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An update on Monkeypox in Africa

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Abstract

Monkeypox is a re-emerging viral zoonosis that occurs naturally in heavily forested regions of West and Central Africa. Monkeypox was first identified as a distinct illness in 1958 among laboratory monkeys in Copenhagen, Denmark. Inter-human transmission of monkeypox virus, although limited, drives outbreaks, particularly in household and health-care settings. But the available evidence suggests that without repeated zoonotic introductions, human infections would eventually cease to occur. Therefore, interrupting virus transmission from animals to humans is key to combating this disease. The first documented cases in humans was in 1970, in six unvaccinated children during the smallpox eradication efforts. It has largely been believed its epidemiology was masked by smallpox transmission and the eradication of smallpox in 1977 brought the disease to prominence. Monkeypox is manifested by fever, headache, muscle pains, shivering, blistering rashes, swollen lymph node etc. The period of exposure to onset of symptoms ranges from 5-21 days and duration of symptoms is typically 2-4 weeks and symptoms ranges from mild to severe and can occur without any symptoms. One of the setbacks observed in Africa is limitation in data collection with reference to monkey and underfunding of Monkeypox Research. There is gap in knowledge and the preventive measures utilized aren't emphasized and the citizens are not well oriented about the disease. This seminar gives an insight into the History and various studies conducted by outstanding researchers. It explains terminologies, and review concisely previous study relevant to monkeypox in Africa and Nigeria. It also delineates the various Diagnostic methods, Virology, Epidemiology, Clinical features, Pathogenesis and Pathology, Treatment, and Preventive measures utilized so far.

Keywords: Monkey pox, diagnostic methods, virology, epidemiology, clinical features, pathogenesis, pathology, treatment, preventive measures.

Introduction

The symptoms caused by monkeypox (also known as MPX) are clinically identical to those caused by other pox infections such as smallpox. A viral zoonotic illness called monkeypox may sometimes be seen in Sub-Saharan Africa (Di Giulio, 2004). Throughout the smallpox period, it was mostly kept secret; it was not until the late phases of smallpox eradication campaigns that it was identified as a human illness (Obeagu *et al.,* 2023). Due to two considerations, namely the difficulty in distinguishing between monkeypox and distinct regular smallpox and the absence of standard laboratory confirmation of cases in smallpox-endemic regions, the illness has been kept secret (WHO, 2017).

In 1970, a total of six newborns who had not been vaccinated against smallpox were discovered to be infected with the illness. The disease was originally discovered in a 9-month-old child in the Democratic Republic of the Congo. These instances happened during the disease's eradication attempts. In 1958, sick Macaca cynomolgus monkeys from Singapore were transported to Copenhagen, Denmark's State Serum Institute. This is where the condition was first identified (formerly Zaire). The remaining children, including three of the same age who had been playing together, were found in Liberia and Sierra Leone.

Most people have assumed that the disease's epidemiology was concealed by smallpox transmission, which rose to prominence in 1977 after smallpox was eradicated (Quiner, 2017).

Twenty to thirty per cent of each shipment's animals were afflicted with the illness, which did not prove deadly (von Magus, 1959). The causal agent was isolated and then characterised using selective methods that were prevalent at the time. This gave the agent the illusion of being distinct while showing that it was closely linked to viruses from the vaccinia-variola subgroup of poxviruses (Cho CT and Wenner, 1973). The next ten years witnessed a succession of epidemics among captive non-human primates (NHP) in both Europe and the United States (WHO, 1968).

Eventually, samples gathered in 1970, at the beginning of the expanded programme of smallpox eradication operations in Africa, revealed evidence of human infection. A suspected case of smallpox was identified during a regular check-in in a remote area of the Democratic Republic of the Congo (DRC, formerly known as Zaire) that had been free of the illness for the preceding two years. A child nine months old who was admitted to the hospital with a serious illness and suspected case of smallpox was at the centre of the inquiry that was being conducted. The sickness was caused by MPXV, the same virus that destroyed primate facilities in Europe and the United States, according to analyses of diagnostic samples taken from the infant at the World Health Organization's (WHO) smallpox reference laboratory in Moscow (Ladnyj *et al.,* 1972).

The mechanism by which the monkeypox virus is kept alive is an element of the virus that has been the subject of a significant amount of research but is still not completely understood. Our capacity to accurately predict how changes (such as rainfall, climate change, human habitat disturbance, and so on) may modify viral prevalence in nature and, therefore, the risk of human monkeypox infection is limited by the absence of this information. At this time, monkeypox can only be found in the wet woods of West and Central Africa. Until recently, the Democratic Republic of the Congo was responsible for the majority of chronic and persistent cases documented.

However, this revelation raised several urgent issues. The discovery of this virus provided evidence that nonhuman primates (NHPs) had the potential to act as reservoirs for the variola virus. Is it possible that the MPX virus, a mix of the variola virus and an animal orthopoxvirus, was the cause of this disease? Could variola be easily replaced as a pathogenic danger to humans by this zoonotic virus (Cho and Wenner, 1973). Over the next two decades, a group of determined scientists from throughout the world conducted an extensive study that resulted in numerous crucial

discoveries that essentially allayed these concerns.

One aspect of the monkeypox virus that has attracted a significant amount of investigation but does not yet have a definitive answer is how the virus is kept alive in its natural environment. Our capacity to accurately predict how changes (such as rainfall, climate change, human habitat disturbance, and so on) may modify viral prevalence in nature and, therefore, the risk of human monkeypox infection is limited by the absence of this information. Currently, monkeypox is found only in the damp woods of West and Central Africa. The vast majority of chronic and persistent case reports were coming from the Democratic Republic of the Congo up until quite recently (Durski *et al.*, 2017).

Additionally, it is anticipated that the danger of the monkeypox virus would rise as public immunity to the smallpox virus wanes (Fred, 2004). The primary objective of this research is to conduct a comprehensive assessment of monkeypox in Africa, covering topics such as epidemiology, pathophysiology, analysis, preventative measures, treatment options, and recommendations. Previous research will also be taken into consideration, as well as diagnostic techniques that have been applied over time.

Monkeypox

This zoonotic disease mostly affects tropical parts of Central and West Africa, with rare dissemination to other regions.It was named after being isolated from monkeys, yet rodents are the predominant hosts of this virus (CDC, 2022). If people or animals come into contact with the monkeypox virus, a zoonotic virus belonging to the genus Orthopoxvirus, they may get infected. This is because the monkeypox virus is zoonotic. Among its symptoms are fever, headache, muscle pain, shivering, blistering rashes, and lymph node enlargement. The interval between exposure and onset of symptoms may range between 5 and 21 days. Symptoms can range in severity from moderate to severe, and they can also appear without any symptoms. Monkeypox virus comes in two different forms, Clade I and Clade II, which originate from Central and West Africa, respectively. Not all outbreaks have the traditional appearance of fever, followed by enlarged glands and a lesion, all at the same stage (WHO, 2022).

History

In 1958, researchers in Copenhagen, Denmark, discovered monkeypox for the very first time as a separate disease that could be found in lab monkeys (Parker, 2013). Six children who had not been immunised against smallpox were the first to get the disease in 1970, while the Democratic Republic of the Congo (previously known as Zaire) was striving to eradicate it. Previously, Zaire was called the Democratic Republic of the Congo (Bunge, 2022). They were in Sierra Leone and Liberia with three playmates (Breman, 1980). It was noticed that it was less contagious than smallpox (Petersen, 2020). Between 1981 and 1986, 300 cases of human monkeypox were observed in the Democratic Republic of the Congo. (DRC). The great majority of these cases were caused by contact with animals (Meyer *et al.*, 2002). The human-to-human transfer was responsible for 88 per cent of the disease's recurrence inside the Democratic Republic of the Congo in 1996. (DRC). 2020 (Petersen). Minor viral epidemics with death rates of about 10% and recurrent human-to-human infection rates almost equal to those of the original epidemics are common in Central and West African tropical regions (Meyer *et al.*, 2002). Before 2003, the monkeypox virus was exclusively found in Western and Central African rainforests. However, the illness caused an outbreak in the United States in 2003. (eMedicine, monkeypox, 2022). Each instance was linked to infected rats brought from Ghana (Petersen, 2020). Local prairie dogs caught the sickness, who subsequently infected their owners (Petersen, 2020). There were no deaths since the disease was deemed minor (Petersen, 2020). Between 1970 and 2019, twelve African nations were recognised as having the illness, with the majority of cases occurring in Central and West Africa (Bunge, 2022).

In 2018, the UK got reports of monkeypox from two Nigerian travellers who were unrelated to one another (Vaughan *et al.*, 2020). In the same year, for the first time outside of Africa, human-to-human infection of the virus was detected in the United Kingdom (Mauldin *et al.,* 2022). This individual worked in healthcare and may have caught the illness via tainted bedding (Vaughan *et al.*, 2020). In addition, incidents affecting tourists in Singapore and Israel were documented (Mauldin *et al.,* 2022). In 2019 and 2021, more occurrences happened in the United Kingdom. (GOV. UK, 2022).

Virology

Infections caused by monkeypox are brought on by the monkeypox virus, which is a DNA virus with two strands and belongs to the poxviridae family and the genus Orthopoxvirus. Monkeypox may occur in both people and animals (subfamily-Chordopoxvirinae). Other orthopoxvirus members that cause cowpox and smallpox, respectively, are the Variola and Cowpox viruses. Variola virus and the monkeypox virus (MPV) have a 90 per cent genomic homology (Quiner; Monroe and Moses, 2017).

The 200–250 nm in size, brick-shaped, enveloped, and cytoplasmic human monkeypox virus attaches to glycosaminoglycans to enter the host cells. It has been hypothesised that since the virus is enveloped, it may instead use the traditional apoptotic mimicking technique to enter the host cells (WHO, 2022). The virus has two different subtypes known as Clade I and Clade II, respectively. These subtypes are connected with the Congo Basin and West Africa geographical areas. Clade II is less virulent compared to Clade I. (Osorio and Yuill, 2008).

Causative factor

The caged monkeys were the ones that led to the discovery of the virus, which turned out to be most prevalent in the tropical rain forests of Central and Western Africa (Centers for disease control and prevention, 2022).

The virus has been found in a variety of other mammals than monkeys, including African squirrels, dormice, and Gambian pouched rats (Cricetomys gambianus) (Heliosciurus, and Funisciurus). It is quite probable that one of the main ways the virus spreads to humans is by eating these animals (WHO, 2022).

Epidemiology

The Democratic Republic of the Congo (previously ZaireEquateur)'s Province's Basankusu saw the first cases of monkeypox in 1970. (Ladnyj ID, 1972). Although it was first thought that the illness was rare in individuals, rates have grown since the 1980s (James, 2020), most likely as a consequence of losing immunity after regular smallpox immunisation was discontinued (McCollum, 2014; Sklenovská and Van Ranst, 2018) Data from WHO monitoring in the DRC/Zaire between the years 1981 and 1986 indicated a total of 338 confirmed cases and 33 fatalities (9.8 per cent CFR).

In DRC/Zaire, a second human illness outbreak was identified in 1996–1997, and between 1991 and 1999, 511 cases were recorded (Heymann, 1998). Clade I of the disease is still prevalent in the Democratic Republic of the Congo and has a higher CFR than the other genetic clade detected in Western Africa. (WHO,2022)

Prior epidemics had a case fatality rate (CFR) of 3 to 6% by May 2022 (WHO, 2022), however, the current pandemic's CFR has not yet gone over 1%. Before the 2022 pandemic, there was no indication of human-to-human transmission of monkeypox in Europe, according to Sklenovská and Van Ranst's study. (2018). (BBC News, 2022) "News" In 2003, in the Midwest of the United States, among people who kept prairie dogs as pets, the first monkeypox epidemic to occur outside of Africa was discovered. This epidemic was brought forth by Clan II. 71 individuals acquired the sickness, however, none of them died (U.S. Centers for Disease Control and Prevention, 2003).

According to Sklenovská and Van Ranst (2018), the environment of tropical rainforests has

historically been the exclusive habitat for monkeypox. On the other hand, while 49 occurrences in Sudan (regions that are now a part of South Sudan) were recorded in 2005, there were no fatalities. According to the findings of the genome study, the virus's origins were most likely in the Democratic Republic of the Congo (DRC), rather than Sudan (Nakazawa, 2013).

Between 2011 and 2014, 2,000 cases of monkeypox were reported per year in West Africa, Central Africa, as well as the Democratic Republic of the Congo. These regions are located in Africa. It is difficult to make precise predictions about the number of instances of monkeypox that will occur over time since the data given is often inadequate, and the quality of the data provided cannot be guaranteed. However, according to Sklenovská and Van Ranst (2018), as of 2018 both the number of cases that had been reported and the disease's geographic dispersion had expanded.

Even though the monkeypox virus has been prevalent in locations where it was formerly endemic for decades, research into the illness has been neglected and underfunded. The World Health Organization categorised monkeypox as a growing danger of moderate public health concern" on June 23, 2022, after reports of over 3000 cases in more than 50 nations and five regions since the beginning of May 2022. This was done as a result of the fact that monkeypox was a "developing threat of moderate public health concern (WHO, 2022).

Outbreak in Africa

Since the smallpox virus has been eliminated from the human population on a global scale, monkeypox has surpassed smallpox as the most common orthopox virus infection in humans. The Democratic Republic of the Congo (DRC), where the sickness was detected for the first time in 1970 and where the majority of reported instances of human monkeypox have been found, is blamed for the vast majority of these cases. On the other side, more cases of the illness have been reported in new nations in west and central Africa during the previous decade, many of which had not recorded a case in decades before this (Check the Table and Geographical Map below). Since 2016, the following countries have reported and confirmed cases of monkeypox: The Central African Republic (19 cases), the Democratic Republic of the Congo (more than 1,000 cases per year), Liberia (2), Nigeria (more than 80), Republic of the Congo (88), and Sierra Leone (1). Cameroon experienced a chimpanzee epidemic during this time. Nigeria is now witnessing the most severe epidemic of human monkeypox in West Africa. There have been 80 confirmed cases in Nigeria. Global health security is concerned about the instances that are appearing (McCollum and Damon, 2014).

A zoonotic orthopoxvirus called monkeypox resembles smallpox in terms of clinical presentation. The primary differentiating feature of monkeypox is lymphadenopathy. The majority of individuals get a maculopapular rash with lesions on their hands, feet, and palms after a fever prodrome. The crusts may not split and a new skin layer may not emerge for up to four weeks following the illness. Secondary bacterial infections, respiratory distress, bronchopneumonia, gastrointestinal involvement, dehydration, encephalitis, and ocular infections that might result in a permanent eye scar are all potential side effects. The management of patients with a monkeypox virus infection now relies on supportive care and symptomatic therapy. The case fatality rate for those who have not received the smallpox vaccination, which provides cross-protection, is 11%. Respiratory droplets and contact with virus-carrying lesions are the two primary modes of human-to-human transmission (McCollum & Damon, 2014).

Outbreak in Nigeria

Between 1971 and 1978, only 10 instances of human monkeypox were reported to the Nigeria Centre for Disease Control (NCDC). This information comes from the NCDC (Oyewale, 2022).

Human monkeypox reemerged in Nigeria in September 2017, exactly 39 years after the

country's last recorded case of the disease. The ensuing human monkeypox pandemic that occurred in Nigeria in 2017–18 included a total of 118 confirmed cases, making it the virus's largest-ever clade II epidemic at the time. In contrast to previous outbreaks of this lineage, the majority of those who were infected were young adult men, and it seems that human-to-human transmission took place without any difficulty. One kid and four adults living with HIV/AIDS were among the seven people who were found to have passed away. The case fatality rate was 6%, and there were 5 males and 2 females among the deceased. In addition, a lady who was pregnant and in the middle of her second trimester experienced a miscarriage because of a sickness that was brought on by monkeypox (Ogunleye, 2019)

According to a Niger Delta University Teaching Hospital study, a significant percentage of the institution's young adult patients also had genital ulcers, syphilis, and HIV (Dimie, 2017). Southeast and southern Nigeria were ravaged by the outbreak of monkeypox, which was being controlled by several states and the authorities of the Nigerian federal government (NCDC, 2022). It has expanded to the Federal Capital Territory, Lagos, Akwa Ibom, Abia, Bayelsa, Benue, Cross River, Delta, Edo, Ekiti, Enugu, Imo, Nasarawa, Oyo, and Plateau by the end of December 2017. It was also recorded in Edo, Ekiti, Enugu, Imo, Nasarawa, Oyo, and Plateau. (WHO, 2018). As of May 2019, the outbreak, which began in September 2017 in many states, was still raging. (WHO, 2019).

After returning home after excursions to Lagos and Ibadan, the Centers for Disease Control and Prevention in the United States received reports of monkeypox cases from American tourists (U.S. Centers for Disease Control and Prevention, 2019). According to Agam Rao, a physician in the CDC's Division of Pathogens and High Consequence Pathology, Nigeria is the only country in the world that is presently hosting the virus, and all cases detected outside of Africa since 2018 have been linked to Nigeria (NBC News, 2022). Monkeypox illnesses in Nigeria up until 2021 were probably underreported, according to Oyewale Tomori, who highlighted this in a 2021 publication. This is because a substantial portion of the population avoided medical facilities out of concern about contracting COVID-19. Furthermore, Oyewale Tomori claimed that the number of monkeypox diseases in Nigeria through to 2021 was probable (Oyewale, 2022).

Transmission

Skin lesions, large respiratory droplets, and possibly infected fomites may all be transmission vectors for the virus. Transmission can occur via close or direct contact with the lesions (UK Health Security Agency, 2018). The mode of transmission is divided into three, which are:

- Animal to Human
- Human to Human
- Dangerous for Humans Environments

Animal to human

It can spread from animals to people directly (through a bite or scratch from an infected animal), directly (through direct transfusion, outer wounds or injuries where an infected animal's blood, body fluids, or secretions come into contact with human blood), or indirectly (through objects contaminated with blood and body secretions) (WHO, 2017). Meat from diseased animals that have not been properly prepared may potentially spread this.

Human to human

Transmission can take place through any combination of the following: close contact with respiratory droplets expelled by an infected person; direct contact with the person's blood or other bodily fluids; indirect contact with objects contaminated by the infected person's blood or other bodily fluids; or close contact with respiratory droplets expelled by an infected person (Adebayo *et al*, 2015). There is no conclusive proof that seminal or vaginal secretions may transmit sexually. Fetal fatalities and vertical transmission have both been reported (Mbala et al., 2017). Virus penetration into the oral mucosa is associated with an enhanced transmission risk (Kantele, 2016). It is yet

unknown whether those who do not have monkeypox symptoms may transmit the virus (CDC. 2015).

Contaminated environments to human

Infected linens or garments with contagious skin particles may spread the disease from the environment to people (also described as fomite transmission). It has been suggested that the MPX virus is spread through contact with contaminated bedding by one documented case of infection in a health worker. When these particles are disturbed, they have the potential to disperse into the air, where they may be breathed in, where they can then cause infection and transmission by settling on wounded skin or mucous membranes, and where they can then be transmitted to other people. Aside from contaminated linens, there are now little data on surface contamination and fomite transmission. Surrogate pox virus has been reported to remain in the environment and on diverse surfaces for 1 to 56 days, depending on temperature and relative humidity. In general, MPX is more stable and more resistant to environmental factors. There is no information on whether there are viruses in wastewater (WHO, 2017).

Pathogenesis and pathology

The MPV enters the body by a breach in the mucocutaneous layer or the respiratory lining and then multiplies in lymphoid tissue, which includes the spleen, bone marrow, and lymph nodes. This is how primary viraemia occurs (virus.stanford.edu). Cytotoxic T-cell immunological activation is triggered by the invasion. During secondary viraemia, MPV multiplies in the macrophages before spreading via the blood arteries to other areas of the body. It first settles in the dermal veins before spreading to the epidermis. It starts the skin layer's necrosis and oedema (Wenner *et al.*, 1969).

The most characteristic histologic signs of monkeypox are acanthosis, a thickening of the skin brought on by cellular proliferation, necrosis, degeneration, the formation of blisters, and inflammation inside the lesion. Additionally, the lesion exhibits intracellular oedema (spongiosis) caused by inflammatory processes (Weedon, 2010).

Clinical features

Incubation lasts 10 to 14 days. 1 Within the first week of the illness's development, it is often contagious. 1 Rash, followed by a fever that lasts for two days before breaking, and significant lymphadenopathy are the telltale signs of this condition. 1 over 14-21 days, the rash advances from a maculopapular phase with a diameter of 2-5 mm through papular, vesicular, pustular, and crust stages. The maculopapular phase has a diameter of 2–5 mm (See figure 2&3). The rashes are monomorphic the vast majority of the time, but every so often they are pleomorphic. When they are pleomorphic, the number of lesions may range from 100 to 500, with 100 being the typical number of lesions. (Reynolds, 2017). According to the findings of a study carried out by Reynolds and colleagues, the severity of a rash may be assessed by the number of lesions present:

(i) 5 to 25 lesions that affect the eyes are benign.
(ii) Moderate: from 26 to 100 lesions, including the eyes.
(iii) Graves with lymphadenopathy and 101–250 lesions.
(iv) more grave: more than 250 lesions 2017 (Reynolds)

The cheeks, feet, and palms of the hands are where the rashes are most prominent (WHO, 2017). After that, the rashes peel off and leave behind a depigmented scar (Di Giulio, 2004). Other symptoms include a severe headache, chills, appetite loss, and back discomfort (Huhn, 2005). Additionally, conjunctivitis and respiratory problems are present (Reynolds, 2017).

Early on in the disease, myalgia and asthenia are fairly severe. Lymphadenopathy, which is a distinguishing characteristic, may affect the lymph nodes in the submandibular region, the cervical region, the postauricular region, the axillary region, or the inguinal region (Di Giulio, 2004). Clinically, it is difficult to differentiate between illnesses that resemble pox, such as

chicken pox and smallpox. One to ten per cent of instances of the illness result in death, and it may not even cause symptoms (Huhn, 2005).

Diagnosis

To confirm an MPXV infection, unique viral DNA sequences must first be identified using either real-time or classical polymerase chain reactions (PCR). This lays the groundwork for the diagnosis. Samples must be taken from the crusted surface of skin lesions, the fluid flowing from vesicles and pustules, and the surface of skin lesions themselves. After being collected, samples of the lesion need to be placed in dry, sterile containers, then either refrigerated or frozen within the first hour, and then sent as soon as feasible (WHO, 2022).

Even though PCR is the most often used laboratory test for diagnosing MPX infection, there is a range of diagnostic procedures available. These solutions do have some drawbacks, however. The use of PCR blood tests, serum investigations for antibody detection, electron microscopy visualisation, immunohistochemistry labelling for orthopoxvirus antigens, and case-defining criteria are examples of alternatives to biopsy for culture. By the time lesions develop, serum antibodies are already observable. However, as infectivity begins when the fever does, the patient will already be infectious by this point. Lesions may start to show up to 3 days after the fever begins, which occurs during the first 5 days of illness. Because of the short period of viremia in comparison to the amount of time that has passed after the beginning of symptoms until the specimen was collected, PCR blood tests often provide inconclusive results. Because orthopoxviruses are serologically cross-reactive, antigen or antibody detection techniques cannot be employed to establish MPX-specific confirmation. Because only highly trained medical professionals will be able to take the necessary biopsies if a culture is to be conducted, this choice cannot be implemented in practice (McCollum and Damon, 2014). Since the ailment must be distinguished from others including chickenpox, smallpox, scabies, measles, generalised vaccinia, and dermatitis herpeticum, case definitions are ineffective (Osadebe *et al.*, 2017).

The capabilities of African countries to identify and treat the illness. All African nations now have the PCR equipment required to screen for MPXV as a consequence of the increased laboratory capacity after COVID-19. The MPXV can only be sequenced in seven African nations, however. Lack of resources and instruction in the collecting, processing, and testing of specimens is another difficulty African nations have when diagnosing MPX. Additionally, certain parts of Africa have healthcare facilities without dependable power sources or freezers to preserve the specimens until they are transferred to the testing locations. Additionally, there are isolated regions of Africa that are difficult to reach by any kind of transportation (WHO, 2022c). It is difficult for African governments to gather samples for laboratory validation since there is a shortage of medical staff throughout the continent. Even though it was discovered that including frequent MPX components in the case definition increases the description's specificity by 85 per cent, it is still possible that 50 per cent of real MPX occurrences will be overlooked (Mande *et al.*, 2022).

Furthermore, much African medical personnel lack the essential expertise and experience to identify and treat MPX patients. In rural African health facilities, a lack of infection prevention and control procedures and resources is often a problem (Durski *et al.*, 2018). The majority of African countries either do not have access to or do not have simple access to the necessary technologies to prevent the spread of the MPX pandemic. These technologies include diagnostics, immunizations, therapies, and comprehensive surveillance systems (Africa Centers for Disease Control and Prevention, 2022). Despite being phased out in 1980, when the illness was proclaimed eliminated, the vaccination for smallpox may protect against MPXV. Even though the illness has been proclaimed eliminated. Even if manufacturers restarted manufacturing, it would take some time for the vaccine to reach African nations since, as

with the COVID-19 vaccine, they often give higher-income countries precedence when it comes to vaccine distribution (Tatar *et al*., 2021).
In the vast majority of Sub-Saharan African nations, routine data from health management information systems are seldom examined, evaluated for quality, or used for decision-making. Numerous studies have shown that the identification and reporting of patients in basic health facilities in sub-Saharan Africa are imperfect. The quality of data acquired for infectious disease surveillance is lowered as a result of several variables. Inadequate data collection and data disagreement at various stages of the monitoring system are examples of these challenges. Lack of training among medical personnel, low levels of motivation, and inadequate funding for health management information systems have all been mentioned as potential causes of this issue. Additionally, there is sometimes no analysis of the data obtained and no feedback on the data. The operationalization of preventative and control efforts is hampered by delayed outbreak identification and case reporting, which contributes to the disease's continued to spread (Mremi *et al.*, 2021).

Recommendations based on the knowledge gained from earlier outbreaks, such as the COVID-19 pandemic and earlier Ebola viral illness outbreaks, we put up several suggestions on how to strengthen Africa's capability for MPX disease diagnosis and containment. Lessons from earlier epidemics revealed that most African nations had adequate monitoring and testing infrastructure, which made it difficult to detect outbreaks when they occurred. In addition, there was a lack of data collection, analysis, and dissemination. These problems prevented prompt public health interventions from being instituted and local and international help from being mobilised (Afolabi et al., 2021).

Differential diagnosis

The illness resembles human smallpox or chickenpox but is less severe. Alternative diagnoses include bacterial skin illnesses, scabies, syphilis, drug eruptions, herpetiformis, rickettsialpox, eczema herpeticum, dermatitis, and molluscum contagiosum. Smallpox, chickenpox, drug eruptions, herpetiformis, and rickettsialpox are all instances of other diagnoses (WHO,2017). Chickenpox, in contrast to monkeypox, does not cause lymphadenopathy, and the rash of chickenpox manifests itself mostly on the trunk and at varying stages of development (Heymann, 1998).

Prevention and control

This refers to the method utilized to prevent and control the monkeypox virus. Both human-to-human and animal-to-human transmission must be decreased to limit the spread of this disease. Maintaining proper precautions is crucial for the prevention and management of the spread of monkeypox (Adebayo, 2015). To be more specific, the prevention and control measures consist of avoiding contact with infected hosts (both animals and people) as well as avoiding consumption of the identified animals, ensuring that meat from reservoirs is thoroughly cooked, routinely practising hand hygiene with soap and water or alcohol gel, doing so before and after contact with any suspected sick person or when in a hospital or the community, and adhering to other safety precautions such as rinsing one's hands after contact with any suspected sick person or when in the (WHO, 2017).

Those who are going to be caring for sick people or animals or conducting research on monkeypox outbreaks are strongly encouraged to get the smallpox vaccination as a preventative measure against monkeypox. The Centers for Disease Control and Prevention in the United States of America issued this suggestion (CDC). Furthermore, vaccines should be given to everyone who has had close or personal contact with people or animals who have been diagnosed with monkeypox and have not previously had them (CDC, 2021).

Medical practitioners are obliged by the Centers for Disease Control and Prevention (CDC) to dress in complete protective gear before giving treatment to patients who have been exposed to infectious illnesses (PPE). This outfit comes

complete with a robe, a mask, goggles, and a disposable respirator with a filter. Additionally, the respirator is disposable (such as an N95). A person who is sick must be isolated to avoid contact with other persons. The best place for this is a chamber with negative air pressure, although a private examination room would do in a pinch (CDC, 2021).

As a result, it is advised to adopt airborne precautions while inspecting and admitting patients owing to the possibility of illness transmission via the air (Infection Control Hospital, 2015). At the moment of entrance to the medical institution, suspected cases are recognised via respiratory visual triage, which employs clinical characteristics to identify persons with contagious respiratory infections. Patients and any accompanying persons (family, friends, or others) are then provided with face masks, and all waiting rooms for patients with respiratory illnesses must have chairs separated by 1 metre (Infection prevention & control manual, 2017). Following the airborne precautions that were discussed earlier, the patient should ideally be assessed and admitted while in a room that has air isolation and a negative air pressure environment.

Single isolation rooms may be used in place of air-negative pressure rooms when none are available (Infection Control Hospital, 2015). To minimise the spread of MPV, the patient's journey from the reception desk to the admissions area should be confined to areas with little congestion. The number of members of the patient's family or friends who visit them should be restricted to just those who are essential for giving care and support to the patient. All visitors should have received infection control training. To monitor secondary infections among all contacts, a record book of persons entering and leaving the isolation room while exhibiting symptoms specific to the monkeypox illness should be preserved (Infection prevention & control manual, 2017).

Treatment

Monkeypox has no known, approved particular treatment. Due to MPV's many hosts, its eradication has been challenging (Di Giulio, 2004). The use of Tecovirimat as a therapy for a variety of poxviruses, including monkeypox, has been given the green light in both the European Union and the United States (European Medicines Agency, 2022). In cases where it is necessary, the British Medical Journal's Best Practice guidelines advise using supportive care in conjunction with tecovirimat or brin cidofovir as the first antiviral therapy (including antipyretic, fluid balance and oxygenation).

Vaccines and vaccinations

Even though the smallpox vaccination was shown to be 85% effective, there is no vaccine against monkeypox (WHO, 2017). Even if it is not easy to get your hands on the immunisation, the Centers for Disease Control and Prevention (CDC) recommends getting it at least two weeks before coming into touch with the illness's cause. Because smallpox and monkeypox are closely related viruses, vaccination against smallpox is expected to protect against infection with monkeypox in humans. This is supported by the fact that the vaccine protects animals against potentially fatal monkeypox challenges during testing (Marriott, 2008). Because systematic smallpox vaccination was stopped after smallpox was eradicated, this has not been definitively shown in people (WHO, 2022).

It has been shown in Africa that smallpox immunisation reduces the risk of monkeypox among persons who have previously gotten the injection. Monkeypox is more common because exposed people have a decreased level of immunity to poxviruses. There has been a steady increase in the number of people who have not received any smallpox vaccinations, and the cross-protective immunity of those who were vaccinated before 1980, the year that routine smallpox vaccinations were phased out, has been decreasing. These two factors are to blame for this (Kantele, 2016).

However, unless these individuals are participating in field investigations, the CDC does not advise pre-exposure immunisation for veterinary professionals, veterinary personnel, or animal control officials who have not been

exposed (CDC, 2021). No vaccination against smallpox or monkeypox has been authorised for use during pregnancy (Khantal, 2022).

Conclusion

In central and western Africa, the monkeypox virus is widespread. Before 2022, several outbreaks have been documented in different African nations. In 2022, Nigeria will be the most important nation in Africa.

The traditional PCR method is used to identify the viral DNA in samples from the rash, confirming the diagnosis of monkeypox infection. Inadequate laboratory equipment, healthcare professionals, limited disease monitoring systems, and a lack of MPXV awareness among communities and healthcare workers are all factors that raise doubts about Africa's capacity to identify and control MPXV.

By using the lessons acquired from prior outbreaks, including resource mobilisation, bolstered surveillance systems, international cooperation, training of healthcare professionals, task shifting, and community engagement, these hurdles may be overcome.

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Clinical picture of Monkeypox rash.Image credit: CDC https://www.cdc.gov/poxvirus/monkeypox/index.html

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