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## Monkeypox virus preparation in Pakistan-Next viral zoonotic disease outbreak after COVID-19?

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**Abstract**

Monkeypox is a viral disease that often affects central and western African rainforests. But the illness has recently arisen in the World in imported African wild rats. Monkeypox exhibits symptoms that are remarkably similar to other types of smallpox, including flu-like symptoms, malaise, headache, back pain, fever, and the distinctive rash. Considering this therapeutic range, performing a differential diagnosis to exclude smallpox is critical. Monkeypox has no recognized treatment, but the smallpox vaccination can prevent the infection. Reducing contact with sick patients or animals and avoiding respiratory exposure to infected patients is vital for proper protection.



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## Introduction

Monkeypox (MPX) is a rare viral infection caused by the MPX virus. Monkeypox virus (MPXV) is a Poxviridae family member of the Orthopoxvirus genus. Variola virus (which causes Smallpox), vaccinia virus (used in the smallpox vaccine), and cowpox virus are all members of the Orthopoxvirus genus [1]. MPX is a zoonotic illness that may be transferred from animals to people, with symptoms similar to those of smallpox victims previously, although clinically less severe. Just after the abolition of Smallpox in 1980 and the subsequent cessation of smallpox immunization, it emerged as one of the most prominent Orthopoxviruses. MPX is common in Central and West Africa, particularly near tropical rainforests [2]. Common symptoms include headaches, fever, swollen lymph nodes, muscle discomfort, and fatigue. It is then accompanied by a rash that forms blisters and crusts. Between exposure to MPXV and developing symptoms is ten (10) days. Symptoms usually last two to four weeks [3-5]. MPXV can be transferred by bushmeat, an animal bite or scrape, bodily fluids, contaminated items, or intimate contact with an infected person. The virus is known to infect several rodents in Africa [6]. MPX infection may be confirmed via isolating MPXV DNA from a patient's blood sample and replicating it in a viral culture [1]. In appearance, the disease may mimic chickenpox [7]. The vaccine against Smallpox protects against infection [8]. There is presently no proven, safe treatment for MPXV disease. Smallpox vaccine, antivirals, and vaccinia immune globulin (VIG) can or have been used to control an MPX epidemic in the United States (US). The efficacy of cidofovir and brincidofovir in curing MPX cases is uncertain. Both have been found in both in vitro and animal experiments to be effective against poxviruses [9]. Those affected have a 10% risk of dying [10].

In 1958, the illness was found in experimental monkeys. In 1970, the Democratic Republic of the Congo reported the first human cases [11]. Because the World Health Organization (WHO) declared Smallpox eliminated in 1980, MPX still arises infrequently in Central and West Africa [12]. An epidemic in the US was connected in 2003 to a pet store that sold mice imported from Ghana [8, 13]. The previous MPX epidemic in Nigeria, which lasted from October 2017 to February 2018, posed a public health risk [14]. A recent MPX incidence occurred in a United Kingdom (UK) resident who arrived in Nigeria on April 20, 2022, traveled to Lagos and Delta States during his stay, departed Lagos on May 3, 2022, and

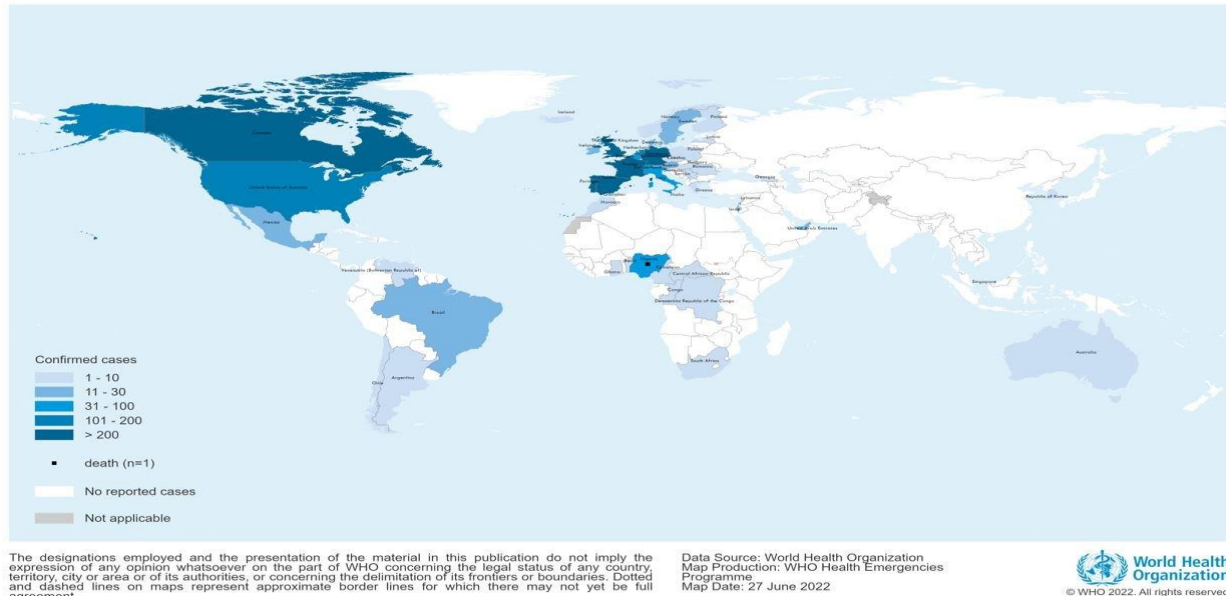
returned to the UK on May 4, 2022 [15] mimicking SARS-Cov-2 transmission [16-18]. Early diagnosis was difficult since many individuals, including professionals, did not understand what was causing the condition. According to Nigeria Center for Disease Control (NCDC) (2022), after the reemergence of MPX in Nigeria in September 2017, the country has continued to report isolated virus cases from all states. Between September 2017 and April 30, 2022, 558 cases and eight fatalities were recorded from 22 states. There are a total of 46 suspects. There have been 15 verified cases from seven states. However, there have been no recorded deaths [19].

May 2022 marks the start of a new epidemic of worry worldwide since it spreads swiftly in various nations, among people who have never traveled [20]. MPX is currently suspected in about 3413 clinical cases in more than 50 countries (**Fig. 1**) outside Africa [21]. This zoonosis is widespread, particularly in the Democratic Republic of the Congo, the Congo, and Nigeria. Has Monkeypox arrived in Pakistan? No. At the time of writing, no suspected cases have been reported in Pakistan. According to the National Institute of Health (NIH), no cases of MPX have been detected in Pakistan, and 'news' to the contrary spreading on social media is "incorrect" Steps have already been taken to prevent a potential epidemic in the nation, with preparations planned throughout all airports, such as medical tests, to detect potentially infected travelers [22].

Predict probable MPX cases in Pakistan and other nations, particularly those with high international flights between them and Africa, the United Arab Emirates (UAE), Europe, and North America, like Nigeria, Brazil, Chile, Mexico, and Colombia, as others in the globe.

## Symptoms

MPV has a 4-21-day incubation period. Nonspecific symptoms of MPX include fever, headache, backache, chills, lymphadenopathy, muscle aches, and exhaustion. MPX has a clinical appearance similar to smallpox. MPV disease can also be differentiated from smallpox by the initial elongation of lymph nodes (maxillary, cervical, and inguinal), which commonly happens concurrently with acute infection. The affected lymph nodes can range in size from 1-4 cm and can be delicate, firm, harsh, and distressing. Rashes arise 1-3 days after fever and lymphadenopathy. Skin problems and rashes are subordinate and concurrent, and though depending on the severity of the disease, they can cover the entire



**Fig. 1:** shows the geographic distribution of confirmed and probable Monkeypox cases in non-endemic countries from January 1 to June 22, 2022, at 17:00 CEST., according to the World Health Organization (WHO).

body. Four weeks after the onset of symptoms, the infection resolves with the mucous secretion of rashes[23]. Patients may experience a variety of health issues. Rashes in the oral cavity can cause food to become contaminated. Patients frequently develop secondary bacterial infections of skin lesions. Scarring and vision loss can result from corneal disease. Bronchopneumonia is another possibility, particularly in patients infected with influenza. Excessive immune responses can result in sepsis and septic shock[23, 24]. In the lack of laboratory confirmation, immunological methods such as ELISA, Polymerase Chain Reaction (PCR), electron microscopy, and phenotypic and clinical presentation of disease can be used to diagnose. However, the precision of diagnosis based on the clinical assessment is limited[24, 25].

## Scenario of Pakistan

Pakistan has been affected by several infectious diseases and natural calamities. As seen in **Fig. 2**, the UAE and Pakistan are geographically and politically linked. Many Pakistanis work on various projects and live in the UAE to pursue their studies, businesses, and careers. The MPX outbreak occurred during the peak travel season when people from Pakistan and across the globe traveled to various countries. The Pakistani community, particularly workers (school, college, and universities) and students return to Pakistan due to summer vacations. However, one case was recorded

in UAE on May 24, 2022, when a person recently toured West Africa and was identified with MPX[26]. The future seems bleak in the presented scenario. Because of the summer holiday, individuals may return home from overseas, perhaps resulting in an epidemic of MPX in Pakistan and other nations.

## The concern is whether Pakistan is ready to deal with any MPX outbreaks?

According to published research, endemic and epidemic diseases, new diseases, and an increasing prevalence of non-communicable diseases are all prevalent in Pakistan [27]. Despite Pakistan's Ministry of Health's NIH giving MPX alerts, and According to the Pakistani Health Ministry, the country lacks diagnostic testing for the virus[28], resource-limited countries are less involved and well-prepared to handle possible trauma associated with the present MPX Epidemic. If new cases are not found and treated as soon as possible, the number of new cases and death tolls in countries like Pakistan may escalate, ending in a disaster.

## Concerns

Several hundred cases of MPX have been documented in North America, the UK, and Europe. Person-to-person transmission separates these cases, which exist outside the virus's endemic area. Most cases appear



**Fig. 2:** Pakistan and the Gulf countries are labeled on the map (Source: Modified Encyclopedia Britannica, Inc).

unrelated to coming from a prevalent country and forming several as-yet unconnected groups. The feature is that many of the cases have been identified in men who have sex with men. Also, many patients are identified in sexually transmitted infection (STI) hospitals [29]. This shows that the virus is taking advantage of specific social networks. Instead of depending on the skin-to-skin interaction and droplet respiratory spread, the virus may or may not transmit sexually in this population. The latter has been identified as a meningococcus transmission mechanism in men who have sex with men (MSM) clusters. The most critical and urgent difficulty is determining the origins of this epidemic. What is causing this epidemic to be far more significant and extensive than the previous MPX epidemic outside of Africa? A preliminary genetic study has shown no genetic alternations that are thought to promote transmissibility [30]. Was it possible that clustering at certain events aided transmission? Quick case examinations and case-control training are now underway and are critical to understanding this. Meanwhile, efforts to boost case detection, early diagnosis, contact tracing, isolation and post-exposure vaccination will be prioritized. Physicians, outpatient treatment doctors, critical care clinicians, dermatologists, and those practicing and dealing in STI clinics are the most susceptible to identifying additional cases if MPX epidemics continue.

## Recommendations

MPX should be predicted throughout Pakistan. Now is the time to disseminate scientific awareness and

engage healthcare personnel and the public. Scientific and medical organizations should lead this effort soon, particularly those specializing in infectious illnesses, virology, public health, and epidemiology. An intensive case search should be conducted at institutions and areas where positive cases have been documented. Simultaneously, public health officials throughout the country should work fast to develop PCR for molecular-specific detection of the MPXV, which would be identified and detected from skin lesions in suspected cases during the disease's skin eruption stage [31]. Luckily, due to work done during more than two years of the COVID-19 pandemic, the capacities and facilities for molecular identification of infectious illnesses and the individual response by the general population have considerably grown in Pakistan [32-34].

Furthermore, the possibility of genome sequencing, which is critical for mutation detection as well as identifying virus clades, may mark a different clinical evolution and outcome, as the West African clade is milder, with 1-5% of previously reported case fatality rate (CFR), whereas the Central African clade has up to 8-13% of CFR [11]. Because this is a fast-changing environment, healthcare personnel must be informed and knowledgeable of the data given by WHO and regional and national health officials. Furthermore, resources, increased monitoring, and capability building should be targeted promptly in nations with a slightly higher risk who may be unprepared to identify imported cases and minimize onward transmission [11].

The COVID-19 pandemic has caused illness and death in our region, but it has also prepared us to deal with new and re-emerging diseases. What we learned with

SARS-CoV-2 enables us to handle MPX more effectively, with health care teams capable of promptly establishing the suspected diagnosis and correct use of Personal Protective Equipment (PPE) and other precautions, and there is a clear need to develop an effective MPX vaccine as quickly as possible.

## Conclusion

MPXV disease is rare and usually self-limiting. With increased human mobility and cross-border animal transportation, the infection has the potential to spread to many parts of the globe. The virus's propensity to evolve, the panic of using it in bioterrorism, and its recent rise in Africa and the rest of the world contribute to a better understanding of MPX infectious disease.

## Abbreviations

MPX: Monkeypox; MPXV: Monkeypox virus; VIG: Vaccinia immune globulin; US: United States; WHO: World Health Organization; UK: United Kingdom; NCDC: Nigeria Center for Disease Control; NIH: National Institute of Health; UAE: United Arab Emirate; PCR: Polymerase Chain Reaction; STI: Sexually transmitted infection; CFR: Case fatality rate; PPE: Personal Protective Equipment; MSM: Men who have sex with men

## Conflict of interest

The authors declare no conflict of interest.

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