



CASE REPORT

Re-Emergence of Monkeypox in Sierra Leone, a Challenge for Clinicians in a Developing Country, 2021: A Case Report

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Abstract

Introduction: Monkeypox is an emerging zoonotic disease with potentially serious illness with similar symptoms as smallpox but with the distinguishing symptom of lymphadenopathy. On March 9, 2021, health authorities in the Koinadugu District in Sierra Leone reported a suspected case of monkeypox. We investigated this case to confirm the diagnosis, and to identify the source of infection and risk factors, and institute control measures.

Methods: We used the Integrated Disease Surveillance Response case-based form to collect demographic information and clinical symptoms. Blood samples from the case-patient were collected for laboratory confirmation. Contacts were identified, line listed, traced, and monitored for 21 days. Active searches for people with monkeypox-like symptoms in health facilities and communities and an environmental assessment in the community was conducted.

Results: Monkeypox case was confirmed in a 47-year-old male who presented with fever, headache, generalized painless vesicles, rash, itching skin, and firm pustules prominent on the face and ear. The case-patient had no travel history in the last two months and no contact with animals. However, his household's surroundings showed poor sanitary conditions and the presence of rodents. None of the 24 contacts identified and monitored daily for 21 days showed signs or symptoms of monkeypox infection. The case-patient was isolated, treated, and recovered from the disease. No additional cases were found in health facility or in the community.

Conclusions: The confirmation of human monkeypox virus infection in the Koinadugu District indicates that the virus

is circulating in the environment. However, the source of infection and risk of exposure are unknown. Strengthening surveillance capacity to quickly detect and notify similar cases may be helpful to raise awareness of the disease and its manifestations and establish appropriate prevention measures, preparedness, and response activities.

Keywords

Koinadugu, Monkeypox, Orthopoxvirus

What is known about this topic

- Monkeypox is a rare disease spreading in Central and West Africa, including Sierra Leone

What this study adds

- Monkeypox was confirmed in Koinadug District, Sierra Leone as a first time in this district.
- Monkeypox is a challenge for clinicians and public health workers specially in remote areas

Introduction

Monkeypox is the most important orthopoxvirus infection in human beings since the eradication of smallpox in the 1970s [1]. Public health authorities are concerned about human monkeypox because it causes significant morbidity and mortality [2]. Fever is the first symptom and accompanied by fatigue and lymphadenopathy with a rash in 1-3 days. The rash can cover the whole body during a severe illness. Lymphadenopathy is a distinguishing symptom. The

infection can last up to four weeks until the lesions heal [3]. The case fatality rate of monkeypox (10%) of those without prior smallpox vaccination. Most deaths occur in younger age groups [3].

The reservoir of monkeypox is unknown. However, the virus has been isolated from rope squirrel (*Funisciurus anerythrus*) in the Democratic Republic of Congo and from a sooty mangabey (*Cercocebus atys*) in Côte d'Ivoire (2). Transmission of the virus can occur through direct contact with infectious secretions from animals via the handling of infected animals, including body tissues and fluids. The virus spreads from person to person through body fluids, respiratory droplets, and infected items such as bedding. The virus enters the body through broken skin, respiratory tract, or mucous membranes [4].

Monkeypox virus infection mainly occurs in the rain forests of West and Central Africa. The largest monkeypox outbreak in West Africa occurred in Nigeria in 2017 [3,5]. Monkeypox has also been reported in Liberia, Cameroon, Sudan, Gabon, Côte d'Ivoire, Central African Republic, Democratic Republic of Congo (DRC), Republic of Congo, and Sierra Leone [4].

Prior to 2000, monkeypox cases have been reported from several countries in West and Central Africa, including Central Republic Africa (19 cases), DRC (more than 1000 per year), Liberia (two), Nigeria (more than 80), Republic of Congo (88), and Sierra Leone (one). The presence of orthopoxvirus antibodies among populations near Kenema District suggested an ongoing circulation of orthopoxvirus in Sierra Leone. Four cases of monkeypox were reported in Sierra Leone between 1970 and 2020 [2].

On March 09, 2021, a nurse at the Kabala Government Hospital suspected monkeypox in a 47-year-old male resident of the Koinadugu community, that was admitted with fever and firm pustules on his face. She notified the Koinadugu District Health Management Team. The district surveillance officers, and Field Epidemiology Training Program graduates immediately investigated the case to confirm the diagnosis, to identify risk factors, to sensitize health care workers and community members, and to initiate control measures in Koinadugu District, Sierra Leone.

Methods and Materials

Study setting

Koinadugu District is one of 16 districts in Sierra Leone and it shares the international border with the Republic of Guinea. The case-patient was admitted to the Kabala Government Hospital (KGH), the only referral hospital in Koinadugu and Falaba Districts. The case-patient lives in the Koinadugu 2 community in the Sengbeh chiefdom. Koinadugu 2 is one of the communities on the Bintumani Mountain, which has many forests and hills and shares

a border with the Falaba District. The community has a health facility providing health services for an estimated population of 5000 residents. People depend on farming for their livelihood.

Case definitions

Suspected case: A person living in Sengbeh chiefdom with fever (> 38.5 °C rectal or 38.0 °C axillary), macular rash, and one of the following signs: headache, generalized painless vesicles, firm pustules prominent on the face and ear, and itching skin from February 18 to March 31, 2021.

Confirmed case: A suspected case with a positive diagnostic laboratory test by polymerase chain reaction (PCR) for monkeypox virus.

Contact: A person who had close contact (i.e., eating together, sharing sleeping quarters, and taking care of case-patient) with a confirmed case of monkeypox with symptom onset from February 18 to March 31, 2021, in Sengbeh chiefdom, Koinadugu District.

Interview: We interviewed the case-patient using the Sierra Leone Integrated Disease Surveillance Response Case-Based Diseases Surveillance form. Demographic information such as age, sex, location of resident, occupation, and marital status, as well as clinical data, exposure history to infected animals or humans, were collected from the suspected case-patient. Demographic data, exposure history, and symptoms were also collected from the contacts.

Sample collection: A blood sample was collected from the case-patient and sent to the Central Public Health Reference Laboratory in Freetown confirmation by polymerase chain reaction tests.

Contact tracing: We interviewed the case-patient to identify contacts which were line listed. The line list variables consisted of district, community, contact name, age, sex, symptoms, last date of contact with patient, and the relationship to the case. We visited the residence of each contact each day for 21 days to document the occurrence of monkeypox like symptoms of fever (> 38.5 °C rectal or 38.0 °C axillary), macular rash, headache, vesicles, pustules, or itching skin.

Additional case finding: We searched for additional cases in nearby health facilities and communities at the Koinadugu2, in the Koinadugu District. We reviewed the rumour log book, case-based forms, weekly surveillance summary report, and under-five children and people more than five years registers from February 18 to March 31, 2021.

Environmental assessment: We assessed rodents' existence and sanitation conditions of the case-patient household and surrounding environment.

Consent: We obtained verbal consent from the case-patient. He consented to be photographed,

and to disseminate and publish the findings of this investigation.

Results

Case report information

The case-patient was a middle age and lived in Sengbeh Chiefdom, Koinadugu District. On March 3, 2021, he developed fever and was treated with traditional medications at home for four days. Because there was no improvement, the patient reported to the Koinadugu 2 Community Health Centre on March 6, 2021. The health care worker performed a rapid diagnostic test for malaria which was positive and provided antimalarial drugs. After three days, the case-patient's fever did not subside and he developed firm pustules that started on his face and spread to other parts of the body, headache, generalized body weakness, and itchy skin.

On March 9, 2021, the teacher asked his colleague to accompany him to KGH for further medical treatment. When he arrived at KGH, his temperature was 37.6 °C, and presented with firm pustules prominent on the face and ear, generalized painless vesicles rash, and itching skin. The community health officer suspected monkeypox and immediately alerted the District Surveillance Officer, who together with Field Epidemiology Training Program graduates and laboratory personnel investigated this report. A blood sample was collected and sent to the Central Public Health Reference Laboratory for confirmation. The suspected case was isolated in KGH while waiting for the laboratory result.

On March 13, 2021, the Central Public Health Reference Laboratory notified the district response team that the suspected case-patient isolated at KGH was confirmed positive for monkeypox virus by PCR. The case-patient was treated with analgesics, anti-inflammatory and broad-spectrum antibiotic drugs. The case-patient lived with his family in the same household, had no history of recent travel outside the district, and had no contact with any known animal reservoir either by hunting or eating monkey and squirrel meat. No additional patients with similar symptoms were found in the three health facilities.

Contact tracing findings in the community: Twenty-four people (11 males and 13 females) had close contact with the case-patient, including one teacher, two health care workers and the rest were family members. After continuous daily monitoring by the surveillance team for 21 days, none of these contacts showed any signs or symptoms of monkeypox.

Environmental assessment: The case-patient's household and surroundings had garbage and rodent droppings.

Intervention: The case-patient was isolated and treated for seven days at KGH. No suspected cases were

found among 24 identified contacts. Clinicians at KGH and three other health facilities were told to increase awareness of infection, given the case definition of monkeypox, and informed on the importance of reporting any suspected case. Community members, including case-patient household members, were sensitized to the signs and symptoms of monkeypox, and the importance of reporting any fever to the nearest health facility.

Discussion

Monkeypox was laboratory confirmed in a 47-year-old male living in the Koinadugu District, northern Sierra Leone. The most recent reports of monkeypox in Sierra Leone occurred in 2014 and 2017 [6]. Despite the low number of monkeypox cases in Sierra Leone, the occurrence of another case shows that the monkeypox virus is still circulating in the country. Ecologic niche modelling indicates that Sierra Leone is in a geographic region suitable for monkeypox transmission [7]. Approximately 39% of Sierra Leone is covered by forests, scattered in different locations of the country. Mount Bintumani in Koinadugu, where this case-patient lives, is the highest mountain covered by rainforests [8].

Many factors drive the occurrence of the monkeypox virus in Sierra Leone. These factors include increased susceptibility due to lack of smallpox vaccination and waning population-level immunity, sylvatic animals which may carry monkeypox virus, and shedding of infectious particles in faeces [9]. The large family of poxviruses, which include monkeypox, can infect a wide range of vertebrates and insects, and cause mild to severe clinical symptoms [10]. Monkeypox can infect several species of mammals that are in their food chain (i.e., omnivorous animals such as monkeys eat monkeys that eat rodents) [11].

Animal surveillance, especially wildlife-related surveillance, is not systematically carried out in Koinadugu District. This makes it difficult to identify the specific reservoir species for outbreaks. Since monkeypox is a reportable disease in Sierra Leone, every reported case is investigated. Consequently, investigations need to use a One Health concept between veterinary medicine, public health, and wildlife biologists regarding the control of zoonotic diseases including monkeypox [12,13].

In addition, clinicians may find it difficult to identify to rule out monkeypox infection because the virus itself may present with a severe respiratory disease with a diffuse rash [9]. This may lead to misdiagnosis of monkeypox infection [14]. In Africa, the diagnosis of monkeypox infection may be mistaken for other diseases with rash or fever such as chickenpox, and measles. This presents a challenge for clinicians to differentiate between these infections [2,3]. The case-patient initially had fever with no rash and was tested positive and



Figure 1: Case-patient with rash, macules, and papules on the face and chest of the patient infected with monkeypox virus in Koinadugu District, Sierra Leone, 9th of March 2021(6 days post fever onset, and 3 days post rash onset).

treated for malaria. Then, the case-patient developed a rash, lymphadenopathy, firm pustules prominent in the face and ear, and itchy skin, after which health workers suspected monkeypox (Figure 1). The clinical manifestation of the case-patient signs and symptoms were consistent with monkeypox: febrile prodrome prior to rash; lymphadenopathy; and firm lesions first noted on the face. Cessation of the smallpox vaccine, which might provide protection against monkeypox virus infection, may have led to infections of poxvirus in susceptible human hosts [6]. A study conducted in Congo basin showed the increase in number of human monkeypox cases was associated with the increase in the proportion of people who have not received the smallpox vaccine; because of their susceptibility to the monkeypox infection [15]. About 90% of monkeypox cases in Nigeria are naive to orthopoxvirus infection, many of them were born after the cessation of smallpox eradication program [16].

Limitation of this case investigation: rodents were not captured for monkeypox test and thus source of infection was not established. Genotypic of the monkey virus was also not performed which limits this investigation from linking the virus to genome sequence of the poxvirus family.

Conclusion

A person with monkeypox was confirmed in the Koinadugu 2 community, Sengbeh chiefdom-Koinadugu District. No additional cases were found, and the case-patient recovered from the infection. The source and the risk factors for the infection were not identified.

Early detection and diagnosis of monkeypox is a challenge for clinicians and health care workers because it is a rare disease that mimics many other diseases. The first and most common symptom of monkeypox is fever and thus the health care professional often empirically diagnose and treat the patient as malaria.

To prevent further outbreaks, it may be helpful for the Ministry of Health and Sanitation to urge clinicians to be vigilant about including monkeypox and other rare viral diseases in the differential diagnosis of patients with fever.

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Conflict of interest

The authors declare no conflict of interest. No copyrighted materials were used in developing this article.

Authors' contributions

Conception and design of study

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Analysis and interpretation of data

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Approval of the version of the manuscript to be published

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Disclaimer

“The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention”.

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