authored by Jezek and Fenner.

Monkeypox virus previously identified as a member of the orthopox virus genus in 1958, at a time when there was increased use of monkeys and tissues for the safety testing and initial growth of both the inactivated and live attenuated pox virus vaccines. Investigation of an outbreak of generalized vesiculo-pustular rash illness within a captive cynomolgus monkey at the State Serum Institute Copenhagen led to identification of the virus within rash lesions [3].

2) Virus and Disease Studies

Subsequent to declaration of small pox eradication in 1980 by the World Health Assembly, WHO sponsored enhanced human monkey pox surveillance efforts in the central region of DRC and some limited animal-human ecologic studies were undertaken [4].

3) Transmission

Animal-to-human transmission can occur from direct contact with the blood, bodily fluids, cutaneous or mucosal lesions of infected animals in Africa; evidence of monkey pox virus infection has been found in many animals including rope squirrels, dormice, different species of monkeys and others. The natural reservoir of monkey pox has not yet been identified, though rodents are the most likely.

Human-to-human transmission 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 [5].

Transmission can also occur via the placenta from mother to fetus or during close contact during and after birth.

4) Epidemiology

Since the first human case was discovered in 1970, the incidence of monkey pox has increased with high prevalence in Nigeria, the Democratic Republic of the Congo, Sudan, Liberia, Sierra Leone, and Central African Republic. In recent years, the disease has seen emergence in countries such as the US, UK, Singapore, Israel, and the incidence has been linked to African origin.

According to CDC National Center for Emerging Zoonotic Diseases, around 400-500 positive cases of KFD are documented every year among the human population across India.

The smallpox vaccine given to the people before 1980 seemed to protect against the monkey pox virus [6]. Cross-protective immunity has dwindled since the smallpox immunization campaign was ended, and as a result, the younger age group has become more susceptible to infection.

5) Signs and symptoms

The incubation period of monkey pox is usually from 6-13 days but can range from 5-21 days.

The infection can be divided into two periods:

- a) The invasion period (lasts about 0-5 days) characterized by fever, intense headache, lymphadenopathy is a distinctive feature of monkey pox compared to other diseases that may initially appear similar (chicken pox, small pox).
- b) The skin eruption usually begins within 1-3 days of appearance of fever. The rash tends to be more concentrated on the face and on the extremities rather than on the trunk. The rash evolves sequentially from macules (lesions with a flat base) to papules (slightly raised firm lesions), vesicles (lesions filled with clear fluid), pustules (lesions filled with yellowish fluid), and crusts which dry up and fall off.

Monkey pox is usually a self-limited disease with the symptoms lasting from 2-4 weeks. Severe cases occur more commonly among children and are related to the extent of virus exposure, patient health status and nature of complications [7]. Complications of monkey pox can include secondary infections, bronchopneumonia, sepsis, encephalitis, and the infection of the cornea with ensuing loss of vision.

5) Diagnosis

Because the clinical picture of monkey pox is very similar to that of chicken pox and that of smallpox, definitive diagnosis is key to keeping natural disease under control or in the early detection of a potential bio terrorism event. The evaluation criteria in the differential diagnosis for patients with monkey pox, chicken pox(8). Once the disease is identified, quarantine and immediate ring vaccination are the only effective public health protective procedures, because there is no effective, licensed anti arrival therapy for monkey pox.

6) Treatment

There is no specific treatment for monkey pox. Supportive care, symptomatic management and treatment of secondary bacterial infection should be treated as indicated. An anti viral agent known as tecovirimat that was developed for small pox was licensed by the European medicine agency for monkey pox in 2022 based on data in animal and human studies [9]. It is not widely available.

If used for patient care, tecovirimat should ideally be monitored in a clinical research context with prospective data collection.

7) Vaccination

Vaccination against smallpox was demonstrated through several observational studies to be about 85% effective in preventing monkey pox. At the present time, the original small pox vaccine is no longer available to the general public. Some laboratory personnel or health workers may be required to receive a more recent small pox vaccine to protect them in the event of exposure to orthopox viruses in the work place. Small pox and monkey pox vaccines are developed in formulations based on the vaccinia virus due to cross protection afforded for the immune response to orthopox virus [10].

9) Prevention

Vaccination combined with an aggressive surveillance programme ultimately resulted in the global eradication of small pox. Raising awareness of risk factors and educating people about the measures they can take to reduce exposure to the virus is the main prevention strategy for monkey pox. Scientific studies are now under way to assess the feasibility and appropriateness of vaccination for the prevention and control of monkey pox [11]. Some countries have, or are developing, policies to offer vaccine to persons who may be at risk such as laboratory personnel, rapid response teams and health workers.

10) Clinical features

Monkey pox is usually a self limited disease with the symptoms lasting from 2-4 weeks. Severe cases occur more commonly among children and related to the extent of virus exposure, patient health status and nature of complications. The extent to which asymptomatic infection occurs is unknown. The case fatality ratio of monkey pox has historically ranged from 0-11% in the general population and has been higher among young children in recent times. The case fatality ratio has been around 3-6% [12].

11) Extraction and Quality Assessment

Data extraction was conducted in a similar approach to that of screening. A senior author drafted a pilot sheet on excel that included three main tabs, a baseline characteristic tab, another one for intended outcomes, and the third one quality assessment. Extracted baseline characteristics included reference, country, study design, sample size, age, gender, symptoms, travel history, previous smallpox vaccination, sexual transmission and diagnostic method. Events of positive monkey pox virus DNA, time of onset symptoms, and viral loads were extracted for each of the samples. The quality of included case series was assessed using the national institute of Health (NIH) quality assessment tool [13]. The tool assesses the quality of each study at the level of seven domains / questions. To reviewers assessed the quality of included studies, and any discrepancies among them was solved by consulting one of the senior authors.

12) Laboratory Studies

a) Virus characterization-

Growth of virus on embryonated hen eggs with characteristic pock formation and restriction endonuclease digestion. Genome were used to differentiate the virus species monkey pox from other orthopox virus species.

b) Population surveys and associated method-

The 1980s used serologic cross adsorption tests in order to detect the specific presence of monkey pox virus serologic reactivity. In the absence of virus containing specimens, RIAA became one of the more specific methods for identification of infection. These tests largely look for IgG serologic activity vs these viruses, and the IgG response may be long lived [14].

C) Disease prevalence Studies

In the Likouala region of the Republic of the Congo an overall anti-orthopox virus IgG seroprevalence of 59% was summed from a convenience sample of the population living along major roads, or in larger villages.

Recent orthopoxvirus infection, implied by anti-IgM orthopox virus infection sero reactivity, was documented in 1.7% of the population sampled.

In 3 villages, two from the eastern region, the third in the volta region, 33,85,92% of population was surveyed (15).

Human IgG anti orthopox virus seropositivity was significantly associated with cultivation in the forest, but not firewood collection nor work as a professional animal worker, in this age group.

The later two (xerus and cricetomys) were involved as infected species in the US importation of monkeypox virus. Anti-orthopox virus ELISA sero prevalence was only robustly detected in cricetomys and funisciuris species collected in the eastern region.

13) Conclusion

Monkey pox virus occurs mainly in the jungles of central and western Africa. The disease, unlike smallpox, is a typical zoonosis in that most cases occur as a result of direct contact with an infected animal. The symptoms of the disease in human can be very similar to those of small pox, chicken pox, other causes of vesiculo pustular rash, therefore accurate and rapid laboratory diagnostic are paramount in controlling an outbreak. The similarity of African monkeypox cases to smallpox cases, as well as the growing lack of immunity in the population since the discontinuation of protein small pox vaccination, has led to the concern that monkey pox virus, along with variola virus and other pox viruses has been placed on the national institutes of health's highest category threat list and this considered to be a select agent by the centers for disease control and prevention. Although not a result of bioterrorism, the introduction of a disease such as monkey pox into a new, previously disease-free region of the world, has happened with the 2003 monkey pox outbreak in the United States, can cause substantial alarm and even fear. These events have brought attention to the issue related to exotic pets and has further raised concerns pertaining to the increasing global transport of wild animals and other potential vectors of infectious diseases once thought to be geographically restricted and not a concern for the United States.

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