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Ebola Virus As an Emerging Threat

Aneela Hussain[1*], Ayesha Quddus[1], Abdul Raheem[1], Muhammad Zaid Khalil[1], Muhammad Zubair[2]

1. Faculty of Veterinary Science, University of Agriculture Faisalabad, Pakistan.
2. Department of Pathology, University of Agriculture Faisalabad, Pakistan

*Corresponding Author: **aneelarandhawa202gatti@gmail.com**

ABSTRACT

Ebola hemorrhagic fever (EHF) is a highly infectious ailment, caused by the Ebola virus. It is a zoonotic disease that can cause mortality up to 90%. Once the Ebola virus enters the host body, it suppresses the immune system and systemic indications, that include immediate inflammatory responses and multi-organ damage. Ebola virus can be transmitted mainly by contact with body fluids, aerosols, and sexual contact. Clinical signs and symptoms include myalgia, sore throat, anorexia, tachypnoea, fatigue, skin rashes, convulsions, and coma. The definitive or natural host for the Ebola virus is still unknown that's why it doesn't have any definitive treatment. Supportive and symptomatic treatment such as nutritional support by antibiotics or antimalarial drugs, are the only available options to treat Ebola hemorrhagic fever.

1. Introduction:

The Ebola virus (EBOV) is a member of the Filoviridae family, and it consists of a genome having negative-stranded RNA [1]. Almost 28,000 cases with 11,000 deaths were reported in West Africa, between 2013 and 2016 [2]. This indicates that it is a highly infectious virus that can cause high mortality. This virus can be transmitted through contact with the body fluids from human to human and animal to human facilitating its spread to the unhygienic community. The Main ways of transmission are through contact with blood and body fluids, other ways may include aerosol, sexual, and vertical transmission. EBOV disease shows symptoms such as fever, fatigue, and arthralgia that lead to organ damage or even death [3]. Despite high mortality, survived patients may develop chronic diseases resembling autoimmune disorders such as rheumatoid arthritis and other systemic problems [4].

2. Epidemiology

Acute hemorrhagic fever caused by EBOV was first reported in Germany in 1967 and later on in Yugoslavia and its main agent was named Marburg-virus [5]. Southern Sudan and Northern Zaire were first reported for having hemorrhagic fever. It had similar symptoms to malaria and its transmission involved the use of unsterilized needles [6]. After the isolation of the causative agent from the affected patients it was given the names of the Sudan Ebola virus (SEBOV) and Zaire Ebola virus (ZEBOV) [7]. Tai forest Ebola virus was the third African Ebola virus. A diseased ethnologist led the isolation of this virus when he acquired the virus after performing a necropsy on a chimpanzee that remained with a crowd that later died of the EHF [8]. For humans, Reston Ebola virus is non-pathogenic [9].

3. Pathogenesis

Body lesions or body fluids are the primary means by which the virus gains entry into the human body and exhibits cellular tropism. It highly affects macrophages, endothelial, and adrenal cells [10]. For replication, the virus needs to bind with different host receptors. After getting entry into the cytoplasm, it releases its RNA which is followed by RNA transcription and translation into the viral genome and protein respectively, allowing for its assembly, encapsulations, and budding of the viral genome. Lectins are the main receptors that allow virion to attach to the host membrane [11]. Once it binds to the host membrane, it is engulfed into the target cell through macro-pinocytosis so the cell can undergo apoptosis. After transcription and translation massive production of virions is now ready to cause necrosis in the functional part of different organs such as gonads, spleen, liver, and kidney. Lymphoid organs are highly affected by this virus [12]. The genomic structure of EBOV is shown in (Fig. 1).

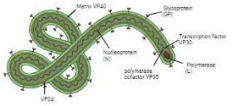

Fig.1: Genome of EBOV (Retrieved from Biorender)

4. Clinical Manifestation

The severity of the disease is highly variable depending on the type of strain. Such as ZEBOV can cause mortality of up to 90%, on the other hand, SEBOV has a mortality rate of up to 53-66% [13]. The incubation period of both the strains SEBOV and ZEBOV is almost 2-21 days [14]. The clinical symptoms comprise fever, sore throat, fatigue, myalgia, cough, abdominal pain, anorexia, and dysphagia [15]. The typical signs include infection of conjunctiva, tachypnoea, shock, and bleeding [16]. Dermatological problems that include maculopapular rashes on the body (trunk) are more commonly present in white people than darker ones. Other people may also have neurological problems such as convulsions, coma, and delirium. So, these typical signs and symptoms make it clear that it is closely related to typhoid fever, or malaria at the onset of the disease [17].

5-Treatment and prevention

Owing to the lack of successful vaccines or antiviral drugs there is no accurate treatment for EHF. Favipiravir is an antiviral drug that is commonly used against EBOV other than that supportive and symptomatic treatment such as hydration and nutritional support are the available options to treat the virus [18]. To control the spread of disease the infected patient should be quarantined and must follow the safety measures suggested by CDC [19]. The drugs such as anticoagulants, steroidal, and nonsteroidal anti-inflammatory drugs should be contraindicated [20]. There is a huge need to make more effective vaccines and drugs against the EBOV [21].

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