



# Monkeypox 22: A Review on the monkeypox disease general approaches, outbreaks, and detection

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## Abstract

According to the US Centers for Disease Control and Prevention, monkeypox has been found across most of the US, except for a few states. New York, California, Illinois, and Florida are the states with the most instances. In Copenhagen, Denmark, laboratory monkeys were initially affected by it in 1958, and it was then recognized as a unique disease. It is believed that several animal species serve as a natural reservoir for the virus. Two outbreaks of a disease resembling the pox in colonies of monkeys kept for study led to the discovery of monkeypox in 1958. Despite being called "monkeypox," the disease's origin is still a mystery. However, the virus may be carried by African rodents and non-human primates (such as monkeys) and infect humans. There were many general approaches for the diagnosis of these monkey pox viruses. So, in this paper, signs of monkey pox virus, an outbreak of monkey pox virus in different countries, risk factors of the monkey pox infection, and detection of the monkey pox virus using different approaches had been reviewed. This paper also analyzes the evolution of the monkey pox virus cases in the month and year of May 2022.

**Keywords:** Monkey pox virus, Detection, Outbreak of monkey pox virus, Risk factors, and Treatment  
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## 1. Introduction

Nowadays, viruses play a significant role in a huge number of newly developing and re-emerging illnesses [1]. There are some viruses that could create dangerous diseases for humans, and they can spread fast and make the diseases into global infectious diseases. There is a virus named orthopox virus, which causes smallpox. Back in the 1960s, there is an

outbreak of smallpox, and it came to attention on 11 January 1962. The last smallpox epidemic in the United States happened in 1949 because of the effectiveness of vaccination. Since the World Health Organization (WHO) proclaimed smallpox eliminated in 1980, there have been no examples of the disease developing spontaneously [2]. But in the 1970s, there is an outbreak of another disease named "Monkey



pox", which comes from the same family (variola virus) as smallpox belongs. A zoonotic disease called monkey pox often appears as fever, rash, and swollen lymph nodes. It is spread via contaminated bodily fluids or secretions, direct contact with infected body fluids, or respiratory droplets. It can cause severe disease [3]. Monkey pox is milder as compared to smallpox. Its symptoms are like smallpox, but it is self-limiting and is cured in around three weeks [4]. Two outbreaks of a disease resembling the pox that were occurring in groups of monkeys being used for research led to the discovery of monkey pox in 1958. It was developed in central and western Africa. It's spread mainly through human contact with

infected rodents but can sometimes be spread through skin-to-skin contact with an infected person [5]. The variations between smallpox and monkey pox were that monkeypox cause enlargement of lymph nodes or glands, which are there in the body and it helps us to differentiate between the two. Monkey pox spreads through close, physical contact between people. This means anyone can get monkey pox. However, based on the current outbreak, certain populations are being affected by monkey pox more than others, men who have sex with men are included (MSM) [6]. Figure 1 explains the symptoms of monkey pox.

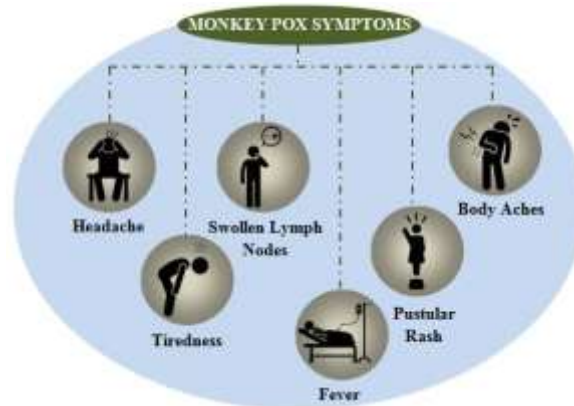


Figure 1 Symptoms of the monkey pox

The monkey pox virus (MPXV) has recently spread to several countries on almost every continent. To date, no source of infection has been identified, as opposed to sporadic cases associated with travel to endemic countries [7]. There are some of the following steps for the prevention of getting monkey pox [8]:

- ✓ Avoid skin-to-skin contact with people who have a rash that resembles monkey pox.
- ✓ Do not touch a person with monkey pox's rash or scabs.
- ✓ You should not kiss, hug, cuddle, or have sex with someone who has monkey pox.
- ✓ Do not handle or touch a person with monkey pox's bedding, towels, or clothing.
- ✓ After that, wash your hands with soap and water or an alcohol-based sanitizer.

- ✓ Avoid contact with animals that can spread the monkey pox virus, typically rodents and primates, in Central and West Africa.
- ✓ If a person has monkey pox, he or she should be isolated at home in a separate room or area away from other people or pets.

There are some general approaches such as Polymerase Chain Reaction (PCR) to predict and detect or diagnose monkey pox [9] [10]. In the detection of Monkey pox virus infections, the PCR technique detects DNA at different quantities and provides a qualitative result of positive, negative, or inconclusive. Another approach named AI helps in monkey pox disease diagnosis. AI has some sub fields such as machine learning (ML), Neural network (NN),



Deep learning (DL), Computer Vision, and Natural Language Processing (NLP).

The remainder of the paper has been organized as follows: Section 2 presents the related work; Section 3 briefly discusses the current study; Section 4 gives the current study's results and discussion; and Section 5 draws a conclusion from the entire work.

## 2. Related Works

[11], The monkey pox virus and a recent outbreak of skin rash sickness in Nigeria were explained. The big epidemic included 262 suspected, 115 confirmed, and 7 fatal cases spread over 26 states. The results showed that immunization against monkey pox provides modest protection, with serious sequelae occurring in the unprotected group (74 %) more than in the vaccinated group (39.5 %). Although the index patient and two of her siblings had reported having contact with a monkey in their area, it was impossible to determine if the monkey was the cause of the infection, especially since it had no history of the illness.

[12], The global human monkey pox epidemic in 2022 was examined. To collect and compile the relevant knowledge regarding the pandemic, research was undertaken utilizing prior textbooks and studies. Brincidofovir and tecovirimat have been found in animal trials to be efficacious against monkey pox. Clinical care for monkey pox, on the other hand, must be greatly improved to alleviate symptoms, manage difficulties, and avoid consequences.

[13], The reliable and quick Real-time PCR technique for human monkey pox virus (MPXV) diagnosis was described. The MPXV diagnostic test was not widely used in diagnostic laboratories. The accuracy of our real-time PCR was demonstrated using five MPXV positive DNA samples from the Democratic Republic of the Congo. Furthermore, in the present MPXV epidemic, five out of ten clinical samples proved positive, with Ct values ranging from 20.6 to 34.9. The tests can only identify ongoing illness;

they cannot tell if a person has already been infected.

[14], discussed the possibility of a monkey pox epidemic in Nepal recorded the first fatality from monkey pox and confirmed 21 of 66 suspected cases, whereas 9 persons died in Congo in 2022. As of May 26, 2022, there were 26 confirmed cases in Canada, ten in the United States of America, 218 in 16 European nations, including the United Kingdom, two in Australia, and one in the United Arab Emirates (UAE). Everyone should be cautious and avoid unwanted interaction with other individuals.

[15], The neuro-fuzzy-based methodology for diagnosing monkey pox illnesses was discussed. Monkey pox has the same clinical signs as other types of smallpox, including flu-like symptoms, fever, malaise, back pain, headache, and a distinctive rash. The fuzzy findings were sent into the architecture's neural network. The Neuro-Fuzzy program was created with Java 1.8 and NetBeans IDE 8.0.2. It was advised that all symptoms be included in the collection of inputs for the real-world execution of this applicable system.

## 3. Outbreak of Monkey Pox and Detection of monkey pox using AI approach and other approaches

Monkey pox is a viral illness that causes fever and other nonspecific symptoms a week or two after exposure, followed by a rash with blisters that might linger for a couple of weeks before clearing up. Prior to the current outbreak, 1-3 % of patients with confirmed illnesses died (without treatment). According to the US Centers for Disease Control, there have been over 9424 confirmed cases of monkey pox in non-endemic nations since the epidemic began in May 2022. A hybridization experiment employing an MGB Eclipse trade mark (Epoch Biosciences) probe precisely identifies monkey pox virus by targeting an envelope protein gene (B6R) (MPXV). The assays were verified using coded orthopox virus DNA samples and then



used to examine lesion samples from five confirmed monkey pox cases in the United States. The AI method might potentially detect viruses and aid in the conservation of wildlife.

**3.1. Signs of monkey pox**

Monkey pox is an infectious illness caused by the monkey pox virus. Monkey pox, on the other hand, is less infectious than smallpox. This illness has milder symptoms and is seldom deadly. There are two kinds of monkey pox viruses: Central African and West African. The central African virus has the potential to inflict more disease and death than the West African virus. The average time between infection and onset of symptoms is 5 to 21 days. According to the World Health Organization (WHO), there are two categories of infections.

- Invasion period
- Skin eruption period

**3.1.1. Invasion period**


The invasion stage normally lasts 0-5 days and is marked by fever, strong headache, lymph node

swelling, back pain, muscular pains, and a lack of energy. Swelling of the lymph nodes is a distinguishing feature of monkey pox that is not seen in other rash-causing infections such as measles and chickenpox.





**3.1.2. Skin eruption period**

The phase of skin eruption occurs 1-3 years after the commencement of fever. The patient develops a rash, which usually begins on the face and subsequently spreads to other regions of the body [16]. The most afflicted areas are the face, palms of the hands, and soles of the feet. Three weeks may be required before the crusts are completely removed. Skin eruption begins with red rashes all over the body, primarily on the face and limbs, and progresses to lumps on the skin that progressively fill with clear or milky fluid. The wound (lesion) comprises six stages. Each phase is identified, characterized, and has a varied length. Table 1 illustrates the phases of the skin eruption period with distinct identification, model, and durations [16].

**Table 1** Phases with different identification, model, and durations in the skin eruption period

PHASES	IDENTIFICATION	MODEL	DURATION
RASH	The skin develops a macular rash, which begins on the face and spreads to the arms and legs, then to the hands and feet, including the palms and soles.	 <p style="text-align: center;"><b>RASH</b></p>	1 to 2 days



<p><b>MACULES</b></p>	<p>Macules starting from the face spread to arms, legs, palms, and soles (centrifugal distribution), within 24 hours, and lesions will be on flat base</p>	 <p style="text-align: center;"><b>Macules</b></p>	<p>1 to 2 days</p>
<p><b>PAPULES</b></p>	<p>Raised firm painful lesions</p>	 <p style="text-align: center;"><b>Papules</b></p>	<p>1 to 2 days</p>
<p><b>VESICLES</b></p>	<p>Filled with the clear fluid</p>	 <p style="text-align: center;"><b>Vesicles</b></p>	<p>1 to 2 days</p>
<p><b>PUSTULES</b></p>	<p>Filled with the pus</p>	 <p style="text-align: center;"><b>Pustules</b></p>	<p>5 to 7 days</p>



<b>SCABS</b>	The lesions then start to crust and scab over, and the scabs last for another week before falling off	 <p style="text-align: center;"><b>Scabs</b></p>	7 to 14 days
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From Table 1, 6 phases were known. The rash usually appears on the face and extremities rather than the trunk. It mostly affects the face (in 95% of cases), palms of the hands, and soles of the feet (in 75 percent of cases). The rash progresses from macules (flat-based lesions) to papules (slightly raised firm lesions), vesicles (clear fluid-filled lesions), pustules (yellowish fluid-filled lesions), and crusts that dry up and flake off. Each phase has its own set of characteristics:

- ✚ **MASCULES:** The skin develops a macular rash, which begins on the face and spreads to the arms and legs, then to the hands and feet, including the palms and soles.
- ✚ **PAPULES:** Lesions had developed from macular (flat) to popular on the third day of the rash (raised)
- ✚ **VESICLES:** Lesions have turned vesicular on the fourth to fifth day.
- ✚ **PUSTULES:** The lesions have turned pustular (filled with opaque fluid) - strongly elevated, generally spherical, and stiff to the touch

✚ **SWABS:** Scabs will persist for about a week before falling off.

### 3.2. Outbreak of monkey pox virus

The Centers for Disease Control and Prevention (CDC) is following an outbreak of monkey pox that has expanded across multiple nations, including the United States, that do not routinely report monkey pox. People infected with monkey pox in the present epidemic report having close, continuous physical contact with other people infected with monkey pox. While majority of individuals infected in the current global epidemics are homosexual, bisexual, or other males who have sex with men, anybody who has had intimate contact with someone who has monkey pox can contract the disease. Unofficial sources of information, such as ProMED mail or other epidemic reporting systems, are quick and vital. The Program for Monitoring Emerging Diseases (also known as ProMED-mail or ProMED) is one of the world's largest publicly available emerging disease and outbreak reporting systems. It allows for the rapid response and management of monkey pox disease outbreaks. Table 2 explains some of the cases of monkey pox from ProMED mail.

**Table 2** Some of the cases of monkey pox from ProMED mail

Month and Year of Outbreak	Number of cases reported	Location	Confirmed Cases	ProMED Archive Number
10 <sup>th</sup> July 2008	39 cases reported	Bokungu, DRC	No confirmed cases	20080714.21
17 <sup>th</sup> June 2022	9 Cases reported	INDONESIA: (WEST NUSA)	No confirmed cases	20220618.87



		TENGGARA)		
25 <sup>th</sup> September 2007	62	Likouala department, ROC	The majority of those afflicted were DRC refugees under the age of 15.	20070925.32
15 <sup>th</sup> July 2022	6162 cases	Spain, Germany, and the United Kingdom	1470 confirmed cases	20220715.87
12 <sup>th</sup> July 2022	1984 cases	United States, France, and Portugal	866 confirmed cases	20220712.87
30 <sup>th</sup> June 2022	87 cases	Israel, Ireland, and Brazil	25 confirmed cases	20220701.87
12 <sup>th</sup> January 2011	114 cases	Equaetor province	not known	20110113.01
27 <sup>th</sup> May 2022	15 cases	Finland	1 case	20220530.87
18 <sup>th</sup> May 2022	9 Cases reported	North America	1 case	20220519.87

From Table 2, The above overview of documented cases shows a rise in the incidence of monkey pox cases in recent years, as well as a greater geographical occurrence. However, the data obtained is frequently fragmentary and unsubstantiated, making meaningful estimates of the frequency and incidence of monkey pox over time difficult [20]. On 10<sup>th</sup> July 2008, 39 cases had been reported in Bokungu, DRC but there are no confirmed cases [17]. The year 2022 has many cases of monkey pox which has been in the ProMED mail [18]. They are:

- ❖ 17<sup>th</sup> June 2022, 9 Cases were reported in INDONESIA: (WEST NUSA TENGGARA)
- ❖ 15<sup>th</sup> July 2022, 6162 cases were reported in Spain, Germany, and the United Kingdom
- ❖ 12<sup>th</sup> July 2022, 1984, cases were reported in the United States, France, and Portugal
- ❖ 30<sup>th</sup> June 2022, 87 cases were reported in Israel, Ireland, and Brazil
- ❖ 27<sup>th</sup> May 2022, 15 cases were reported in Finland

- ❖ 18<sup>th</sup> May 2022, 9 Cases were reported in North America

These cases made people's lives in a danger zone. There were more cases in the year September 2007 of location Likouala department [19]. In the place of Equaetor province, the monkey pox cases were very few initially, but on the year 12<sup>th</sup> January 2011, 114 cases have been reported.

### 3.2.1. Cases of monkey pox in non-endemic countries

Monkey pox has been reported to WHO from 23 Member States that are not endemic for the monkey pox virus, spanning four WHO regions, since May 13, 2022. Epidemiological research is continuing. So far, most reported cases have no known travel ties to an endemic location and have presented at general care or sexual health clinics. There are some of the following direct measures to be taken.

- The data given should be correct because it may help in the identification
  - Lay out in groups will be a risk
- Non-endemic countries include Argentina, Canada, French Guiana, United States of



America (USA), United Arab Emirates (UAE), Belgium, Denmark, Germany, Australia, Slovenia, Switzerland, Netherlands, Italy, Finland, and Czechia, etc of 23 countries. Table 3 explains the cases of monkey pox in non-endemic countries [21].

**Table 3** Cases of monkey pox in non-endemic countries

COUNTRIES	CONFIRMED CASES	SUSPECTED UNDER INVESTIGATION
Canada	26	25 to 35
USA	10	Nil
UAE	1	Nil
Austria	1	Nil
Belgium	3	3
Denmark	2	Nil
France	7	Nil
Italy	4	Nil
Netherlands	12	>20
Portugal	49	Nil
Australia	2	Nil
Sweden	2	Nil
Switzerland	1	Nil
Spain	20	64
Solvenia	2	Nil
United Kingdom of Great Britain and Northern Ireland	106	Nil
Total	248	117 to 122

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Several European countries, including Belgium, Finland, France, Germany, Israel, Italy, the Netherlands, Portugal, Slovenia, Spain, Switzerland, and the United Kingdom of Great Britain and Northern Ireland, as well as Australia, Canada, Nigeria, Singapore, and the United States, have published full-length or partial genomes. So far, no deaths have been reported in non-endemic countries because of the current outbreak. Most instances were detected through sexual health clinics and primary care facilities, and they largely, but not solely, involved the men who have sex with men (MSM) population. Aside from cases reported in non-endemic countries, the World Health Organization continues to receive information on monkeypox outbreaks in endemic African nations via existing surveillance procedures (Integrated Disease Surveillance and Response).

**3.3. Risk factors for monkey pox infection**

Consuming undercooked meat and other animal products from infected animals may pose a danger. Monkey pox is normally self-limiting, but persons in non-endemic nations are unlikely to have protection because the virus has not previously been recognized in those areas. Newborn newborns, young children, and persons with preexisting immune weaknesses are more likely to develop severe symptoms, and in rare cases, death, from monkeypox. According to Rosamund Lewis, WHO Technical Lead for Monkey Pox, intimate contact with monkey pox patients is the most major risk factor for monkey pox virus infection, and the virus is spreading to older populations even in endemic areas. An inquiry and a case study were carried out to discover risk variables impacting the monkey pox virus in the community and transmission inside the family. Within the family, there are various behavioral





characteristics that increase the chance of monkey pox infection. [22] in Table 4.

**Table 4** Important behavioral factors with an enhanced risk of monkey pox infection within the household

BEHAVIORAL FACTORS	X <sup>2</sup>	P VALUE
Resting in the same room	17.3	<0.001
Resting in the same bed	12.49	<0.001
Drinking in the same cup	9.09	0.003
Eating from the same dish	5.93	0.015

Sleeping in the same room (P = 0.001) or bed (P = 0.001), sharing meals from the same dish (P = 0.015), and drinking from the same cup (P = 0.003) were shown to be related with a significant increase in the probability of obtaining an MPXV infection. Within the household, some of the following restrict contamination.

- ✓ Place coversheets, waterproof mattress coverings, blankets, or tarps over upholstered furniture and other porous items that cannot be cleaned to avoid contaminating them.

- ✓ If contamination is a problem, further procedures such as steam cleaning might be taken.

Petting, caressing, and embracing, kissing, licking, sharing sleeping spaces, and sharing meals are all examples of close contact. Pets that have had close contact with a symptomatic human with monkey pox should be kept at home and away from other animals and people for 21 days following the most recent interaction. There are certain key characteristics of monkey pox infection in the home, much like in a house. Table 5 explains the significant factors with an enhanced risk of monkey pox infection in a household [22].

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**Table 5** Significant factors with an enhanced risk of monkey pox infection in a household

RISK FACTORS	POINT EVALUATION	P VALUE
Stay in a house with a door	0.067	0.012
Prepare wild animals for consumption	0.29	0.049
Rest on a floor	6.06	0.032

Infected people should not take care of exposed pets. The person with monkey pox should avoid close contact with the exposed animal, and when possible, ask another household member to care for the animal until the person with monkey pox is fully recovered. Out of all these mentioned factors, REST ON FLOOR has a higher point evaluation and P value.

### 3.4. Detection of monkey pox using general approach and AI approach

Monkey pox virus tests are used to determine if a person is infected with the virus that causes monkey pox, which is a type of orthopox virus.

The CDC's FDA-cleared non-variola orthopox virus test can detect monkey pox from a lesion sample. Monkey pox can also affect animals. Monkey pox virus can infect a broad variety of animal species, including monkeys, anteaters, hedgehogs, prairie dogs, squirrels, and shrews. Polymerase chain reaction (PCR), viral isolation, Fuzzy test, etc are some of the common approaches for the diagnosis of monkey pox. Table 6 explains the detection methods of monkey pox virus using general approaches for the infected animals.

**Table 6** Detection methods of monkey pox virus using general approaches for the infected animals

INFECTED ANIMALS	LOCATION	DETECTION METHODS	LIMITATIONS
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African Squirrels	Rope	Zaire	PCR	The monkey pox virus recovered from this animal was likewise confirmed by PCR to be from the inoculum used to infect the other animals, but it was devoid of any guanine phosphoribosyl transferase.
African Dormice		USA	PCR	The capacity of eastern sites to forecast the appropriateness of western locations (1-tailed Between-model Wilcoxon signed rank test)
Elephant shrews		Singapore	PCR	Due to worries of serious negative consequences in a population with a compromised immune system, vaccines were not frequently used in endemic areas.
Cambian pouched cat		Africa	Viral isolation	It was challenging to identify which vaccination method most closely resembles how the monkey pox virus spreads naturally.
Cynomolgus Macaque		Not known	Quantitative PCR	Due to the small number of tested animals and the fact that only two of the four higher dosage animals survived while the other two did, the 95 percent confidence intervals were not constrained.
Giant anteaters		UK	PCR	Undiagnosed was the third gene, E3L, which influences the host's innate immunological response.
Prairie dogs		USA	PCR and viral isolation	Several investigated organs failed to show the presence of a replicating virus by luminous signal or a live virus by tissue culture.

Infected animals such as African Rope Squirrels [23], African Dormice [24], Elephant shrews [25], Cambian pouched cat [26], Cynomolgus Macaque [27], Giant anteaters [28], and Prairie dogs [29] were considered. These infected animals get affected with the monkey pox virus and it has been detected using the mentioned techniques like PCR and viral isolation, Quantitative PCR, and viral isolation, etc. If viral spillover must be addressed before it spreads and becomes a pandemic, early warning of emerging zoonoses is essential. Pandemics like the COVID-19 and swine flu (influenza H1N1) have made us aware of the immense potential of AI-enabled disease surveillance and prediction. In the instance of monkey pox, the virus has previously been spreading in African nations but has recently expanded to other countries. Normally, AI helps in clinical diagnosis by processing the image data. However, it was unable to find any publicly

available monkey pox dataset on an AI-based approach to diagnose and prevent the Monkey pox disease efficiently [30]. Due to this reason, it was difficult for the contribution of detection of monkey pox virus using the AI approaches.

### 3.5. Clinical disorders and treatment for the monkey pox virus

According to the CDC, there is no medication licensed for treating monkeypox virus infections. However, antivirals that were created for use in smallpox patients could be effective. These are new products and are not yet widely available. However, the vaccine is recommended for persons who have been in contact with someone who has monkeypox. When it comes to treatment, most people don't need the new products. Most people don't have a severe case of monkeypox and can be managed conservatively with regular care where it's necessary. It may be possible to access the new treatments for a very select few



patients who may need them. Furthermore, the smallpox vaccine is said to be 85% effective in treating the illness. The US is distributing the Jynneos vaccine, which is smallpox and monkeypox vaccine

(Live, Nonreplicating). The vaccine is administered in two doses and delivered 28 days apart. Table 7 explains the clinical disorders and treatment with the monitoring areas [31].

**Table 7** Clinical disorders and treatment with the monitoring areas

CLINICAL DISORDERS	TREATMENT	MONITORING
Inhaling Tract	Avoid inhaling infections and inhaling consolation	Respiratory rate and pulse monitoring
Fever	Treat periodic fever so that there would not be the cause of virus	The temperature should be checked regularly
Inflammation	Reduce pain and decrease the size of lymphadenopathy	Size of lymphadenopathy
Sepsis	Hemodynamic stabilization	Pulse rate and blood pressure should be checked
Vomiting and Diarrhoea	Reduce gastrointestinal water losses	The volume of diarrhea and intake and output of fluid

Antivirals such as tecovirimat or ST-246 (TPOXX), brincidofovir (Tembexa), and cidofovir (Vistide) are typically suggested for individuals who are more prone to become very ill, such as those with compromised immune systems. From table 7, it has been known that there are some clinical disorders with the treatment. Based on the mentioned disorders (Inhaling tract, fever, inflammation, sepsis, and vomiting and diarrhea), there were different treatments with the monitoring procedures.

**4. Discussions**

This section outlines the evolution of the monkey pox virus cases according to the statistical data for May 2022. On May 6, 2022, monkey pox first occurred. The country where the case was found was the United Kingdom, specifically England. Monkey pox, which causes symptoms like those formerly observed in smallpox patients but is clinically less severe, is caused by an animal to human virus [32]. Table 8 explains the Countries versus the monkey pox virus cases.

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**Table 8** Countries versus the monkey pox virus cases

COUNTRIES	CASES
UK	72
Portugal	40
Spain	52
Canada	15
Germany	12
Italy	5
France	5
US	2
Australia	2
Switzerland	2
Sweden	1
Slovenia	1



The monkey pox virus affected countries in May 2022 is the UK, Portugal, Spain, Canada, Germany, Italy, France, US, Australia, Switzerland, Sweden, and Slovenia. Figure 2 explains the evolution of the monkey pox virus cases during the month of May 2022 in the statistical data.

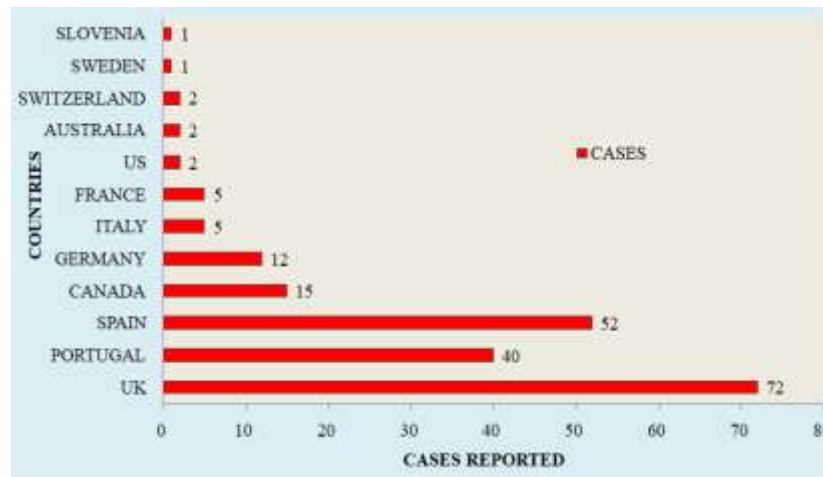


Figure 2 Symptoms of the monkey pox

From figure 2, the UK showed the higher cases (72) when compared with the other countries (Portugal, Spain, Canada, Germany, Italy, France, US, Australia, Switzerland, Sweden, and Slovenia). From 6 May until 15 May, the total number of cases detected in the UK was 7. But in the following days, cases also appeared in other countries. Among them, Portugal had 3 cases on 17 May and 11 confirmed cases on 18 May. As of 2 July 2022, there were 6178 confirmed cases of Monkey pox worldwide (latest available data) [32].

### 5. Conclusion

Monkey pox cases usually seen in West and Central Africa, are now turning up in the United States, Europe, and Australia. Cases reportedly occur close to rainforests where virus-carrying animals reside, according to the WHO. Several types of squirrels poached Gambian rats, dormice, and certain monkey species have been shown to be infected with the monkey pox virus. Even while the virus may be taking advantage of a shift in human behavior and an increase in international travel, experts believe that it may still be stopped from spreading further. According to the current epidemic in non-endemic nations, prolonged human-to-human transmission is extremely possible,

which raises the possibility that continued human transmission may be occurring in Africa on a wider scale than previously believed. So, in this paper, signs of monkey pox virus, outbreak of monkey pox virus in different countries, risk factors of the monkey pox infection, and detection of the monkey pox virus using different approaches had been discussed. The growth of monkey pox virus cases in the countries in the month of May 2022 had been analyzed.

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