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REVIEW ARTICLE

An outbreak of Marburg virus disease: World Health Organization

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ABSTRACT

In this review, we discussed in brief about the recent emergency update released by the World Health Organization (WHO) (July 22, 2022) on Marburg virus disease (MVD). This virus was first identified in some African countries in 1976 as hemorrhagic fever. This was noticed that year during a series of Marburg virus (MARV) infections in German cities as well as in the Yugoslav capital of Belgrade. The epidemic was linked to research involving African apes transported from Uganda. To complete this review, we used previously published studies related to this disease and a regular visit to the WHO's official website to know the current status of MVD. Information was collected from Google scholar, PubMed, Research gate, and national library of medicine from September 2022 to December 2022. The main objective of this study is to provide current information on MVD to researchers, practicians, health-care professionals, and academicians due to awareness. If people know about that disease, only then can they handle and prevent it themselves. For this, we include the pathogenesis of the disease, epidemiology status, symptoms of the disease, how to diagnose according to the WHO guidelines, possible treatments according to the WHO, and a brief comparison of COVID-19 and MARV. This is a needful study for future perspective because if no one takes it seriously, then maybe in the future, it will become a severe pandemic like COVID-19.

KEY WORDS: COVID-19, Epidemiology, Marburg virus disease, Marburg virus, Pathogenesis, World Health Organization

INTRODUCTION

In this paper, we provide the current information based on recent emergency news related to the Marburg virus (MARV), which was released on July 22, 2022 at the World Health Organization (WHO)'s official website.[1] MARV, first identified in 1967, belongs to the family Filoviridae (Ebola virus). Both are clinically similar and with high fatality rates, with a mortality rate is more than 90% in the infected person. From the structure view, this virus has two genes that are separated by 5–98 nucleotide-long intergenic regions. These genes stop the signal and the transcription where the movement starts and share a 5-nucleotide overlapping sequence, and this is an enclosed, fibrous pathogen with only a false RNA genome weighing approximately 4.2 × 6.[2,3] The virus assembly RNA is just not pathogenic because it does not attach to cellulose.[3,4] This virus can cause severe hemorrhagic fever in an infected person.[1-3] This disease was linked to research involving African apes, which were transported from Uganda. During that research, two people were infected even though the symptoms had not been particularly concerning during the first 3–4 days. However, studies show that signs or symptoms emerge by the end of the first week, and in some situations, deaths occur from severe internal bleeding

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the next day after being admitted to the hospital.[5] Other instances were discovered in 2008 among visitors to a cellar in Uganda occupied by bat dominions.[6] Once infected, the virus could transmit through human exposure through direct contact with diseased people's blood, mucus, organs, or other bodily fluids, as well as surfaces and materials contaminated with these fluids.[7] MARV disease (MVD) was previously identified as Marburg hemorrhagic fever (MHF). This serious, potentially deadly illness affects humans, and this virus can also lead to severe viral hemorrhagic fever.

The average mortality rate of cases is around 65%. Previously, deaths ranged from 24% to 88%, based on infectious agents and treatment planning. There is presently no licensed treatment that has been proven to neutralize the virus. Still, a variety of blood components, immune therapies, and drug treatments are being developed for this virus.[8] Bats of the Pteropodidae family are thought to be the intermediate host of this virus. It is spread to people by bats and continues to spread through human-to-human transmission. The involvement of the community is critical to the successful control of occurrences by knowledge about this disease.[9] In this review, we focused on pathogenesis, how it can affect a person and transfer from person to person, clinical aspects of this virus and mechanism of actions, pharmacology, and the epidemiology of this disease. We have also discussed the current guidelines to cure form this virus disease according to the current WHO outbreak.

METHODS

This review concluded from current MARV-specific publications and information used for Google search, Google scholar, PubMed, Research gate, WHO, Food and Drug Administration, national library of medicine, Journals, books, letters, newspapers, and other websites visited from September 2022 to December 2022. The main aim of this review is to provide current information related to this virus from already published different types of data and most information collected from the WHO outbreaks and emergencies. We have used more than 50 pre-published studies, books, articles, news, and WHO outbreaks to complete this study.

EPIDEMIOLOGY

This illness is an epidemic disease with a high case mortality ratio of about (25–89%) due to the commonality in clinical symptoms, it is challenging to differentiate it from many other tropical febrile diseases in the early stages of the disease. Even though there are no authorized vaccines or antiviral treatments for the virus, supportive care such as rehydration with oral or intravenous fluids and treatment of specific symptoms improves survival. Various potential treatments are being investigated, including blood products, immune therapies, and drug therapies. It spreads by contact with contaminated host or reservoir materials (droplets, blood, tissues, and cells). In the instance of the Ugandan apes transported into Marburg, laboratory technicians became sick after touching the apes' tissues and blood. Human-to-human infection can also be transmitted by direct contact (through damaged skin) with diseased people (blood, saliva, and organs) or other body fluids, as well as surfaces and objects.[10]

PATHOGENESIS

MVD is a zoonotic illness, and the main transmission source (natural) of MARV is the fruit bat Rousettus aegyptiacus. Aside from that, Hipposideros caffer and various Chiroptera can be an infection source. This virus strains can be transmitted from bat to bat in a variety of ways. A recent study revealed the identification of viral transmission in oral and rectal samples, as well as urine, of bats infected with the disease, and it was discovered that this virus is present in the blood and mouth samples of bats in interaction. Thus, our study establishes the horizontal spread of the disease from infected bats to in-contact bats.[11] Intermediate hosts, such as National Health Policies (NHPs) and animals slaughtered for bushmeat, may potentially operate as major vectors of viral transmission. However, the illness might be transferred to humans and NHPs through bat secretions (saliva) and excretions (feces and urine), as well as through fruits infected with MARV.[12,13] MARV may be transmitted to humans in the initial phases of illness through infected intermediate animals. Sexual contact may potentially transmit MVD, as MARV antigens have been identified in the sperm of affected males. Direct contact with blood, as well as other bodily fluids such as urine, feces, tears, breast milk, and so on, can enhance human-to-human transmission. The possibilities of transmission rise due to the administration of health-care services to virus-infected patients, health-care professionals being sick, and incorrect handling of human corpses.[14,15] It is vital to highlight that in some cases, hemorrhage does not occur during the sickness. In severe situations, a person may die after a few days following the commencement of clinical indications.[16] MARV enters the body through damaged skin, causing damage to many different kinds of tissues and organs. Finally, hemorrhagic fever manifests itself.[9] This virus generally enters the body through chapped skin, causing harm to various cells and organs, resulting in MHF. Due to the village and serious environment among most occurrences in Africa, there are few clinical examination explanations of MVD, and the accessibility of pathophysiologic and research laboratory information from sick people is restricted.[17] Different conditions from this illness could also cause psychological signs such as uncertainty, irritability, hypersensitivity, muscle spasms, and deep sleep. All sick people in the

initial confrontation in Marburg were defined as scowling, false, and mildly aggressive.[18,19] Sick people may recover or die from excessive water loss, internal bleeding, organ damage, and other combinations, such as immune system dysfunction due to the virus. Patients who survive typically do not have severe delayed signs. Still, they may have side effects such as joint pain, eye infections, muscle aches, and psychotic symptoms during and following recovery.[18-20] Investigations of cell cultures from people who survived show that t lymphocytes build an appropriate adaptation to reinfection. Furthermore, IgG replies had been observed in blood serum from people who survived.[3] Figure 1 depicts a brief description of the pathophysiology of MARV infection.

SYMPTOMS

The symptoms caused by the MARV appear suddenly, with a high fever, dizziness, and severe lethargy. Muscle aches are common symptoms. After 3rd day, severe diarrhea, abdominal discomfort and cramping, nausea, and vomiting may occur. Diarrhea can last up to a week. Many patients can develop severe hemorrhagic manifestations during this stage, 5 and 7 days. Deaths typically can occur due to bleeding.

DIAGNOSIS

According to the WHO, an infection caused by the MARV can be diagnosed with specific methods, but it is complicated to differentiate some other diseases, such as typhoid and malaria. The following techniques are-

- Reverse transcription polymerase chain reaction
- Electron microscopy techniques
- Enzyme-linked immunosorbent assay – test
- Serum neutralization tests.

We can find out the Marburg infections using the given tests. Many more tests are available for detecting viral infection, but doctors most commonly use these tests. The diagnosis process is fundamental to identifying any disease and different viral infections have various diagnostic tests.[1,21,22]

TREATMENT AND PREVENTION

There are presently no accepted therapies or antimicrobial treatment methods for this disease. Some medical intervention, such as the absorption of water and therapeutic interventions of specific symptoms, does enhance preservation. There are some antibodies under development to cure these kinds of diseases. However, we can prevent this disease by following non-pharmacological methods such as maintaining physical distance, proper hygiene, and avoiding unnecessary contact. There are some other following as:-

- The risk of possible sexual transmission
- The risk of person-to-person transmission in the community
- Communities infected by Marburg
- The risk of bat-to-people transmission.

These are some parameters needed to reduce to improve the quality of life and also help reduce the overall

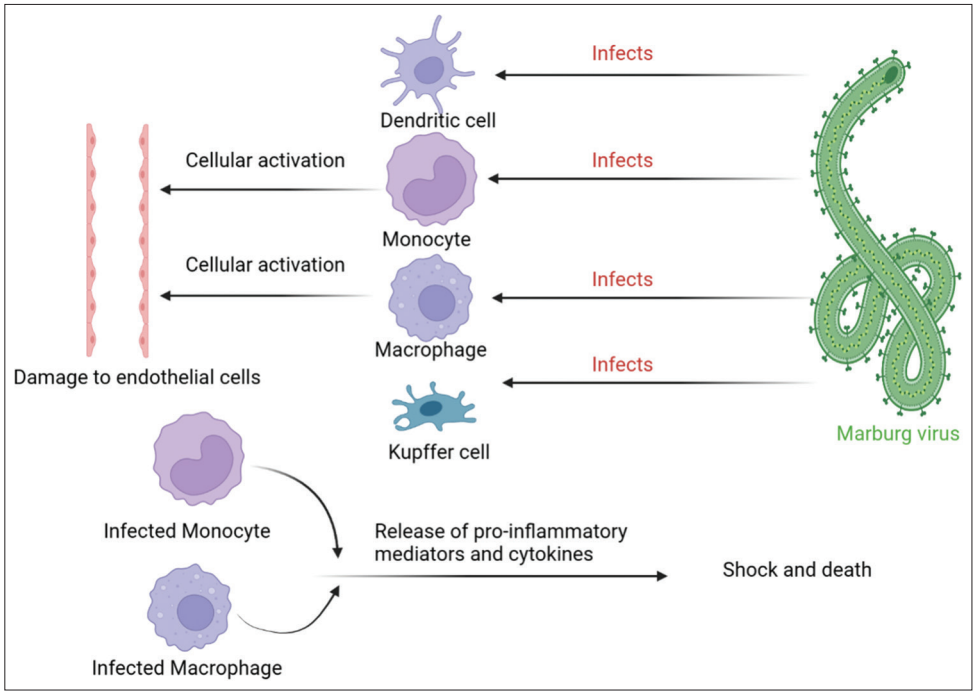

Figure 1: Pathophysiology of Marburg virus infection

infected population. Irrespective of the person's assumed prognosis and health professionals must always carry out safety procedures while showing concern for them. Basic hand hygiene, respiratory hygiene, personal protective equipment (to prevent splashes or other contacts with infected materials), safe injection practices, and safe and dignified burial practices are examples. Workers in laboratories are also in danger. Both human and animal samples collected for examining Marburg inflammation must be managed by adequate training and analyzed in properly equipped research labs.[1,6]

MARV VERSUS COVID-19

MARV can be similar in terms of symptoms of COVID-19. This disease has the same type of diagnostic techniques. Given the lethality of the COVID-19 global epidemic, the present Marburg disease in Guinea could be more lethal and difficult to control for the Guinean health-care system and the world. However, COVID-19 and MARV have similar symptoms that are difficult for medical practitioners to distinguish if sufficient monitoring and diagnostic imaging machinery are unavailable. Because there are presently no accepted therapies to cure the MARV, the pathogen becomes more dangerous for the health system to handle.[21] According to a present review from Guinean health-care officials, an incident of MVD has been clarified in the southern Africa prefecture. The recorded case of Marburg pathogens is the first reported in Guinea and West Africa. MARV illness is a lethal infection with a frequently identified symptom of hemorrhagic fever.[22] MVD is a forgotten viral infection that has the potential to have a significant impact on international population health. There are still substantial gaps in knowledge, and it is strongly advised to truly understand virus/host communication and develop evidence-based recommendations for assurance of infectious disease prevention and management. Its greater case fatality rate (90%) and reported cases necessitate broad research on this illness and its correlative virus. Whereas many occurrences have already been observed worldwide, significant epidemics of MVD are uncommon, and investigations are frequently insufficient.[23,24] The pathophysiology of the disease is almost similar. The virus's life cycle with the host includes connection, permeability, metabolic enzymes, development, and discharge. Viruses join the human cell membrane through an endosome combination that takes place after binding to receptors. Viral RNA needs to enter the genetic material for multiplication as one viral component has been issued within the human cell membrane. Highly infectious mRNA is utilized in the production of viral proteins. After that, new viral proteins are created and launched. COVID-19 is composed of four structural proteins the spike, the membrane, the envelope, and the nucleocapsid.[25,26] MARV also has an almost similar life cycle to this; both diseases have similar characteristics.

CONCLUSION

In the conclusion of this review, we used various types of already published articles and news. We also used some books to complete this review, including the WHO latest emergencies update on the MARV, released on July 22, 2022. In this study, we discussed the MVD and compared COVID-19 and the MARV. MVD is not ignorable because in Africa, many people are surviving this disease, and it is necessary to notice MVD directly to the highest health-care authorities to do something. Not many people reported this disease, but in the future, it may become a pandemic due to ignorance. It can also be transmitted by bats and animal contact, such as by African apes. Infected humans can infect other humans. In this review, according to the WHO, we are trying to give accurate information about this virus and its current condition. This paper provides information to the researcher, doctors, pharmacists, and academicians. Because it is necessary to develop an effective treatment or vaccine for MVD, the MARV can also cause severe diseases like COVID-19 in the future. Hence, this is the world's most important requirement to take action on this disease.

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AUTHORS' CONTRIBUTIONS

Ranjeet Kumar and Arvind Kumar contributed toward the conceptions or design of the manuscript and manuscript writing.
Arvind Kumar is first and main author of the manuscript writing.
Abrar Ahmad Zargar, Ruby Gangwar and Hardik Kumar supported to manuscript writing.
Amit Sharma reviewed the final manuscript and gave suggestion

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