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LETTER TO THE EDITOR

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# Marburg virus outbreaks in Africa

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**Abstract**

Marburg virus disease (MVD) is a zoonotic viral hemorrhagic illness, caused by a negative sense, single-stranded RNA virus which has an envelope. The Marburg virus belongs to the genus *Marburgvirus* of the family *Filoviridae*. Due to the similarities in clinical signs and symptoms seen in other viral hemorrhagic diseases, arboviral infections, and malaria, MVD is difficult to diagnose. On February 8, 2023, Equatorial Guinea declared the first case of the MVD, which was confirmed by the Institute Pasteur Laboratory, Dakar, Senegal. MVD had a fatality rate of up to 88% during this outbreak. About eight individuals who had suspected infections, as well as the individuals with the confirmed infection, passed away. This letter addresses the current and previous Marburg virus outbreaks in African nations and whether or not they may result in an epidemic. It also discusses the significance of effective biosecurity and quarantine in limiting the spread of a highly contagious illness like MVD in African population.

**Dear Editor,**

Marburg virus disease (MVD) is a zoonotic viral hemorrhagic disease. The disease has a morbidity rate of 50% and is among the most deadly viral infections (Zhao et al. 2022). The disease manifests similar clinical signs to Ebola and other viral hemorrhagic infections. Clinical symptoms manifest 2–21 days after the infection set in with chills, fever, headache, sore throat, myalgia, joint pain, and malaise. An infected individual may develop abdominal pain, nausea, vomiting, diarrhea, and fatigue, and this is followed by hemorrhagic fever such as mucosal bleeding, hemoptysis, hematochezia, and the appearance of maculopapular rashes around the body with prolonged fever (Shifflett and Marzi 2019). Marburg virus is a negative sense, single-stranded RNA virus with an envelope (Zhao et al. 2022), belonging to the genus *Marburgvirus* (Olejnik et al. 2019) of the family *Filoviridae*. According to epidemiologic data, Egyptian fruit bats (*Rousettus aegyptiacus*) are the primary natural reservoir of Marburg virus (Kajihara et al. 2019). Infections with MVD have commonly been connected to entering Egyptian fruit bat-inhabited caves and mines (Olejnik et al. 2019). In relation to research conducted in Uganda, Egyptian fruit bats that live in caves can sustain Marburg virus with a variety of genetic makeup for a minimum of a few years (Kajihara et al. 2019). Human-to-human transmission occurs when infected individuals' body fluids come into direct contact with susceptible individuals through damaged skin or mucous membranes, as well as through contaminated surfaces and materials. In attending to patients with suspected or proven MVD, healthcare personnel have regularly become infected. Also, direct contact with the deceased's corpse during funeral rites has been linked to the spread of Marburg virus, and as long as the virus is present in a person's blood, they remain contagious (World Health Organisation 2021).

At the clinics, MVD is difficult to diagnose and misdiagnose with other viral hemorrhagic diseases, arboviral infections, and malaria due to similar clinical signs and symptoms associated with these conditions. But laboratory techniques are used in the diagnosis of the Marburg virus. Laboratory techniques like viral isolation, molecular techniques (such as reverse transcriptase real-time PCR), and serological tests (including ELISA) (Drosten

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et al. 2002). According to the World Health Organization, there is no vaccine available for the prevention of MVD, and four vaccine candidates are being reviewed for MVD and await trial (WHO Ready for Marburg Vaccine Trials 2023). This paper addresses the previous and recent MVD in African countries, and whether it will further cause outbreaks in other African countries after the known recent COVID-19. At an early stage, MVD has analogous clinical presentations to COVID-19, which might worsen the problem of MVD. This can also have a negative effect because it will cause diagnosis and the treatment of MVD individuals more complicated.

The first outbreak of MVD was recorded in 1967 in Marburg, Germany where researchers and technicians in the lab were experimenting with African green monkey tissue brought from Uganda in an attempt to develop a polio vaccine (Feldmann et al. 1996). Further outbreaks of the virus occurred at the same time in Frankfurt and Yugoslavia, where it was detected and characterized using electron microscopy, and it was given the name "Marburg virus" (Ristanović et al. 2020). Subsequent outbreaks keep occurring in African countries (Table 1). Starting from 1975 when the first outbreak occurred in Africa, Angola has recorded the highest cases of MVD up to date (Fig. 1). Unfortunately, there is no specific therapy available, but it is essential to use supportive treatment, which includes managing the patient's fluid and electrolyte balance, preserving blood pressure and oxygen levels, restoring lost blood and clotting components, and treating any exacerbating infections (Centre for Disease Control 2023).

In July 2022, three cases of MVD were recorded in the Ashanti area of Ghana, of which two mortality cases were recorded among the affected three individuals (World Health Organisation (WHO) 2023; Asad et al. 2020; Harris 2023). Recently, on 8 February 2023, the Institute Pasteur in Dakar, Senegal, declared the first instance of the MVD in Equatorial Guinea, which later had a case fatality rate of up to 88%. With nine laboratory-confirmed MVD cases documented, the Bata area in the Litoral province is the most afflicted (Republic of Tanzania declares Marburg Virus Disease (MVD) Outbreak 2023). A few days later, on 21 March 2023, the Republic of Tanzania's Ministry of Health notified of an MVD outbreak in the Bukoba district, Kagera area, and northwestern Tanzania. About eight confirmed cases and five mortalities (including one of a healthcare worker) have been reported, with a fatality rate of 63% (Reuben and Abunike 2023). Many of the cases that have been recorded have been associated with relationships, social gatherings, or proximity to one another. The various districts in which the outbreaks had occurred in Equatorial Guinea and Tanzania are major cities that have large numbers of people in the countries which contributes to the high incidence of MVD in these areas. Marburg virus spreads between people in these regions via direct contact (broken skin or mucous membranes) with the infected people with Marburg virus.

Considering the spontaneous outbreaks of MVD in 2023 in Africa (Fig. 1), which has led to the inter-countries' transmission of MVD between Equatorial Guinea, and Tanzania, it should serve as a wake-up call to all the neighboring countries to strengthen surveillance, refurbish their healthcare facilities and prepare against the current Marburg virus outbreak. A global reaction will be needed to combat the virus to stop it from spreading to other regions of Africa and becoming an epidemic. All preventable and control measures used against COVID-19 from 2019 to 2023 should be used to contain the spread of this deadly virus (Asad et al. 2020).

In order to end the sporadic waves of Marburg disease from being spread to other African countries, its threat should be treated with urgency. We recommend the following recommendations;

At present, most Marburg virus outbreaks are found in Africa (Reuben and Abunike 2023). A holistic approach is needed from all governments and healthcare practitioners in combating this disease. Also, good biosecurity and quarantine are crucial tools in preventing the occurrence of a highly infectious disease like MVD in the population, we recommend its usage in Africa. Furthermore, educating the public about the disease is also important, healthcare workers should also be trained on sample handling and patient management. They should be provided with adequate personal protective equipment since they are at high risk of infection. Moreover, vaccine research and development against MVD should be rapid and made available to everyone in Africa.

**Table 1** Countries with past and present Marburg virus disease outbreaks in humans

| Countries | Year of the outbreak | References |
|---|---|---|
| South Africa | 1975 | Gear et al. (1975) |
| Kenya | 1980–1987 | Kuzmin et al. (2010) |
| Democratic Republic of Congo (DRC) | 1998–2000 | Bertherat et al. (1999) |
| Angola | 2004–2005 | Smetana et al. (2006) |
| Uganda | 2007 | Adjemian et al. (2011) |
| Uganda | 2012–2017 | Siya et al. (2019) |
| Guinea | 2021 | Makenov et al. (2023) |
| Ghana | 2022 | Denkyira et al. (2022) |
| Equatorial Guinea | 2023 | Centre for Disease Control (2023) |
| Tanzania | 2023 | Centre for Disease Control (2023) |

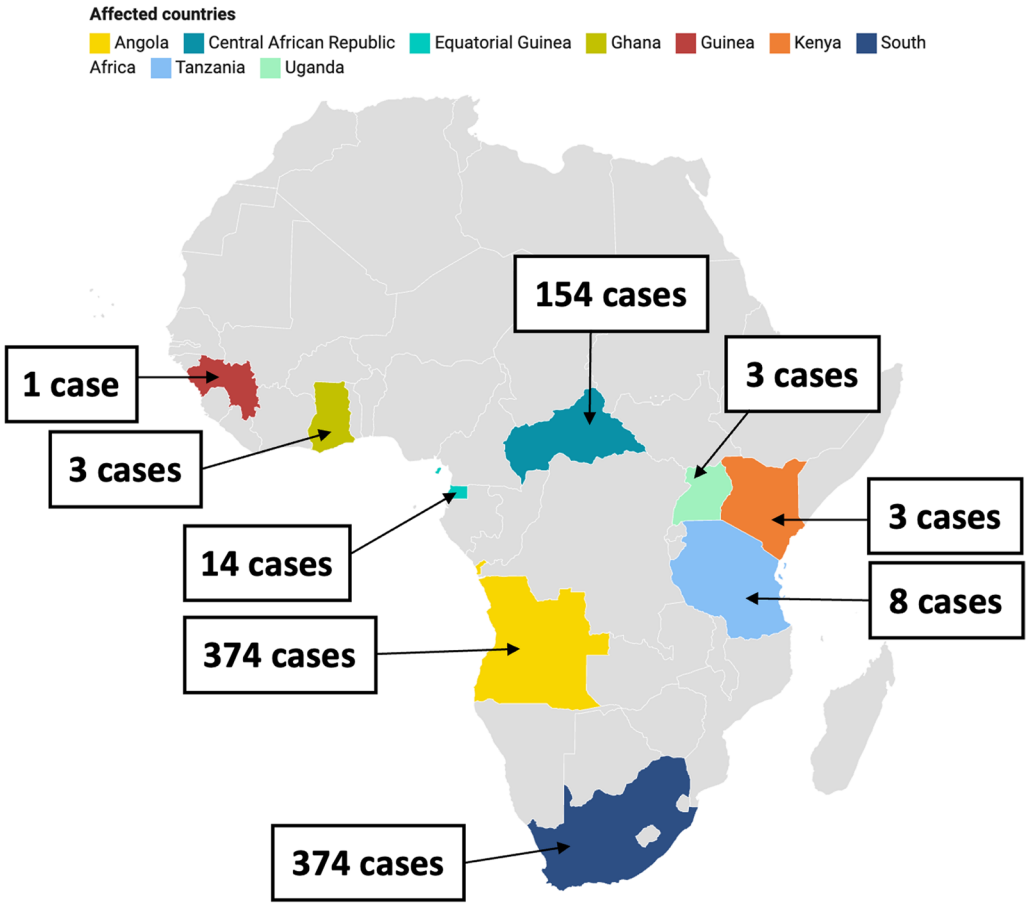


**Fig. 1** Number of cases of Marburg virus diseases in 9 African countries (South Africa, Kenya, Democratic Republic of Congo, Angola, Uganda, Guinea, Ghana, Equatorial Guinea, and Tanzania)

In conclusion, half of all deaths in African countries are caused by infectious diseases such as MVD. To this note, strict public biosecurity measures used to combat COVID-19 should be adapted to control the ongoing Marburg virus outbreak in Africa.

**Abbreviations**

| | |
|---|---|
| MVD | Marburg virus disease |
| PCR | Polymerase chain reaction |
| ELISA | Enzyme-linked immunosorbent assay |
| DRC | Democratic Republic of Congo |

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