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Research article

Medical research

A study on pathogens, stages and diagnosis of monkey pox virus

Dr.G.Kiran*¹, I.Divya², Ch.Abidha², K.Praveen², P.Abhinandhana²

1. Associate Professor, Department Of Pharmacology, A.M Reddy Memorial College Of Pharmacy, Petlurivaripalem, Palanadu District, Guntur, A.P, Pin 522601.

2. Department Of Pharmacy Practice, A.M Reddy Memorial College Of Pharmacy, Petlurivaripalem, Palanadu District, Guntur, A.P, Pin 522601.

Corresponding Author: G. Kiran

ABSTRACT:

Monkey pox which is a zoonotic disease is seen mostly in central and West Africa region For which the natural host are animal species. It is identified with Characteristic symptoms like lymphadenopathy. A comprehensive literature Search supported to this article to explain in detail on stages of monkey pox, Various routes of transmission to humans ,signs and symptoms, diagnosis and complete treatment with vaccinations which are currently being used And prevention methods.

Keywords: Monkey pox, lymphadenopathy, West Africa region etc.

INTRODUCTION

Monkey pox is a virus belongs to family poxviridae, a member of orthopox virus. Monkeypox symptoms lasted for 2-4 weeks and fatality ratio is 3-6%. Monkeypox is a zoonotic disease and mostly seen in tropical rainforest areas of central and west Africa regions. (1) Monkeypox is a virus transmitted from animals to humans and symptoms are similar as small pox virus although it is less severe. With the eradication of smallpox in 1980, and subsequent cessation of small pox vaccination, monkey pox has emerged as important orthopox virus.

THE PATHOGEN

Monkey pox virus is an enveloped double stranded DNA belongs to family poxviridae and genus orthopox virus. There is 2 distinct genetic clades

1. The central African clade (Congo basin)
2. West African clade

The Congo basin clade cause severe cases historically and it is more transmittable.

The natural host of monkey pox virus are animal species, and those includes rope squirrels, tree squirrels, Gambian pouchedrats, dormice and other species(2). There is still an uncertainty remains in host of monkeypox virus and further studies are needed to identify the exact reservoir.



Fig 1: pathogens of monkey pox viruses

Stages of rash in monkeypox:

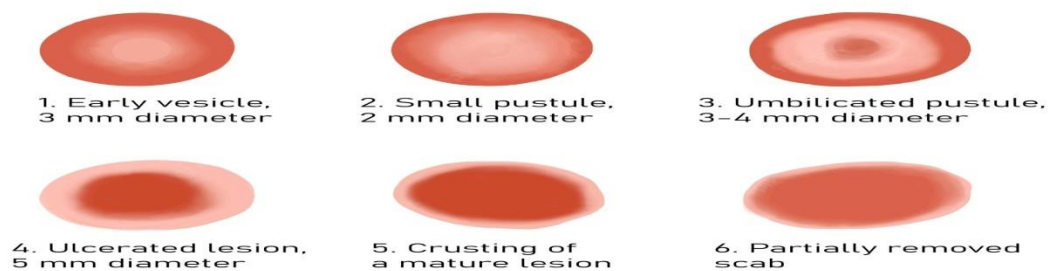


Fig 2: Different stages of monkey pox viruses

OUTBREAKS

- Monkey pox virus was first identified in humans in the year of 1970 to a 9-month old boy in Democratic Republic of the Congo, where small pox had been eliminated in year 1968.(3)
- Since then human monkeypox virus cases have been increasingly reported from rural, rainforest areas of Congo basin and across central and west Africa and also in 11 countries the human pox virus cases have been reported later which are Benin, Cameroon, the central African republic, the democratic republic of congo, Gabon, Cote d'ivoire, Liberia, Nigeria, Sierra, Leone and south Sudan.
- The true cause of monkey pox virus is not known. In 1996-1997, an outbreak was reported in Congo with lower case fatality ratio and more attack rate.(4)
- A concurrent outbreak of chickenpox and monkeypox was found, which could explain some changes in transmission.
- Since 2017, Nigeria has experienced more cases over 500 suspected cases and over 200 confirmed cases with a case fatality ratio is 3%.(5)
- In 2003, beside the Africa the first human monkey pox virus case have been reported in United states of America which has contact with infected pet prairie

dogs .These pets had been imported into country from Ghana. This outbreak leads to over 70 cases in U.S.

- From 2018-2021 Monkey pox virus cases have been reported travellers from Nigeria to Israel, United Kingdom, Singapore and U.S.(6)
- In the year 2022, multiple cases were identified in several non- endemic countries.
- Still some studies are conducted to understand the epidemiology, sources of infection, transmission patterns of monkeypox virus.

SOURCES OF INFECTION

- Monkey pox virus can be transmitted from animals to humans occur from direct contact with the blood, body fluids or mucosal lesions of animals.
- The evidence from Africa shows that monkeypox virus has been found in many animals but the natural reservoir of monkeypox was not identified through rodents is found most likely.
- Eating inadequately cooked food and other products from infected animals are the possible risk factors.(7)
- People who are living in or near at forests may have direct exposure to infected animals.
- Human- Human transmission can result from close contact with respiratory secretions, skin lesions of infected persons.(8)

- Transmission through respiratory droplets can mostly occur in health workers, household members, and other close contacts of active cases from face to face contact.
- Monkey pox virus can also transmitted from mother to child who leads to congenital monkeypox and the transmission can also occur through sexual transmission. Studies are needed to better understand this risk.(9)

SIGNS AND SYMPTOMS

Incubation period: interval from infection to onset of symptoms

- Monkey pox is usually lasts from 6-13 days.
- It ranges from 5-21 days.

Infection can be divided into 2 periods:

1. Invasion period – lasts between 0-5 days
 - It involves fever
 - Intense headache
 - Back pain
 - Muscle aches
 - Reduced energy.
2. Lymphadenopathy –it is compared to other disease to similar to chickenpox, smallpox.
 - Usually begins within 1-3 days appear of fever.
 - Rash tends to be more concentrated on the face.
 - The case fatality Of Monkey box has hysterically range 0-11%.
 - In recent times the case fatality ratio --around 3-6%.

DIAGNOSIS

To detect the clinical differential diagnosis must be include other rash illness such as chickenpox .Bacterial skin infections : scabies, syphilis, medication related allergies .The distinguishing between monkey pox and the chicken pox is clinical feature of lymphadenopathy during the prodromal stage of illness .In case of monkey pox suspect ,the health workers should collect an appropriate sample and have it transported safely to a lab with appropriate capability .The type and quality of the specimen and the type of laboratory testing conducted Confirms the monkey pox. Thus specimens should be packaged and shipped in accordance with national and international requirements.(10)

The accuracy and sensitivity of the monkey pox is diagnosed with polymerase chain reaction PCR. Because of the short duration of viremia Related to timing of specimen collection after symptoms Begin So PCR blood tests are usually inconclusive and should not be collected routinely from the patient .Skin lesions can also be taken as diagnostic samples for and diagnosis of monkey pox And this lesions samples must be stored in a dry sterile tube and captain cold .The false positive results are seen in those who are vaccinated before smallpox eradication or more recently vaccinated due to higher risk such as orthopoxvirus .Interpretation of test results include the patients information be provided with the specimens including date of onset of fever ,date of onset of rash ,date of specimen collection ,current status of the individual and age

A diagnosis of a monkeypox infection required positive presence of monkey pox virus DNA using polymerase chain reaction (PCR) and isolation of virus.

- The best specimens of PCR and isolation: skin lesion material
- Swabs of lesion surface/ fluid
- Crusts/ scabs
- Roofs of multiple lesions.
- Serology is not preferred method. Because of previously smallpox vaccinated individuals and other Orthopoxviruses

THERAPEUTICS

Most cases of monkeypox infections are self-limiting and symptoms will resolve on their own if rashes are left to dry or covered with a moist dressing to protect the area. Clinical care of monkeypox should be fully optimized to symptoms, complications and treat long term sequelae .Patients should be maintain nutritional status. Monkeypox and smallpox are similar, antiviral drugs that protect against smallpox also help prevent monkeypox .An antiviral agent know as tecovirimat .European Medicines Agency (EMA) that was developed for smallpox was licensed. It is used for patient care; tecovirimat should be monitored in a clinical research context with prospective data collection.

VACCINATION

Vaccination against smallpox was demonstrated through several observational studies about 85% affected in preventing monkeypox. Prior smallpox vaccination result in milder illness. Evidence of prior vaccination against smallpox usually found as scar on the upper arm. At the present time smallpox vaccines are no longer available to the general public. A still newer vaccine based on modified attenuated vaccinia virus was approved the prevention of monkeypox in 2019.This is two dose vaccine which availability remains limited. Smallpox and monkeypox was developed based the vaccinia virus to cross protection for the immune response to Orthopoxviruses.The U.S.government has two vaccines to protect against monkeypox.

- JYNNEOS is the vaccine to protect against monkeypox, two dose vaccine.
- ACAM2000 an alternative to JYNNEOS, single dose vaccine. But it having more side effects and adverse effects than JYNNEOS.
- The U.S. Centres for Disease Control and Prevention (CDC) advised vaccination for people who have been exposed to monkeypox or who are more likely to get monkeypox.

Many years of research ended up with development of safer and newer vaccines for eradication of smallpox and there are also being used to treat monkeypox among them only two are approved (MVA-BN and LC16).These are to be used in people who are at risk of developing monkeypox or the one who are in contact with someone who has monkeypox .At this time mass vaccination is not suggested .Vaccine immuno globulin (VIG)and antiviral are advised .Tecovirimat(TPOXX)is an antiviral which is actually used in treating smallpox was approved to treat monkeypox in January 2022 primarily in Canada also investigating to make use of other antivirals such as Cidofovir,Brincidofovir and Tecovirimat .For those who are in contact with cases ,post exposure prophylaxis(PEP)with a second or third generation

vaccine is recommended .this vaccine is given within four days of first exposure and up to 14 days when there is absence of symptoms .It is mostly recommended in health care workers and laboratory staff who have greater chance of developing monkey pox.

PEOPLE WHO ARE MOST LIKELY TO BE EXPOSED INCLUDE

Health care workers who caring for patients with monkeypox (2 doses of vaccine)

Men who are gay: having multiple partners

People who are in close contact with the patients.(vaccination within 4 days of contact also can be given up to 14 days after)

PREVENTION

The prevention strategies for monkeypox include awareness of risk factors and acknowledge of people about the measures they can take to reduce exposure to treat virus. Scientific studies are carried out to assess the feasibility and appropriateness of vaccination for prevention and control of

monkeypox. Vaccination policies are created by some countries for healthcare workers.

Wash your hands with soap and water regularly or use sanitizer

Healthy sexual partner and knowing about their health

Do not share towels or razors with infected people

Do not have close contact with the persons having monkeypox

Stay away from infected animals

Take necessary precautions while travelling to more prevalent areas with monkeypox

CONCLUSION

The conclusion of the review article after Extensive literature search Highlighted that though many vaccines are being used for monkey pox which are actually intended for treating smallpox and with the support of some antiviral drugs there is no accurate vaccine for the treatment of monkey pox. And the signs and symptoms may vary according to patient condition and the stage the virus affected.

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