

Viral Hemorrhagic Fever

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ABSTRACT

Most viruses implicated in these diseases require vectors for transmission to humans, most are transmitted by arthropods or rodent-borne infections, and due to the zoonotic nature of these diseases, these diseases are generally confined to endemic areas where their hosts live. Symptoms of the hemorrhagic fever virus include fatigue, aches, cough, fever, shortness of breath, and eye redness. Given that viral genome detection is the best tool for diagnosis, however, blood sampling requires personal medical training and involves important risks for the patient as well as for personal healthcare. Sampling may therefore be by non-invasive methods (eg, saliva or urine), as well as multiplex PCR, lateral flow assays, and non-invasive sampling, including saliva and urine. It was found that there are many immune indicators related to the hemorrhagic fever virus, including protein C and D-dimer, which were found to increase when infected with hemorrhagic fever. As for inflammatory cytokines, they were found to play an important role in causing infection with the hemorrhagic fever virus, including interleukin 6, interferon gamma, as well as About tumor necrosis factor.

KEYWORDS: Viral Hemorrhagic fever, Pathogenesis of viral hemorrhagic, C-Reactive protein, Interleukin.

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INTRODUCTION

Viruses are described as units that comprise genetic factors made of RNA or DNA and encapsulated in a protein envelope known as capsid. It is the smallest of the organic systems, as it covers each the genetic traits essential for its replication within the intruding mobile ⁽¹⁾. Viruses spread in many approaches through exclusive paths named transmission paths, as human viruses are transmitted thru coughing or sneezing from an infected person to a healthful man or woman ⁽²⁾, and other forms of viruses have appeared, which can be referred to as hemorrhagic fever viruses (HFVs), which are a group of zoonotic diseases acute respiratory infections Due to seven special families of viruses that contaminate human and animal ⁽³⁾.

Hemorrhagic fever viruses (HFVs) are highly contagious RNA viruses characterized by mild to severe symptoms and may lead to multi-organ failure and death ^(3,4). Hemorrhagic fever viruses represent a Predominant global public fitness situation because of their high occurrence and mortality fees ^(5,6). Most of the viruses implicated in these illnesses require

vectors to be transmitted to humans, most of which are transmitted by arthropods or rodents, and due to the zoonotic nature of those diseases, these diseases are typically restrained to endemic regions wherein their hosts stay ⁽⁷⁾.

VHFs are branded by irregular organization and injury to blood vessels ⁽³⁾. Although they share some clinical manifestations, their orbital and organoid cells, As well as the molecular devices fundamental pathogenesis range relying on the causative agent ⁽⁷⁾. However, they all Goal the cells chargeable for starting up the antiviral reaction, inflicting a delay in the immune response. Moreover, this postponement in the immune response leads to patient with VHFs having high viral infections and immunosuppression which could result in a flash-surprise-like syndrome in which inflammatory mediators play a main function in infection with these viruses ^(8,9). As in Figure (1), which exemplifies the greatest significant inflammatory mediators in viral hemorrhagic fevers.

Viral Hemorrhagic Fever

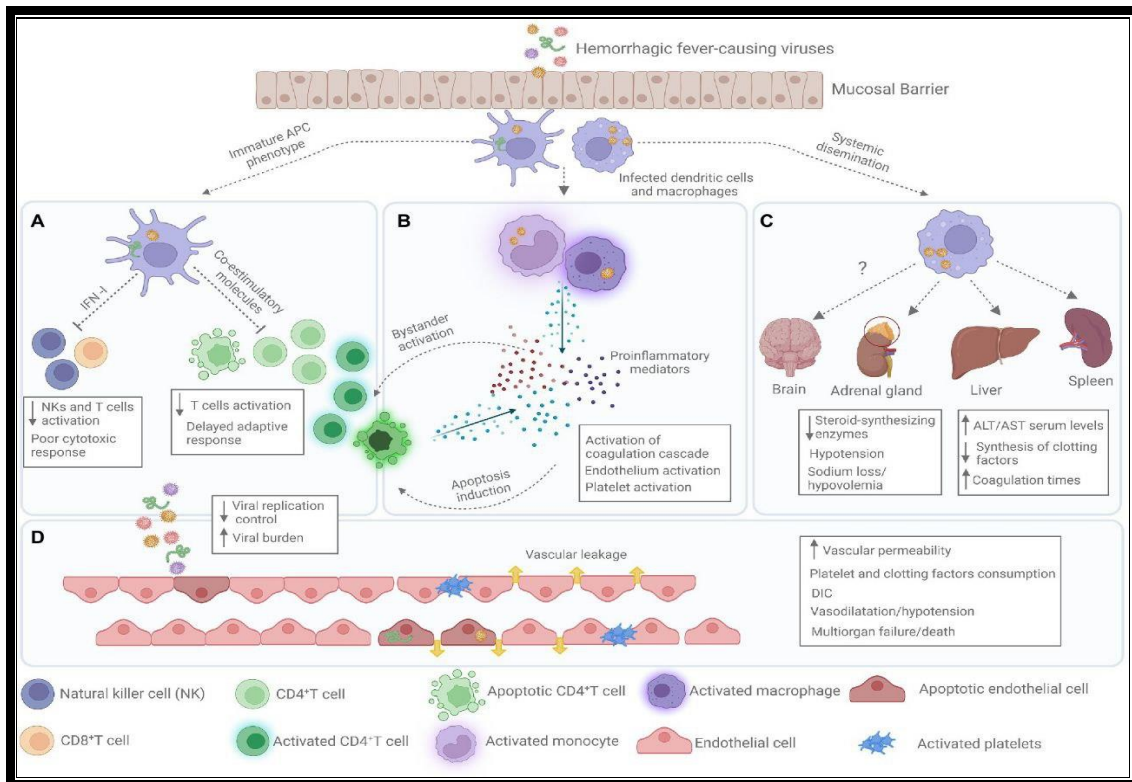


Figure (1) illustrates the most important inflammatory mediators in viral hemorrhagic fevers ⁽¹⁰⁾.

The pathogenesis of severe viral hemorrhagic fever leads to:

(A) - Antigen-presenting cells (APCs) it gives an immature phenotype with low expression of co-stimulatory molecules and coffee production of kind I interferon (IFN-I), resulting in impaired activation of natural killer cells and T cells leading to immunosuppression Generalized, leading to uncontrollability.

(B)- During infection, monocyte and macrophage produce high levels of inflammatory cytokines which reason endothelial and platelet start and T-cell apoptosis.

(C)- APC infection transmits hemorrhagic fever viruses (HFVs) to the lymph nodes and other structures, producing them to spread and thus lead to infection of certain organs, including the liver and adrenal glands, which leads to high liver function and low clotting factors⁽¹¹⁾.

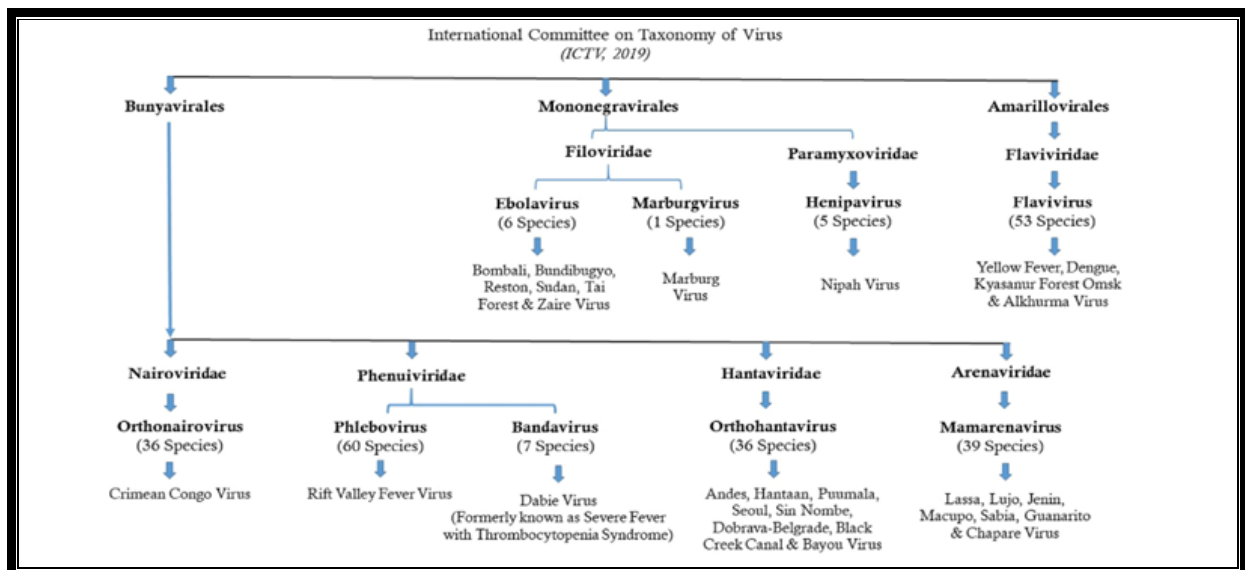


Fig (2) Overview of VHF causing viruses ⁽¹²⁾

Symptoms of viral hemorrhagic fever:

Common symptoms of the disease may be:

🚩 Tiredness

🚩 Aches

🚩 Fever

🚩 Coughing cough

Viral Hemorrhagic Fever

- ✚ Abdominal pain.
- ✚ Shortness of breath or difficulty breathing
- ✚ Bleeding gums or epistaxis.
- ✚ Vomiting
- ✚ Sorethroat sore throat
- ✚ Diarrhea ⁽¹³⁾.

Diagnosis of infection with hemorrhagic fever virus

The PCR technique is more than molecular diagnostics to identify viral diseases including viral pathogen screening ⁽¹⁴⁾.

There are several method for diagnosing hemorrhagic fever virus, including the immunoassay technique and enzyme test. This method usages a solid matrix covered with a exact gene (oligonucleotide) or antigen from the viruses producing the viral acid. Then obtain a DNA sample. The signal is likened by the intensity of the positive control and a diagnosis is complete. Microarrays of viruses producing hemorrhagic fevers have tall specificity and diagnostic compassion ⁽¹⁵⁾. An ELISA is also available to detect IgM and IgG antibodies.

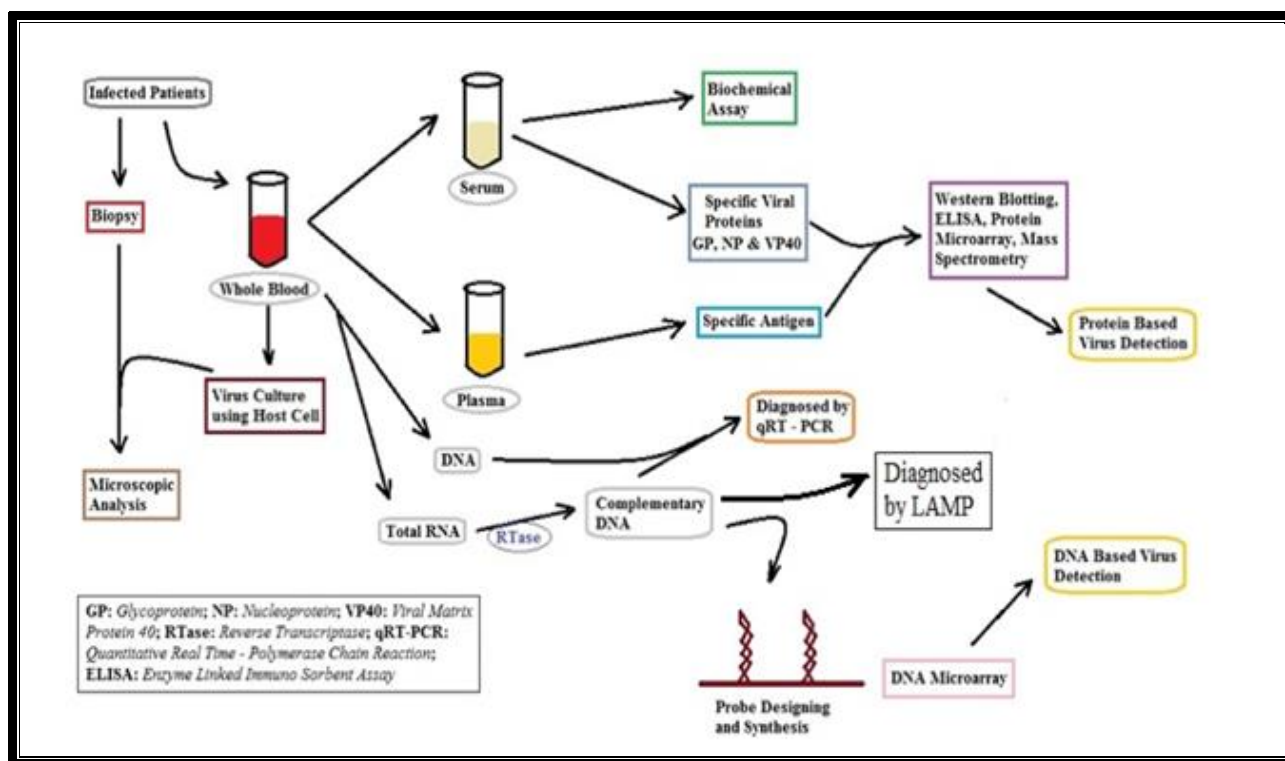


Fig 3:- Diagnostic methods for viral hemorrhagic fevers ⁽¹⁶⁾

Treatments for hemorrhagic fever:

There are vaccines such as Hantavax, which have been test in patient with hemorrhagic fever and have shown high seroconversion rates and low hospitalizations ⁽¹⁷⁾. And The use of plasma as another treatment to reduce the chances of wound infection and reduce the death rate ⁽¹⁸⁾. In addition, he received Inmazeb, a combination of three monoclonal antibody against two protein for treatment ⁽¹⁹⁾.

Relationship between Immunological variables and hemorrhagic fever

C-reactive protein CRP and hemorrhagic fever

C-reactive protein It is one in every of the intense inflammatory protein, which arise when contamination or inflammation happens, as it is synthesize or produce in hepatic cell, in adding to numerous cell, along with lymphocyte, , macrophage ⁽²⁰⁾. As exposed in Figure (4).

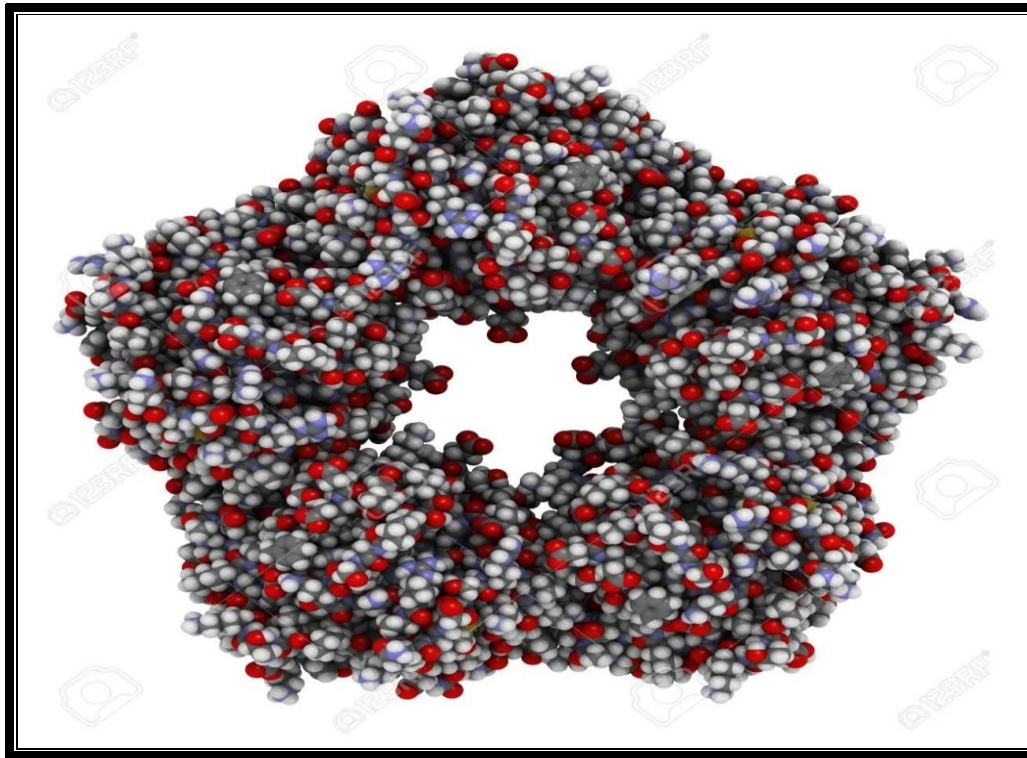


Figure (4) Structure of C-reactive protein ⁽²¹⁾

The course of CRP in this case series indicates that a decrease in CRP level is associated with better survival while a gradual rise may predict a poor outcome, furthermore, Yilmaz and his group and Buyuktuna and his group reported that an elevated CRP level in patients with hemorrhagic fever was reported as a predictive indicator of infection ⁽²²⁾.

D-dimer and hemorrhagic fever

Represents a small molecular protein, resulting from the decomposition of fibrin, as a biomarker detailing clotting molecules, the coagulation dimer level rises, the coagulation dimer level rises, the coagulation D dimer level rises, the coagulation D dimer level rises, the patient's pneumonia rises, and its height increases ⁽²³⁾.

D-dimer is one of the diagnostic indicators for hemorrhagic fever, which is an acute febrile clinical syndrome associated with headache, myalgia, arthralgia, rash, Leukopenia, hemorrhagic manifestations ⁽²⁴⁾. Although these symptoms are consistent with those of the affected person defined in this case file, many of them are nonspecific and may be found in some of not unusual infections, making early analysis difficult. especially in African regions such as Nigeria and other countries where it is high. rates of malaria, patients with this symptom are often misdiagnosed ⁽²⁵⁾.

Interleukins and hemorrhagic fever

Interleukins are proteins that stimulate the immune system in the body to do its work in resisting infections. The body's interleukins are formed in white blood cells, which are cells that work to destroy harmful bacteria and other harmful bodies that enter the body. Internally, Leukin means white

proteins that are secreted from white blood cells and work on them. Interleukin regulates cell growth, differentiation, and motility, and is specifically significant in stimulating immune response along with inflammation ⁽²⁶⁾. Pathogens implicated in viral hemorrhagic fevers can multiply inside phagocytes and dendritic cells, permitting rapid proliferation within the host. Macrophages are inspired to release cytokines and chemokines, which reason improved vascular permeability and blood clotting repute. These viruses also can cause mechanisms that lead to blood clotting within the blood vessels. Infected stem cells are weakened, and loss of their proper feature can cause lymphoid apoptosis ⁽²⁷⁾. Interleukin-6 is a multifunctional cytokines. It plays a key position as a mediator of many inflammatory responses in the acute section. These consist of inflammatory cells, activation of lymphocytes, and stimulation of hepatocytes to manufacture acute-phase proteins. Interleukin-6 is low in normal conditions and its levels in serum. It cannot be detected in the case of weak inflammation, and its increase contributes to many diseases, especially in people of advanced age, such as lymphoma, osteoporosis, and hemorrhagic fever ⁽²⁸⁾. The up-regulated look of anti-inflammatory cytokines e.g. IL-6 and IL-10 promotes dengue and hemorrhagic fever virus replication and leads to disease progression ⁽²⁹⁾.

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Viral Hemorrhagic Fever

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Viral Hemorrhagic Fever

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