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Ebola Virus Disease: A Deadly Hemorrhagic Fever

Muhammad Akram[1], Abid Mahmood[2], Isaac John Umaru[3], Mohammed Khudhair Hasan[4], Hind A. Abdulghafoor[5], Fahad Said Khan[6], Fethi Ahmet Ozdemir[7], Gaweł Sołowski[8], Jaouher Ben Ali[9]

[1,2]Government College University Faisalabad, Pakistan; [3]Federal University Wukari, Taraba State, Nigeria; [4]Al Manara College for Medical Sciences, Maysan, Iraq; [5]University of Fallujah, Iraq; [6]University of Poonch Rawalakot, Azad Jammu and Kashmir, Pakistan; [7]Bingol University, Bingol, Türkiye; [8,9]University of Tunis, Tunisa

makram_0451@yahoo.com

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Abstract

The West African pandemic of 2014–2016 exposed the catastrophic effects of inadequate health systems and delayed responses, serving as a wake-up call for the international community. The Zaire virus is the most virulent of the six known Ebolavirus types and has caused the majority of human outbreaks, including the historic West African epidemic that lasted from 2014 to 2016. Depending on the virus type, host characteristics, and the availability of palliative care, Ebola can have high case fatality rates of over 50%. The potential for quick transmission, high mortality, and severe social and economic disruptions makes EVD a serious public health concern. It is believed that the Ebola virus starts in a zoonotic reservoir, most likely animals. Once in the human population, the virus is disseminated via direct contact with contaminated fomites and people. If proper infection prevention and control procedures are not implemented, family members, caregivers, and healthcare personnel are especially vulnerable. EVD manifests as a generic febrile disease that includes abrupt onset of fever, tiredness, headache, sore

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throat, and muscular discomfort after This is frequently followed by rash, diarrhea, vomiting, and worsening renal and liver function. Viral RNA can be found using RT-PCR, antigen capture assays, or virus isolation from blood or other clinical specimens to confirm the diagnosis. Early case identification and isolation, contact tracking, and quarantining exposed persons are essential for outbreak containment because of its high contagiousness and quick spread. The main goals of supportive treatment are electrolyte balance, fluid replenishment, and problem-solving. With the discovery of vaccinations, EVD prevention has greatly improved. Due to its excellent effectiveness, the rVSV-ZEBOV vaccine (Ervebo), a recombinant live attenuated vaccine based on the vesicular stomatitis virus, is being utilized in ring vaccination techniques during epidemics. One of the main pillars of responses to recent outbreaks is the vaccination of frontline staff and high-risk contacts.

Keywords: Viral hemorrhagic fever, Monoclonal antibodies, Infection prevention and control, Epidemic preparedness Viral pathogenesis

Introduction

The uncommon Ebola virus sickness is caused by infectious and deadly Ebola viruses. It is highly contagious and can lead to pandemics, epidemics, and widespread outbreaks. Several nations outside of continental Africa were impacted by the 2013–2016 West African pandemic, despite efforts to contain outbreaks. Globally, an epidemic may have catastrophic effects on society, the economy, and healthcare. Supportive care is the mainstay of treatment; experimental treatments are also being used. The evaluation, management, and treatment of Ebola-infected patients are covered in this exercise, along with the part the medical staff plays in stopping the virus's spread. Ebola viruses, which cause the uncommon Ebola virus illness, are deadly and highly infectious. Less than half of cases, nevertheless, exhibit these symptoms. Initial symptoms are frequently nonspecific and include headache, myalgia, fever, and malaise. A few days later, there may be severe vomiting, nausea, and diarrhea. Early illness detection, availability of medical care for patient stabilization and supportive care, variations in health status, genetic variations, and patient attitudes on seeking medical attention are the primary factors affecting survival rates. Usually, mucosal membranes and perhaps the skin allow the virus to enter the new host. On rare occasions, it may happen percutaneously. The Ebola virus can linger in body fluids for a long time. For instance, the Ebola virus may be isolated from semen and can be identified by PCR up to 101 days later. There have been reports of the Ebola virus being

sexually transmitted from pregnant women to their fetuses by semen. (Thorson et al., 2021) The virus incubates for a few days to a few weeks after entering the host, during which time it is asymptomatic and non-contagious. Once a patient starts exhibiting symptoms, they are infectious. In certain impacted nations, customary funerals allow attendees to handle the deceased's body and personal items, which might aid in the disease's transmission. There is an incubation period after entering the host. This distinct role has led to the identification of VP30 as a potential target for vaccine development. The host immune system is suppressed by the matrix protein VP40, which is also produced and packed into exosomes. By budding from the cell membrane, the virus is released from the cell, which can result in immediate cell damage or even death. Cellular and humoral immune responses unique to the Ebola virus arise but are frequently overpowered by the virus's interactions with the host cell. (Falasca et al., 2015) This process is currently being studied and is not entirely understood. Be really hygienic. Steer clear of bodily fluids and blood. Stay away from persons who seem sick, have a fever, or are throwing up. Avoid handling objects that could have come into contact with an infected person's blood or bodily fluids. This covers medical supplies, clothes, bedding, and needles. Steer clear of burial customs or funerals that include touching an Ebola victim's body. Steer clear of bats and nonhuman primates, as well as their blood, bodily fluids, and uncooked flesh. Steer clear of West African hospitals that are caring for Ebola patients. The U.S. embassy or consulate may often provide with information about facilities (United States et al., 1998) Keep an eye on health for 21 days after return. Inform physician that have visited a nation where Ebola is a problem. A person who receives quality medical treatment may also have a higher probability of surviving. Ebola survivors are protected from the infection for at least ten years. The virus can no longer be spread by them. Whether a different species of the virus may infect them is unknown. Men who survive, however, may have the Ebola virus in their semen for three months. Until their semen tests negative for the virus, they should either avoid sexual activity or use condoms. Joint and eyesight issues might be long-term concerns.

Viral hemorrhagic fever

It might be challenging to prevent viral hemorrhagic fevers. Use protective barriers while working with bodily fluids, such as blood. Additionally, use caution when handling garbage

and laboratory materials. Generally speaking, the yellow fever vaccination is both safe and effective. Rarely, though, there may be severe adverse consequences. Pregnant women, those with compromised immune systems, and children less than nine months should not receive the yellow fever vaccination. Additionally, there is an Ebola vaccination that guards against a particular virus. It is designed for medical personnel who operate in outbreak-affected areas. Sometimes have to provide proof of immunization. Since mosquitoes are most active at dusk and dawn, try to avoid being outside during these times. Apply insect repellent to skin and clothes that contains 20% to 25% DEET. There are vaccines for Ebola, dengue disease, and yellow fever. Every vaccination has limited availability in various nations and situations. Before visiting places where may be at risk for viral hemorrhagic fevers, find out about vaccinations from a medical practitioner or the local public health authority. Steer clear of bug bites. By applying insect repellent that has been shown to be effective against mosquitoes and ticks, wearing protective clothes, and utilizing mosquito nets. Steer clear of animals that can spread viral hemorrhagic fevers, such as bats and rats. Steer clear of human blood and bodily fluids. To stop the illness from spreading, might be kept apart from other individuals. It is true that milder types of hemorrhagic fever can be recovered from. Yellow fever, Lassa fever, and dengue often have modest symptoms, but severe cases can be lethal. Others, like Ebola and Marburg illness, are frequently lethal. The virus that produces them affects the death rate. But only around 1% of patients with dengue or Lassa fever pass away as a result of them. (Basler et al.,2017)

Monoclonal antibodies

They look for antigens, or foreign substances, and cling to them in order to eliminate them. Laboratory-produced monoclonal antibodies aid in immune system stimulation. The term "monoclonal" describes the fact that laboratory-produced antibodies are clones. They are identical antibodies. The names of the two types of antibodies are what distinguish them from one another. "Poly" denotes several antibodies, whereas "mono" denotes just one. Monoclonal antibodies bind to a single antigen and are clones of a single antibody. Polyclonal antibodies bind to several antigens and originate from a variety of immune cell types. Healthcare providers will keep an eye out for any serious allergic reactions during initial course of therapy. A subcutaneous injection of a monoclonal antibody may also be

prescribed by healthcare provider in certain circumstances. The term "naked monoclonal antibodies" describes this. be transformed into radioactive particles and given in combination with another medication as a kind of treatment. altered to bind to and so target two distinct antigens at the same time. (Liu et al.,2014)

Infection prevention and control

According to the WHO, "access to health-care services designed and managed to minimize the risks of preventable HAIs to patients and healthcare workers is a fundamental human right." This is one of the guiding principles of the IPC building blocks. Apart from basic infection prevention and control strategies, biochemical treatments can be used to expedite the healing process and, in certain situations, totally avoid viral infections. It has been demonstrated that the creation of vaccinations, antivirals, and antibiotics may hasten healing, impede the spread of infectious illnesses, and in certain situations, completely eliminate them in whole populations.

In order to eradicate the bacterial agent causing the illness, antibiotics strengthen the body's defenses against bacterial infections. They are made to either eradicate or stop the growth of microorganisms. However, resistant bacteria have emerged as a result of overprescription, improper use of antibiotics, and bacterial evolution. Higher dosages or a mix of one or more antibiotics are needed in these situations. The purpose of vaccines is to increase resistance to a particular illness. They function by allowing the host to acquire natural immunity by introducing trace quantities of the bacterium or virus that causes the illness. Regular vaccinations have reduced and, in some cases, eliminated the spread of illnesses including rubella, polio, measles, mumps, and whooping cough. There are other vaccines for chickenpox, but they are not often used and are only given to those who are at risk of infecting people with compromised immune systems. (Tomczyk et al.,2022)

Epidemic preparedness

A robust public health infrastructure, sufficient resource allocation, and efficient stakeholder communication are essential components of preparation. In addition to addressing the issues of disinformation and infodemics, this narrative review highlights the need of promptly and accurately disseminating medical knowledge. It also emphasizes how

crucial it is that vaccinations and diagnostic tests become available quickly highlighted, as is the significance of scientific coordination in creating treatment plans. Last but not least, it is important to emphasize the necessity of medical education, interdisciplinary preparation initiatives. According to medical specialists, health authorities are critical to epidemic preparation because they provide strategies for managing resources, guarantee the availability of training and necessary supplies, facilitate communication, and improve safe infection control. In the early stages of the COVID-19 pandemic, a number of challenges surfaced in the majority of pandemic epicenters: concerning accounts from frontline medical personnel detailed severe shortages of drugs, ventilators, and critical care unit beds. In fact, a qualitative research conducted between April and May 2020 that involved interviews with groups of medical experts In terms of managing resource limits, the three most significant themes that surfaced were (a) preparing for crisis response capability, (b) adapting to resource restrictions, and (c) the accessibility of vaccinations and diagnostics. Numerous pandemics, particularly those brought on by viral illnesses like COVID-19 or influenza, have shown how important it is to have quick access to vaccinations and diagnostic testing in order to contain outbreaks. Making sure that new health technologies are developed and made available in a timely manner is essential in the case of new health emergencies. (Lee et al.,2020)

Viral pathogenesis

The process by which a viral infection results in illness is often referred to as viral pathogenesis. However, viruses come in a variety of sizes, from tiny RNA viruses to giant DNA viruses, and each one and several other factors are the cause of these virus-specific pathogenic effects. Furthermore, infection with the same virus frequently causes various clinical consequences in different people due to variations in a wide variety of parameters, including host genetic diversity, host immunological condition, viral dosage, or mode of inoculation. While some people might not become sick at all, while others might show signs and get a serious or fatal sickness. As a result, it is challenging to present a comprehensive picture of viral pathogenesis that appropriately includes the entire spectrum of pathogenic processes brought on by viruses. While each virus's pathogenesis and the diseases it causes are unique, it is also true that all pathogenic viruses share a number of common steps in their life cycle and pathological process. By taking a look at these

common processes, one can illustrate several important viral pathogenesis concepts. We may talk about some broad ideas that show how these interactions affect viral pathogenesis by concentrating on these crucial stages in the viral life cycle/disease process. (Julkunen et al.,2001)

Conclusion

One of the deadliest and most severe viral hemorrhagic fevers that people have ever encountered is Ebola virus disease (EVD). Despite being very uncommon, it poses a serious threat to public health because to its high case fatality rates, fast transmission, and substantial social disruption, particularly in environments with limited resources. Since then, significant advancements have been achieved in our knowledge of the virus's pathophysiology, clinical care, and the creation of efficient preventative and therapeutic measures such vaccinations and monoclonal antibody treatments. But there are still difficulties. There are still isolated epidemics, especially in Central and West Africa, where inadequate medical facilities, Containment measures may be hampered by community distrust and government instability. Future epidemics can be avoided by ensuring prompt discovery, a coordinated response, and ongoing investment in public health systems. Additionally, addressing the disease's wider effects requires international cooperation, the moral application of medical advancements, and sustained assistance for survivors and impacted communities.

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