

Human Monkeypox Outbreaks from 2001 to 2021 – A Systematic Review

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ABSTRACT

Background:- An infectious disease induced by orthopoxviruses is known as monkeypox. In 1958, a viral outbreak in caged monkeys was first identified as monkeypox. The Democratic Republic of Congo was the first country to record human cases in 1970.

Methods:- We searched MEDLINE, Google Scholar, Web of science, African Journals Online, Embase, and public health and infectious diseases medical journals with phrases in the topic headings “human monkeypox”, “monkeypox”, and “human monkeypox outbreaks in Congo” for article published.

Results:- A total number of 17 outbreaks from January 2001 to December 2021 were included in the review. Total suspected cases of human monkeypox were 2527 while 241 cases were confirmed by polymerase chain reaction (PCR) test. 29 deaths out of 2527 were reported in 17 outbreaks.

Conclusion:- The Democratic Republic of the Congo was the site of the majority of outbreaks. Although the immunization vaccine can protect humans against monkeypox virus infection.

Keywords:- Human monkeypox, monkeypox, monkeypox outbreak

INTRODUCTION

An infectious disease induced by orthopoxviruses is known as monkeypox¹. In 1958, a viral outbreak in caged monkeys was first identified as monkeypox. The Democratic Republic of Congo was the first country to record human cases in 1970¹. Humans in the area have experienced monkeypox outbreaks on a regular basis since that time², however, no one outside of Africa has reported it.

Monkeypox is a disease that is similar to smallpox³. The onset of disease was defined as the day when a case patient first detected signs or symptoms of the illness, such as fever, sweats, rash, chills, runny nose, back pain, headache, stiff neck, cough, red eyes, lymphadenopathy, nausea and/or vomiting, sore throat, wheezing, chest pain, myalgia, abdominal pain, joint pain, conjunctivitis, confusion, and shortness of breath⁴.

There is a wide range of illness severity, from moderate to lethal⁵. Sepsis, vomiting, diarrhea, conjunctivitis and corneal scarring, encephalopathy, and bronchopneumonia have all been recorded as complications⁶. Long-term consequences of bacterial superinfection include permanent scarring with pits⁶. There have been reports of miscarriages and even worse diseases in pregnant women⁷⁻⁹.

The efficacy of the smallpox vaccination against monkeypox has been estimated to be on the order of 85%. The frequency and severity of clinical signs and symptoms are significantly reduced by residual immunity from previous immunization^{5,10}. Case fatality rates in unvaccinated persons have been reported to vary anywhere from 0 to 11 percent⁵. People who don't have strong immune systems, like those with untreated HIV, are more likely to get sick and die from it¹¹. Monkeypox epidemics are more common in communities that hunt, kill, handle, and consume bushmeat¹²⁻¹⁴. There is evidence that the primary route of infection is through material from a lesion that is introduced percutaneously, mucocutaneously, or through an inhaled droplet^{15,16}.

The incubation phase lasts between seven and fourteen days¹⁷. From the time the rash appears until 4 weeks later, patients are considered infectious⁶. Person-to-person transmission may occur by breathing droplets, fomites, direct cutaneous abrasions, or placenta¹⁷⁻¹⁹.

As far as we know, no study of relevant literature on human monkeypox outbreaks has been conducted to give practical guidelines in places with fewer available resources with restricted access to clinical diagnostics and medicines. The focus of this

research is on the outbreaks of monkeypox that occurred between 2001 and 2021.

METHODS

We searched MEDLINE, Google Scholar, Web of science, African Journals Online, Embase, and public health and infectious diseases medical journals with phrases in the topic headings “human monkeypox”, “monkeypox”, “West African clade monkeypox”, “human monkeypox outbreaks in Nigeria” and “Human monkeypox outbreaks in Congo” were searched for article published in English through December 31, 2021.

Authors, location, epidemic date, methodology, and epidemiological features (characteristics of affected community, cases numbers, confirmed cases numbers, and fatalities numbers) were retrieved from each document.

RESULTS

The study examined a total of 17 outbreaks. (shown in Table 1). Monkeypox cases and outbreaks data gathered between January 2001 and December 2021 were detailed in all publications published or made available between January 1, 2001, and December 31, 2020.

Data on outbreaks and monitoring were gathered from four countries in Central and West Africa: Democratic Republic of the Congo (DRC) (n = 8), Central African Republic (CAR) (n = 1), Nigeria (n = 3), and Sudan (n = 1) (Table 1). There were four papers that connected to the outbreaks in the United States of America (USA).

Since 2001, the frequency of epidemic reports has steadily increased. There have been nine outbreaks outside of the DRC, four of which have occurred since 2010 (see Table 1). In this literature total number of suspected cases of human monkeypox was 2527 while 241 cases were confirmed by polymerase chain reaction (PCR) test. 29 deaths were reported in the outbreaks since 2001.

In 2005, one outbreak was reported in Sudan's dry grassland zone due to an infected person from DRC^{26,36-38}. In 2003, an outbreak was started in the United States by infectious rodents imported from Ghana and sold to people who bought ill prairie dogs in the United States. There has not yet been a description of the characteristics of the population in Nigeria that was impacted by the latest epidemic. It has been reported that there are ‘no epidemiological links between states’ between

clusters of cases, and it has been hypothesized that the epidemic is due to an underlying epizootic³⁹.

Two investigations conducted in DRC provide evidence that, between the years 2010 and 2021, the number of clinically diagnosed patients with monkeypox infection increased. A surge was also documented between 2001 and 2013, with a 45 percent increase from 21.3 to 28.4 incidences per 10,000 people between 2008 and 2013⁴⁰. Since tetanus and acute flaccid paralysis (AFP), which the author utilized as a reference for changes in ISDR reporting patterns, remained steady over this time period, it is

unlikely that this increase in the per-unit population is related to population expansion.

Across two nations, epidemics or yearly CFRs were documented in five papers (see Table 1). 22 and 7 deaths occurred in DRC and Nigeria, respectively. No deaths were reported in the USA. Because there were not enough demographic data, there was not enough information to stratify the population according to vaccination status, age, or gender. It is not possible to combine or pool the CFR data due to the fact that they represent separate populations and data collecting methods (active case discovery and ISDR notifiable reporting, respectively).

Table 1. Suspected, confirmed and fatal monkeypox cases country and year.

Authors	Outbreaks year	Location	Cases	Lab investigations	Deaths
Hermann M. ¹⁴	2001	DRC	31	PCR	5
Mary G. R. ²⁰	2003	DRC	11	PCR	1
Martin E. ²¹	2003	USA	37	4 PCR confirmed cases	None
Kurt D. ²²	2003	USA	11	PCR	None
James J. ²³	2003	USA	3	PCR	None
James M. ²⁴	2003	USA	50	PCR	None
Anne W. ²⁵	2001 – 2004	DRC	51	PCR	None
Pierre F. ²⁶	2005	Sudan	19	PCR	None
Anne W. R. ²⁷	2005 – 2007	DRC	760	PCR	None
Mary G. R. ²⁸	2009	DRC	10	2 PCR confirmed cases	None
Erin R. W. ²⁹	2011 – 2015	DRC	1057	PCR	None
Leisha D. N. ³⁰	2013	DRC	105	50 PCR confirmed cases	10
Kalthan E. ³¹	2015 – 2016	CAR	12	PCR	None
Dimie O. ³²	2017	Nigeria	21	18 PCR confirmed cases	None
Reena H. ³³	2017	DRC	81	7 PCR confirmed cases	6
Adesola Y. ³⁴	2017	Nigeria	146	42 PCR confirmed cases	None
Adesola Y. ³⁵	2017 – 2018	Nigeria	122	118 PCR confirmed cases	7

CONCLUSION

The Democratic Republic of the Congo was the site of the majority of outbreaks. Even though vaccination may protect people against monkeypox virus infection, symptomatic treatment and environmental public health interventions are the first lines of defense, resulting in decreased death and morbidity.

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Conflict of Interest: Nil

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