

## The current outbreak of Monkeypox virus (MPXV); what strategies can be adopted to control its transmission?

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### Abstract

As the world is still under the grip of COVID-19, "WHO" has started alerting about the new global emergency due to a surge in cases of the Monkeypox virus (MPXV) disease (MPXD). MPXD is a rare viral zoonotic disease, caused by the monkeypox virus, which results in multiple centrifugal rashes similar to smallpox. The current unusual high frequency of transmission has led to the WHO alert because, human-to-human transmission has been observed in Europe, without a history of travel to endemic areas. So, further spread of the virus can be anticipated through close contact, being a threat for its transmission. It is thus necessary for our government to prepare itself for handling this new situation which could spread fast due to globalization.

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### Introduction

Pakistan is a country of about 225 million population with low-income rates and poor public sector health care system.<sup>1</sup> The Government needs to seriously contemplate on further improving the health care system with the cooperation of private-public partnership to handle any emergency as the last COVID-19 Pandemic.

Since January 2022 monkeypox is a threat being circulated around the globe. This is similar to smallpox which has been completely eradicated from the world since 1980. To face this new emergency, doctors, nurses, and technical staff, need to have adequate knowledge about the disease and its mode of transmission. This will help to identify the presenting signs and symptoms for an early diagnosis and prompt treatment and promote prevention. Further transmission can be curbed by quarantine of suspected cases.

Training programmes should be organized for healthcare workers, who deal with patient care and collection and

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transportation of samples to the laboratories.

### What is the current situation?

No doubt, the cases are increasing in the world but till now luckily, not a single case has been detected in Pakistan. The worldwide total number of human monkeypox cases is 11,500.<sup>2,3</sup>

### Nature of the virus MPXV

The virus belongs to the Orthopoxvirus genus of the Poxviridae family. Which also includes other similar viruses as smallpox, variola virus (VARV), cowpox (CPX), mousepox (MPX), chickenpox (CPX) and vaccinia virus (VACC). It is a double strand linear DNA virus, enveloped by an outer wall, comprising of different antigens. Its genome is made of about 190-197kb (196,858-bp). There are approximately  $\approx$ 190-223 nonoverlapping open reading frames (ORFs) The genome has  $\geq$ 60 amino acid residues and which is  $>$ 180 nt in length. It has central coding region sequence (CRS) at its nucleotide positions  $\approx$ 56000-120000. The genome at both ends contains inverted terminal repeats (ITRs).<sup>4</sup>

### Transmission of the MNPXV

Basically, it is a zoonotic disease and the transmission was considered from animals to humans. The people living close to forests are supposed to have a higher chance of getting the disease. The infection can be transmitted from human to human, due to many mutations in the virus. About 50 have been observed in the current virus genome. Originally it is a slowly mutated virus, the expected mutation was considered about 1-2 bp/year, which has made it a human virus with mild outcome. The newly mutated virus has shown a new mode of transmission because majority of the current cases are appearing in homosexual young people. Among these patients, there are many cases which do not have a travelling history in endemic areas.

### Epidemiological Trend of the current MPXV transmission

The trend of epidemiological transmission of MPXV has been shifted from epidemic regions to non-endemic regions because the MPXV cases are being observed for the first time outside the endemic regions of Africa. It is a very interesting observation that about 78% of the

**Table-1:** No of cases in in different countries since June-15 to July 22, 2022 in Europe.<sup>4</sup>

Countries	Cases	Date of confirmation/Detection
<b>No of cases in Europe</b>		
Spain	2,447	July 12.
Germany	1,859	July 15.
France	912	July 12.
Netherlands	549	July 14.
Portugal	515	July 13.
Italy	339	July 15.
Belgium	224	July 12.
Switzerland	189	July 14.
Australia	80	July 15.
Sweden	58	July 13.
Ireland	54	July 13.
Denmark	37	July 15.
Norway	35	July 15.
Hungary	28	July 13.
Poland	21	July 13.
Lovenia	18	July 13
Romania	16	July 14.
Finland	13	July 11.
Greece	13	July 15.
Czech Republic	11	July 8.
Malta	09	July 13.
Iceland	06	July 7.
Luxembourg	06	July 6.
Bulgaria	03	June 30
Gibraltar	04	July 13.
Croatia	03	July 13.
Latvia	02	June 8.
Estonia	02	July 8.
Bosnia	01	July 13.
Georgia	01	June 15.
Russia	01	July 12.
Serbia	01	June 17.
Slovakia	01	July 7.

infection has been reported in young males (18-44 years age) and 98% are those who have sex with males. The serious aspect is the spread of HIV infection because 41% are HIV-positive. The health care workers who are dealing with these patients were also found positive (Table-1, 2).<sup>2-4</sup>

### Rename the Monkeypox virus

As the viral mode of transmission and consequences have changed, the virus should be re-named to get rid of the stigmatized terminology of western or Congo based cladding viruses. Using such names for these countries amounts to discrimination. The new names should follow the criteria for naming the SARS-CoV-2 variants. The name for these coronaviruses for COVID-19 was alfa, beta, delta, Omicron, BA.2 BA.4, & BA.5 etc. Therefor for this virus it could be called a variant of MPXV with Greek letters like A.1, A.2 and B., B,2 etc.

**Table-2:** No of cases in in different countries since June 15 to July 22, 2022 in Asia, America, Australia and Africa.<sup>4</sup>

Countries	Cases	Date of confirmation/Detection
<b>No of cases in UK (1,856)</b>		
England	1,778	July 14
Scotland	46	July 14
Northern Ireland	12	July 14
Wales	20	July 14
<b>No of cases in American regions</b>		
USA	1,469	July 14.
Canada	500	July 14.
Brazil	228	July 11.
Mexico	27	July 8.
ERU	18	July 7.
Chile	16	July 11.
Argentina	12	July 13.
Colombia	06	July 8.
Bahamas	02	June 24
Dominican Republic	01	July 6.
Ecuador	01	July 6.
Jamaica	01	July 6.
Panama	01	July 4
Venezuela	01	June 12.
<b>No of cases in Middle East and Africa</b>		
Israel	80	July 13.
Lebanon	01	June 20.
Morocco	01	June 2.
Saudi Arabia	01	July 14.
South Africa	03	July 11.
UAE	13	June 15.
Turkey	01	June 30.
<b>Asian pacific countries</b>		
<b>Countries</b>	<b>Cases</b>	<b>Date of confirmation 2022</b>
Australia	33	July 14
New Zealand	02	July 12
Singapore	04	July 13
South Korea	02	June 22
Taiwan	01	June 24
India	01	July 14

The currently used names are controversial because they were named after African regions. Due to these mutations and change in transmission, the virus is now no more zoonotic and has become the "human monkeypox virus" (HMPXV) or humanpox virus (HPXV).

This could be a new evolution of the previous virus in 2022, with a new mode of spread in homosexuals. It is also being considered to be included in the list of sexually transmitted diseases.

It is presumed, that due to these mutations, the virus has altered to a large extent giving it a better chance of transmission among people to become a human virus. Monkeypox, unlike SARS-CoV-2, has historically not been considered to be a particularly efficient viral disease and

person-to-person spreader. The new evolution in the current MPXV variants may be due to change in its few enzymes on the virus, like APOBEC3.<sup>4-6</sup>

### **Why is it transmitting in nonendemic countries and getting such attention now?**

Basically, it was the disease of endemic African countries, like west and central Africa but the current outbreak is unusually seen in nonendemic countries like Europe, USA, Canada, etc. Since the elimination of smallpox in 1970-1980, no longer vaccination against smallpox was recommended, for over more than decades. This cessation of vaccination against smallpox, could be the reason for the spread of the current cases globally, besides its mutation and changes in its enzymatic system as discussed previously.<sup>2-4</sup>

### **Situation with current Outbreak**

Pakistan is connected with regions through air traffic in regions where monkeypox is on the rise. It is therefore advisable to have a screening programme at the airports, and suspected or confirmed cases must be isolated and quarantined for 21 days. The social media should play an important role to create awareness on this disease and its transmission. It is suggested that our healthcare authorities should nominate committees for forming the proper strategies to overcome the onset of the outbreak in collaboration with WHO and CDC. Government should channel a well-designed programme to prevent the country from economic, business, and commercial losses in any such unfortunate future circumstances.<sup>4,5</sup>

We must be ready to face any new pandemic after SARS-CoV-2 due to Climate change, rise in population, migration, deforestation, urbanization, globalization (travel, trade) contamination, animal-human contact, and wars.

### **Measures to avoid current outbreak**

The global health authorities must take priority-based preventive measures to stop the outbreaks of monkeypox disease across the globe. These could include the following:

1. Unusual men to men sexual contact should be avoided. Sex with females if there is a history of exposure or are infected should be prevented. Therefore, as a precaution, condom may be used during sexual activities.
2. The subjects exposed to diseased patients should be quarantined till full recovery and falling off of the scabs.
3. They should especially, avoid close contact with immunosuppressed persons and pets.

4. The household items (clothes, bed linen, towels, eating utensils, plates, glasses) of the patients should not be shared. The virus can be infective after falling on the surfaces for > 3 hours and the R0-1.

5. Close contacts of patients should be self-monitored for >21 days after the last exposure and should avoid close physical contact with young children, pregnant women and immunocompromised persons until MPXV is excluded.

6. Health workers, laboratory staff, consultants, and doctors, treating such cases, should avoid touching patient's skin lesions without using disposable gloves.

7. Hospitals should establish infection control units which must be well-equipped with isolation centres and ICUs. There must be permanent quarantine centres to handle and quarantine the patients immediately to limit the further spread of any contagious virus.

8. To stop animal to human transmission, contact with animals which could harbour the virus should be avoided. These include the sick or dead ones in areas where monkeypox is prevalent. Also contact with any materials, such as bedding, which have been in contact with a sick animal should be avoided.

9. The exposed and infected patients should be quarantined to stop transmission to others who could be at risk for infection.

10. Good hand hygiene after contact with infected animals or humans should be practiced. For example, washing hands with soap and water or using an alcohol-based hand sanitizer is highly recommended.

11. Masks should be used to avoid droplet infection and personal protective equipment (PPE) should be donned when caring for patients.

### **Diagnosis of the MPXV**

For an early diagnosis of MPXD, the patient's history and clinical presentation is of prime importance. The laboratory assistance is needed to confirm the case. The diagnostic modalities include detection by ELISA, PCR and immunofluorescent antibody assay. The electron microscopy is used for academic purposes.

The appropriate samples from the skin lesions are used for PCR. The samples should be collected from the roof, fluid of vesicles and pustules. The dry crusts can also be used for PCR.

Specimens of blood, saliva or semen are not recommended and should not be routinely used for

diagnosing MPXD. It is considered that viraemia is of a short duration and the results are usually false negative.

The specimens for laboratories, should be properly packaged and shipped in accordance with national and international rules.<sup>2</sup>

### **What are the classical and current outbreak symptoms of monkeypox?**

The classical symptoms of the MPXD are divided into two phases. In phase I there could be headache, chills, fever, fatigue, asthenia, backache, muscle aches and enlargement of the lymph nodes. There could be flu like symptoms with a cough in some cases.

In the second phase, the mucosal and skin rash commonly develops after three days. The incubation period is up to 21 days but could be 28 days depending upon the immunity of the patients. The rashes first appear on the face and spread to other parts of the body, including hands and feet.

The cutaneous lesions progress from rash to macules, evolving to papules, vesicles, pustules, crusts and scabs. The lymphadenopathy is associated with these symptoms, which is helpful in making the differential diagnosis from other similar diseases and smallpox. But, in the current outbreak patient's symptoms are very mild and self-limiting. The rash and skin vesicles are seen on the genital areas of both active and passive partners.

### **What is the mortality rate of the MPXV?**

It is a self-limiting mild disease and most people recover within weeks. The literature shows high mortality among children, young adults, and immunocompromised individuals. It is also variable among two variants of MPXV, Low in Nigeria, (West African clade) which is about 1-3.3%, as compared to Congo clade virus which is 10-11%.<sup>5-7</sup>

### **What measures must be adopted to face another global emergency of Monkeypox (PMXV)**

The Coronavirus pandemic which has devastated the healthcare system of most of the countries has taught us many good lessons. Therefore, if precautions are not taken, the outbreak of Monkeypox can be disastrous and

dreadful for any infected country. The COVID pandemic produced tremendous economic losses and damaged the current healthcare system. This will need a long time to rebuild these infrastructures. Therefore, it is imperative that relevant stakeholders proactively work towards reestablishing the whole economic and health care system. It is also the need of the day to educate the public regarding effective precautionary measures that can keep them safe from the current outbreak of MNXV. Furthermore, proper surveillance systems need to be developed to monitor cases and deal with them accordingly.

If the authorities do not take this collaborative measure, another pandemic can be faced, which will be vulnerable for the country leading to economic default as there is already political instability and surge in petrol, gas and electricity prices.

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