

Human monkeypox: An update on knowledge and future implications

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Monkeypox is a viral zoonotic disorder caused by a linear enveloped double-stranded DNA virus that belongs to the *Orthopoxvirus* genus of the *Poxviridae* family. It is the same family to which Smallpox causing virus belongs, that was eradicated in 1980, and that's why the symptoms are analogous to smallpox patients reported in the past; however, it is clinically less severe.^[1] Monkeypox is primarily prevalent in certain parts of central and west Africa particularly in regions of tropical rainforests; however, it is gradually appearing in urban areas too.^[2] The United Kingdom Health Security Agency (UKHSA) reported two cases of monkeypox virus on May 14, 2022 in the UK and the most alarming thing is that these two cases had no relation to another case of monkeypox imported from Nigeria that was reported on May 07, 2022,^[2,3] indicating that this virus may change its forms. On May 25, 2022, the UKHSA reported a total of 118 confirmed cases with human monkeypox in the European Union countries which were further elaborated by the WHO,^[2,3] which include 51 confirmed cases maximum in Spain, followed by 37 cases in Portugal, six cases in the Netherlands and the rest were reported in Italy, Germany, France, Belgium, Austria, Czech Republic, Denmark, Slovenia, and Sweden,^[3] indicating that the prevalence of human monkeypox is rapidly increasing in its non-endemic regions. The monkeypox virus was initially discovered in 1958 by a Danish virologist Preben von Magnus in crab-eating macaque monkeys and now it appears in two distinctive genetic clades, the Central African (Congo Basin) clade and the West African clade.^[4,5] The Central African clade is more contagious, harmful and is also responsible for severe disease. The geographical division between the two clades has so far been in Cameroon, the only country where both of these viral clades exist.^[6] Similar to other members of *Poxviridae*, monkeypox virus mainly causes disease in mammals. In addition to monkeys which are the natural host for this virus, it has also been isolated from rope squirrels, tree squirrels, Gambian pouched rats, and dormice.^[7] Conversely, ambiguity still persists on the natural history of monkeypox virus and supplementary studies are required to

identify the precise reservoir and how this virus distribution is maintained in nature. Contact with alive or dead animal for example through hunting and consumption of wild game or bush meat are known risk factors for transmission of this viral disorder.^[6] Human-to-human transmission of monkeypox can also occur particularly in regards to nosocomial and household transmission.^[6,7] Extensive epidemiological studies to trace the source of spread are under process, though astonishingly none of the infected cases thus far have revealed any travel history or link to endemic areas.^[8] On the basis of currently accessible data, the reported cases are largely but not solely among men who had sex with men seeking care in the primary care and sexual health clinics.^[9] The number of cases has been gradually inclining and it can be assumed that as more surveillance and epidemiological studies in its non-endemic areas will detect additional cases of monkeypox. Till date, all the infected cases reported in non-endemic regions are confirmed through molecular studies as being infected with the West African clade.^[10] One of the main reason of increased cases of Monkeypox globally can be attributed to the fact that historically, vaccination against smallpox had been shown to be provide immune defensive against monkeypox; however, as smallpox vaccination campaigns were defunct globally after the disease was eradicated in 1980, this cross-protective immunity from smallpox vaccination is now only limited to old aged population, since large number of populations worldwide is under the age of 40 or 50 years, they are no longer benefited from the immune protection granted by smallpox vaccination programs in the past; hence, there is modest immunity to monkeypox among young generation of present era that is residing in non-endemic regions around the globe.^[11] After viral exposure, an incubation period of time from infection to symptoms for monkeypox is generally 7–14 days and can range from 5 to 21 days after which fever appears, which proceeds to development of rash after 1–3 days. The rash is red and flat macular as well as in the form of a blister or pustule and shedding off in the form of a crust. It begins on the face and then spreads to other parts of the body. The illness

typically lasts for 2–4 weeks.^[11,12] The preventive measures that can be undertaken to prevent the infection with monkeypox virus to spread in the community includes primarily to isolate the infected patient. Moreover, practicing hand hygiene by washing hands with soap and water or using an alcohol-based hand sanitizer after coming in contact with infected animals or humans, evading contact with animals that could serve as a potential host for the virus particularly those animals that are sick or that have been found dead in the regions, where cases of monkeypox have been reported.^[13] Furthermore, the use personal protective equipment when attending an infected patients, which includes gown, gloves, respirator, and eye protection and avoiding direct contact with fomites such as bedding or laundry that has been in contact with a sick animal or patient can contribute effectively in impeding the spread of this infection.^[14] The availability of vaccines to provide immunity against monkeypox should be taken into account and should be provided to close contacts and people who are at high risk such as health care workers. The strategy of “ring vaccination” to restrain the spread of the virus should be taken under consideration; this would vaccinate the close contacts of people who have been infected with monkeypox to interrupt the routes of transmission. Public health officials should be focused on contact tracing as soon as a suspected case is identified and inform those who may be most at risk for monkeypox infection with accurate information ideally within 24 h of identification, to stop further spread on priority basis because existing available evidence suggests that those who are most at risk are those who have had close physical contact with someone with monkeypox, while they are symptomatic. Awareness in the general population by providing public health advice regarding the transmission of disease, symptoms, and preventive measures through mass communication channels and social media should be initiated. These steps should be combined with targeting community engagement to the high-risk population groups who are working intimately with health-care providers, including sexual health clinics and civil society organizations. Risk communication should be informed by insights from social listening detecting public sentiment and should timely address possible rumors and misinformation. In cooperating with health authorities, implementation of an epidemiological surveillance system, in accordance with the highest global practices, to ensure sustainable efficiency and community protection from communicable diseases, and rapid

detection can contribute significantly in limiting the spread of this emerging disorder. Nevertheless, such outbreaks are also a reminder that health-care providers, as well as public health personnel and infectious disease specialists, must stay vigilant to the possibility of a novel or re-emerging disease when patients present with unusual manifestations.

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