ARTICLE **LETTER TO EDITORS**

Marburg Virus Disease: The Current Status of an Urgent Threat and Preventive Measures in Jordan

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DEAR EDITOR,

We would like to draw attention to the significant impact of Marburg virus disease (MVD), formerly known as Marburg hemorrhagic fever, a highly lethal hemorrhagic fever caused by the Marburg virus, a member of the Filoviridae family. With several outbreaks reported in Africa, MVD remains a grave concern for public health. Recent outbreaks in Equatorial Guinea and Tanzania have raised alarm bells, highlighting the urgent need for preventive measures and improved understanding of this deadly virus.(1)

Initially identified during an outbreak in Marburg, Germany, and Belgrade, Serbia in 1967, MVD has since caused devastating epidemics in various regions of Africa. Rousettus aegyptiacus bats are considered natural hosts for the virus, further complicating efforts to control its spread. (2) Since the first outbreak, up to 2017, 652 identified cases have been reported, with the most severe wave being in 2005 in Angola, involving 374 cases and 329 deaths, according to WHO. (Table 1)(3)

The clinical presentation of MVD is characterized by severe symptoms, including nausea, vomiting, chest pain, sore throat, abdominal pain, and diarrhea. As the disease progresses, symptoms worsen and can involve jaundice, pancreatic inflammation, weight loss, delirium, shock, liver failure, massive hemorrhaging, and multi-organ dysfunction. Prompt diagnosis is essential but challenging, as the clinical picture overlaps with other diseases such as malaria, typhoid fever, shigellosis, meningitis, and other viral hemorrhagic fevers. (4) therefore, diagnosis can only be confirmed by laboratory testing such as Antigen-capture enzyme-linked immunosorbent assay (ELISA), polymerase chain reaction (PCR), and IgM-capture ELISA. (2)

The incubation period can vary anywhere from 2 to 21 days, and most symptoms begin on the 3rd day of incubation. (1) most patients show hemorrhagic manifestations, and bleeding from various sites leading to shock which has been the leading cause of death in Marburg virus disease, usually happening on the 8th or 9th day of incubation, fresh blood can be seen in feces and vomitus, and bleeding sites include gums, nose, and vagina.

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Table 1. Most updated outbreaks reported as of May 26, 2023

Variable	Year	Cases	Deaths	Fatality Rate (%)
Marburg, Germany, and Belgrade, Serbia	1967	31	7	22.6%
Yugoslavia	1967	2	0	0%
South Africa	1975	3	1	33%
Kenya	1980	2	1	50%
Kenya	1987	1	1	100%
Russia	1990	1	1	100%
Democratic Republic of the Congo	1998	154	128	83%
Angola	2004-2005	374	329	87.8%
Netherlands (ex-Uganda)	2008	1	1	100%
United States of America (ex-Uganda)	2008	1	0	0%
Uganda	2007	4	2	50%
Uganda	2012	15	4	26.7%
Uganda	2012	1	1	100%
Guinea	2014	28	25	89.3%
Uganda	2017	4	3	75%
Guinea	2021	1	1	100%
Ghana	2022	3	2	66.7%
Equatorial Guinea*	2023	17	12	70.5%
Tanzania*	2023	9	6	66.6%
Total		652	524	80.3%

The only modality of treatment that has been identified for MVD is supportive hospital therapy, which includes rehydration, oxygenation, replacement of lost blood and clotting factors, and treatment of symptoms. (5) however, some trials have suggested that Favipiravir, a broad-spectrum antiviral drug, was used to treat the Ebola virus disease (EVD) in the West African outbreak, achieved promising results when it was administered intravenously to six cynomolgus macaques challenged with the virus, five of which survived the infection. when it comes to vaccines, some have shown promise in animal studies, but none of them have been tested in humans yet. In May 2020, the European Medicines Agency (EMA) approved two vaccines, Zabdeno and Mvabea, for the prevention of Ebola virus disease (EVD). Mvabea contains a modified virus called Vaccinia Ankara Bavarian Nordic (MVA), which has been engineered to produce four proteins from the Zaire ebolavirus and three other filoviruses. The vaccine has the potential to protect against MVD, but its effectiveness has not been proven in clinical trials. (6)(7)

Control of the outbreak of the virus lies in good preventative measures to reduce human transmission. those measures include prevention of direct human-to-bat contact which is the natural host of the Marburg virus, and prevention of human-to-human contact with diseased individuals (8), as The virus spreads through contact with broken skin or mucous membranes in the eyes, nose, or mouth, as well as contact with blood or body fluids such as urine, saliva, sweat, feces, vomit, breast milk, amniotic fluid, and sperm from a person who has Marburg virus disease or has died from it. (8) separation of healthy individuals from diseased individuals is a key preventative measure to ensure that no further spread of the disease occurs.

MVD has recently been detected in several African countries, with outbreaks occurring in Equatorial Guinea and Tanzania. In Equatorial Guinea, the Ministry of Health and Social Welfare declared an MVD outbreak on February 13, 2023, following reports of suspected viral hemorrhagic fever deaths between January 7 and February 7, 2023. On February 12, a case tested positive for the Marburg virus at the Institute Pasteur in Dakar, Senegal (9). In Tanzania, the Ministry of Health announced an MVD outbreak on March 21, 2023, after identifying the Marburg virus through real-time polymerase chain reaction (RT-PCR) in clinical samples collected from patients in the northwest Kagera region. These recent outbreaks follow a similar pattern observed in previous MVD outbreaks. Without effective preventative measures, there is a risk of an increase in the number of cases and the potential for larger outbreaks, especially in areas where individuals encounter the natural host and infected individuals.

It has been noted that the virus does not pose a direct threat in Jordan due to the lack of direct flights between Jordan and South Africa, and because the natural hosts of the virus, Rousettus aegyptiacus, are not present in Jordan, But the WHO has warned that the virus could spread to the region, as it is carried by bats that are found in Africa and Asia. In terms of preventive measures, the Jordan Center for Disease Control advocated increasing awareness among medical staff and isolating persons with a history of

travel to contaminated locations, as well as any other suspected cases. The center emphasized the necessity of following hygiene standards, washing hands often, and ensuring safe injection procedures. (10)

In conclusion, the threat of the Marburg virus disease persists, requiring global collaboration and concerted efforts to prevent its spread. Enhancing surveillance, implementing strict preventive measures, and investing in research for potential treatments and vaccines are essential to mitigate the susceptible impact of MVD on public health.

AUTHORS' CONTRIBUTIONS

MJ Conceptualization, Project administration, Investigation, Writing - Review & Editing, and Supervision.

JH Investigation, Writing - Original Draft, Project administration, and Editing.

MAJ investigation and Writing - Review & Editing.

IMK investigation, Writing - Original Draft, and Writing - Review & Editing.

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