


# Recent outbreak of Marburg virus disease: Could it be a threat for global public health?

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## KEYWORDS

disease outbreaks, Marburg virus, Marburg virus disease, Marburgvirus, public health

## 1 | BACKGROUND

A dangerous communicable infection known as the Marburg virus disease (MVD) has just been detected in Ghana following two fatalities, creating concern and adding to the strain on already overcrowded health-care facilities brought on by the coronavirus disease 2019 (COVID-19) pandemic.<sup>1</sup> Marburg virus and Ebola virus are negative-sense RNA viruses from the filovirus family.<sup>2</sup> MVD is one of the most dangerous infectious diseases worldwide and has a fatality rate of up to 90%.<sup>3</sup> It has been linked to several outbreaks since its simultaneous identification and characterization in 1967 in Marburg and Frankfurt, Germany, as well as in Belgrade, Serbia.<sup>4</sup> A few documented cases of MVD have been reported in Africa from 1975 to 1985. Until 1998, MVD was not considered as fatal as the Ebola virus. This opinion altered when MVD came back in two significant breakouts in the Democratic Republic of the Congo (DRC) in 1998–2000 and subsequently for the first occasion in Angola in 2004–2005. MVD has been exposed as a serious threat to public health (fatality rate of 83%) in the DRC and Angola (fatality rate of 90%) like the Ebola virus.<sup>5</sup> In the recent past, the Marburg virus outbreaked in various parts of Africa. There have been four prior epidemics in Uganda, with case fatality rates ranging from 27% to 100% in 2007, 2012, 2014, and 2017. The Republic of Guinea detected its first Marburg virus-infected patient in August 2021, and the death of that patient was confirmed by the respected Ministry, seeming it was the first case of MVD in West Africa.<sup>3</sup> On the other hand, Ghana has declared the very first Marburg virus epidemic in the nation after gathering samples from two men, ages 26 and 51, who

were stated dead on June 27 and June 28, 2022, respectively.<sup>1</sup> According to our opinion, the health-care authorities across the world should be on alert and take necessary initiatives before the MVD becomes an outbreak/pandemic like monkeypox/COVID-19. In the case of COVID-19, initially, China identified two distinct novel strains of coronavirus, severe acute respiratory syndrome-associated coronavirus-2 (SARS-CoV-2). From November 2002 to August 2003, the SARS-CoV was able to infect roughly 8422 persons before spreading to 32 other areas or nations, with a mortality rate of 11% and 919 SARS-related fatalities.<sup>6</sup> But such a scenario could not appeal for taking measures until the SARS-CoV-2 emerged in December 2019. In less than 3 months, the SARS-CoV-2 spread to 25 different countries, and about 73,230 people were infected by the new variant, causing 181 deaths with a 2.6% fatal rate.<sup>6</sup> These effects compelled the World Health Organization to designate the situation as a pandemic and a worldwide health emergency on March 11, 2020.<sup>7</sup> To avoid similar consequences and restrain the Marburg virus from being a pandemic, it is time to awake and take the necessary steps.

## 2 | TRANSMISSION, SYMPTOMS, AND DISEASE SEVERITY

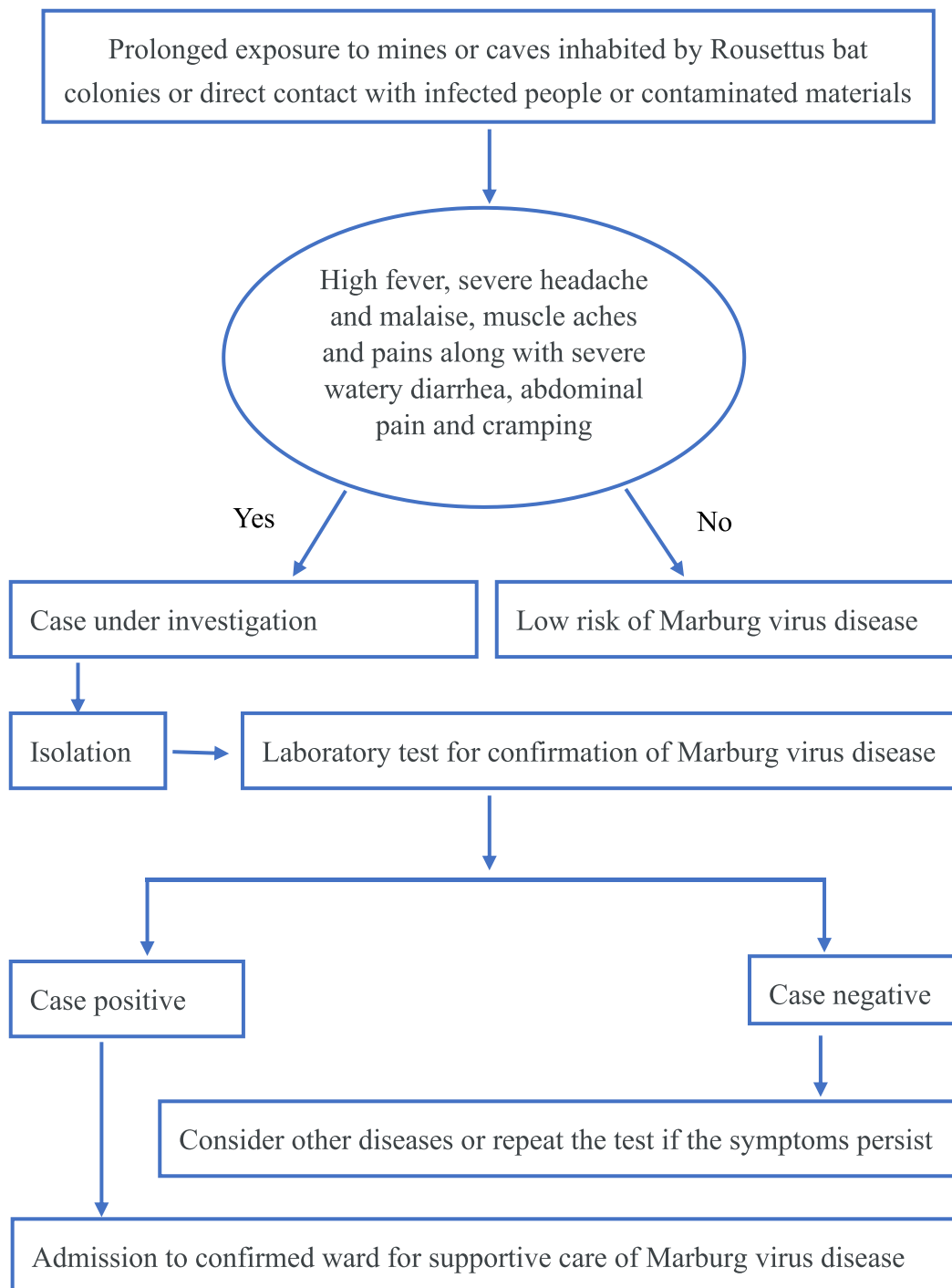
Direct human-to-human transmission of the fatal Marburg virus is possible by contact with blood, secretions, bodily fluids, and tissues of infected individuals or dead bodies, with unprotected contact in the home or health-care facilities accounting for the bulk of

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transmissions.<sup>8</sup> Despite the lack of evidence for direct airborne spreading in human epidemics, droplet distribution to mucosal membranes is likely to occur because animal models have shown this type of transmission.<sup>2</sup> In the case of Marburg virus, it can be transferred sexually, and studies on the Ebola virus have revealed that viral RNA may be found in semen for up to 407 days.<sup>9</sup> One incidence of a live virus has been documented as being isolated from the aqueous humor of a human survivor infected more than 2 months

ago.<sup>2</sup> People who are infected are not viremic before the emergence of the early symptoms, which can take between 2 and 21 days of incubation.<sup>10</sup> After the incubation period, individuals typically develop sudden illnesses with vague symptoms such as fever, headache, chills, myalgia, diarrhea, and vomiting, followed by the failure of multiple organs. Hemorrhagic fever syndromes though a crucial disease indication. Because they resembled more widespread illnesses like malaria and typhoid, early instances may be overlooked.



**FIGURE 1** Epidemiological flow chart of Marburg virus disease

When a case is deadly, the average time it takes for death to occur after the beginning of symptoms is 9 days. Severe metabolic disruption, tachypnea, convulsions, coma, and shock are often the symptoms of the infection that cause death.<sup>11</sup> Individuals are treated for particular symptoms or through rehydration with oral or IV fluids to enhance survival. We have presented the epidemiological flow chart for MVD in Figure 1. There is currently no recognized vaccine or antiviral medication for treating MVD.<sup>1</sup> A few documented cases of MVD have been reported in Africa are undergoing Phase I, II, and III clinical studies.<sup>12</sup> A standardized literature review reported that antiviral drugs such as Galidesivir, Favipiravir, and Remdesivir showed promising results with an 83% to 100% success rate when the drugs are given at a specific dosage regimen.<sup>2</sup> Though their efficacy is not fully proven against a large population, their usage is not yet approved by the Food and Drug Administration (FDA) or any other authorized organization.<sup>2</sup> In brief, when the Marburg virus comes into human contact, it only takes a few days to cause a deathly situation, and effective treatment is not available yet. Thus, it is more important to consider the outbreak of MVD as an alarming situation.

### 3 | REASONS FOR GLOBAL ALARM AND PREVENTIVE MEASURES

According to the present scenario, as the Marburg virus outbreaks recently in a few countries, it has the potential to rise as a pandemic crisis because the infection does not follow the regional boundary.<sup>13</sup> As per the recent outbreaks, the severity of the disease depends on the route of infection, available medical care, the virulence of the strain, infectious dose, and the overall health of the infected person. So, to combat the MVD, ensuring proper treatment is mandatory. By this time, to prevent occupational exposure, all staff with direct patient contact must use personal protection equipment (PPE) as directed, practice good hand hygiene, and only occasionally handle needles and sharps if necessary. Such procedures are essential for controlling epidemics in the future; thus, it is imperative to stop both primary infections and secondary transmission. The management of MVD patients should comprise various teams from different departments such as infectious disease, hospital medicine, intensive care, and public health departments. The Centers for Disease Control and Prevention in the United States, the UK Health Security Agency in the United Kingdom, and comparable organizations in other countries should become involved in finding solutions for MVD as soon as possible.<sup>14</sup> The health-care authorities should develop a program to educate the people traveling to the regions of MVD outbreaks and the patients regarding the recognizable signs and symptoms of the disease and how to prevent infection, which can help reign in the disease progression. At the same time, they should provide quarantine instructions and ensure the isolation of sick people when they get involved with the disease. Like the Ebola virus, the Marburg virus continues to threaten public health due to recent outbreaks. The need to continue learning about the illness and exploring potential therapeutic approaches is required. As the

anti-Ebola virus vaccine is already available and the Marburg virus and Ebola virus are from the same family, it may be possible to discover a vaccine for MVD within a short time if the global leadership, regulators, and vaccine manufacturers are willing to do so.<sup>15</sup> In the recent past, we saw a rapid discovery of the corona vaccines within a record shortest possible time.<sup>16</sup> The researchers should focus on detecting whether there is any virus mutation and come out with a solution to combat the MVD. In the case of a mass population, they should follow the rules and regulations imposed by the respected authorities, maintain personal hygiene and avoid close contact. It is high time to give equal attention to all infectious diseases by global health-care providers, researchers, and local governments. We need to work combinedly to eradicate such diseases and not let them expose to pandemics once again. Also, the continuous mutation of coronavirus is creating more burden on the global health-care systems.<sup>17–22</sup> Also, the recent upsurge of monkeypox infection has created panic worldwide.<sup>23–28</sup> In addition to these present miseries, MVD is creating additional challenges and burdens to the health-care authorities globally. MVD has been detected during the ongoing COVID-19 pandemic and multicountry monkeypox outbreak. There are some common overlapping symptoms of these three viral infections. Therefore, the global health-care authorities should develop and adopt differential diagnostic techniques for quick detection and isolation of cases. Also, they need to develop comprehensive preventive and interventional approaches to combat the recent upsurges of viral infections.

### 4 | CONCLUSION

The recent upsurge of the MVD with about 90% fatal rate created pressure on global public health just after the COVID-19 pandemic. The virus can be lethal as coronaviruses if the health-care authorities would not take appropriate measures right now. To avoid current and emerging infectious diseases, global health-care organizations should offer logistics to weakened health-care authorities. Several human exposures to Marburg virus and the disorganized nature of the material that is now accessible have made it difficult for policy-makers and researchers to develop practical guidelines for battling this disease. They have to find out a way for the betterment of global public health which will make it easier to control MVD and develop new medications and vaccinations. Considering the recent outbreaks of infectious diseases, researchers should be on alert about MVD. They need to conduct more studies to develop therapeutic and preventive agents to fight potential MVD. Also, further epidemiological studies are required to explore more precise nature, transmission, symptoms, diagnosis, and treatment of MVD.

#### AUTHOR CONTRIBUTIONS

**Md Sohan:** Conceptualization; writing – original draft. **Mohammad Shahriar:** Conceptualization; writing – original draft. **Mohiuddin Ahmed Bhuiyan:** Conceptualization; writing – review & editing. **Md Rabiul Islam:** Conceptualization; writing – review & editing.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

## ETHICS STATEMENT

It was an analysis of online available aggregate data. No Ethical approval was needed.

## TRANSPARENCY STATEMENT

The lead author Md. Rabiul Islam affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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## REFERENCES

- Hussain Z. Ghana declares its first outbreak of marburg virus disease after two deaths. *BMJ*. 2022;378:o1797. doi:10.1136/bmj.o1797
- Kortepeter MG, Dierberg K, Shenoy ES, Cieslak TJ. Marburg virus disease: a summary for clinicians. *Int J Infect Dis*. 2020;99:233-242. doi:10.1016/j.ijid.2020.07.042
- Okonji OC, Okonji EF, Mohanan P, et al. Marburg virus disease outbreak amidst COVID-19 in the Republic of Guinea: a point of contention for the fragile health system. *Clin Epidemiol Global Health*. 2022;13:100920. doi:10.1016/j.cegh.2021.100920
- Abir MH, Rahman T, Das A, et al. Pathogenicity and virulence of Marburg virus. *Virulence*. 2022;13(1):609-633. doi:10.1080/21505594.2022.2054760
- Brauburger K, Hume AJ, Mühlberger E, Olejnik J. Forty-five years of Marburg virus research. *Viruses*. 2012;4(10):1878-1927. doi:10.3390/v4101878
- Yang Y, Peng F, Wang R, et al. The deadly coronaviruses: the 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China. *J Autoimmun*. 2020;109:102434. doi:10.1016/j.jaut.2020.102434
- Tariku M, Hajure M. Available evidence and ongoing hypothesis on corona virus (COVID-19) and psychosis: is corona virus and psychosis related? A narrative review. *Psychol Res Behav Manag*. 2020;13:701-704. doi:10.2147/PRBM.S264235
- Nyakarahuka L, Shoemaker TR, Balinandi S, et al. Marburg virus disease outbreak in Kween district Uganda, 2017: epidemiological and laboratory findings. *PLOS Negl Trop Dis*. 2019;13(3):e0007257. doi:10.1371/journal.pntd.0007257
- Sissoko D, Duraffour S, Kerber R, et al. Persistence and clearance of ebola virus RNA from seminal fluid of ebola virus disease survivors: a longitudinal analysis and modelling study. *Lancet Glob Health*. 2017;5(1):e80-e88. doi:10.1016/S2214-109X(16)30243-1
- Kortepeter MG, Bausch DG, Bray M. Basic clinical and laboratory features of filoviral hemorrhagic fever. *J Infect Dis*. 2011;204(Suppl 3):S810-S816. doi:10.1093/infdis/jir299
- Asad A, Aamir A, Qureshi NE, et al. Past and current advances in Marburg virus disease: a review. *Infez Med*. 2020;28(3):332-345.
- Reynolds P, Marzi A. Ebola and Marburg virus vaccines. *Virus Genes*. 2017;53(4):501-515. doi:10.1007/s11262-017-1455-x
- Collins MH, Potter GE, Hitchings MDT, et al. EVITA dengue: a cluster-randomized controlled trial to EVAluate the efficacy of Wolbachia-Infected *Aedes aegypti* mosquitoes in reducing the incidence of arboviral infection in Brazil. *Trials*. 2022;23(1):185. doi:10.1186/s13063-022-05997-4
- Hunter N, Rathish B. *Marburg fever*. StatPearls. Treasure Island (FL): StatPearls Publishing; 2022.
- Jacob ST, Crozier I, Fischer WA 2nd, et al. Ebola virus disease. *Nat Rev Dis Primers*. 2020;6(1):13. doi:10.1038/s41572-020-0147-3
- Abecasis F. The benefits of COVID-19 vaccination programmes for children may not outweigh the risks. *Acta Paediatr*. 2022, 111, 1843-1845. doi:10.1111/apa.16430
- Mohapatra RK, Tiwari R, Sarangi AK, Islam MR, Chakraborty C, Dhama K. Omicron (B.1.1.529) variant of SARS-CoV-2: concerns, challenges, and recent updates. *J Med Virol*. 2022;94(6):2336-2342. doi:10.1002/jmv.27633
- Daria S, Islam MR. The SARS-CoV-2 omicron wave is indicating the end of the pandemic phase but the COVID-19 will continue. *J Med Virol*. 2022;94(6):2343-2345. doi:10.1002/jmv.27635
- Islam MR, Hossain MJ. Detection of SARS-CoV-2 omicron (B.1.1.529) variant has created panic among the people across the world: what should we do right now? *J Med Virol*. 2022;94(5):1768-1769. doi:10.1002/jmv.27546
- Daria S, Bhuiyan MA, Islam MR. Detection of highly muted coronavirus variant omicron (B.1.1.529) is triggering the alarm for South Asian countries: associated risk factors and preventive actions. *J Med Virol*. 2022;94(4):1267-1268. doi:10.1002/jmv.27503
- Islam MR. The SARS-CoV-2 omicron (B.1.1.529) variant and the re-emergence of COVID-19 in Europe: an alarm for Bangladesh. *Health Sci Rep*. 2022;5(2):e545. doi:10.1002/hsr2.545
- Islam S, Islam T, Islam MR. New coronavirus variants are creating more challenges to global healthcare system: a brief report on the current knowledge. *Clin Pathol*. 2022;15:2632010X2210755. doi:10.1177/2632010X221075584
- Rabiul Islam M, Hasan M, Rahman MS, Rahman MA. Monkeypox outbreak—no panic and stigma; only awareness and preventive measures can halt the pandemic turn of this epidemic infection. *Int J Health Plann Manage*. 2022;37:3008-3011. doi:10.1002/hpm.3539
- Islam MR, Asaduzzaman M, Shahriar M, Bhuiyan MA. The spreading of monkeypox in nonendemic countries has created panic across the world: could it be another threat? *J Med Virol*. 2023;95(1):e27919. doi:10.1002/jmv.27919
- Akter MS, Sohan M, Islam MR. The rapid spreading of monkeypox virus is a threat for global public health: what should we do to fight this old enemy. *Health Science Reports*. 2022;5(6):e876. doi:10.1002/hsr2.876
- Chowdhury PPD, Haque MA, Ahamed B, Tanbir M, Islam MR. A brief report on monkeypox outbreak 2022: historical perspective and disease pathogenesis. *Clin Pathol*. 2022;15:2632010X2211316. doi:10.1177/2632010X221131660
- Islam MR, Hossain MJ, Roy A, et al. Repositioning potentials of smallpox vaccines and antiviral agents in monkeypox outbreak: a rapid review on comparative benefits and risks. *Health Science Reports*. 2022;5(5):e798. doi:10.1002/hsr2.798
- Sohan M, Akter MS, Islam MR. Expedition of monkeypox virus from Africa to rest of the world: what has made this old foe so powerful. *Ann Med Surg*. 2022;82:104688. doi:10.1016/j.jamsu.2022.104688