WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A COMPREHENSIVE STUDY ON EBOLA VIRUS : A THREAT TO HUMAN EXISTENCE

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ABSTRACT:

Despite the absence of a specific cure, supportive care plays a vital role in improving survival rates for EVD patients. This includes management of fluids, electrolytes, and oxygenation, alongside treatment of complicating infections. Public health efforts focus on prevention through education, surveillance, and vaccination where available. Avoiding contact with infected individuals and animals, practicing good hygiene, and safe burial practices are crucial in preventing the spread of EVD.Ebola virus disease (EVD), a severe and often fatal illness, is caused by Ebolaviruses, a family of RNA viruses within the Filoviridae family. Primarily affecting humans and other primates in sub-Saharan Africa, EVD outbreaks can cause significant public health emergencies. Transmission occurs through direct contact with bodily fluids of infected people or animals, both living and deceased. Early symptoms are non-specific and flu-like, including fever, fatigue, muscle pain, headache, and sore throat. Progression can lead to vomiting, diarrhea, rash, and internal and external bleeding.

Ebola virus disease (EVD) continues to pose a significant threat to human health, particularly in sub-Saharan Africa. This review delves beyond the well-established characteristics of EVD, exploring the intricate interplay between the virus, its host (focusing on recent discoveries in immune system subversion), and environmental factors that contribute to outbreaks. It sheds light on the ongoing development of therapeutic drugs and vaccines, highlighting promising avenues like DNA vaccines and monoclonal antibodies. Additionally, the review critically examines the effectiveness of current prevention and control measures, proposing potential areas for improvement based on recent outbreaks. By offering a deeper understanding of the complexities surrounding EVD, this review aims to inform targeted interventions and pave the way for more effective control strategies.

Introduction:

The Ebolavirus genus it belong to the family of Filoviridae and it have six identified species. Recently new genus has proposed by yang and co-workers the genus is Dianlovirus [1,2]accordingly to the current term , Ebola virus (EOBV) is Zaire ebolavirus species in the ebola virus genus.[3,4] Ebola, also known as Ebola haemorrhagic disease it is severe or acute often in fetal disease in human cause. It is a unusual and killer disease which caused the infection.[5,6] in the West Africa, in the 2013-2014 resulted 20,834 between the suspected cases is 8,251 confirmed death[5] there is no specific treatment and vaccine available

Now currently five identified different ebola virus species for human there is Tai forest ebola virus, Zaire ebola virus, Sudan ebola virus or Bundibugyo ebola virus ehich is caused in human the last one is Reston ebola virus this is caused disease in non humans (such as chimpanzees, Monkeys)

The ebola virus disease incubated in 2-21 days, which is shown symptoms between 8 to 10 days. Ebola virus is transmitted by direct contact of body fluid or secreted by the infected person which is also transmitted animal to human. It also transmitted by environment and soil with contaminated by body fluids may also occurs. The ebola virus is not transmmitedd in their incubation period.

The most common symptoms of ebola virus disease is in infected person abrupt fever onset, headache, muscle pain weakness and soar throa. Also the diarrhea, vomatting, rashes damage the liver and kidney functions and in advanced stage external and internal bleeding. In laboratory test finding the low white blood cells or platelets decrease the count and boost the liver enzymes[7]

***Epidemiology* :**

Ebola virus disease is discovered in 1976 in Africa in which an outbreak of Ebola hemorrhagic fever occurs in between the 280 death out of 318 confirmed patient cases[8,9] . in 2014-2015 out break of in guineabefore spreading to sierra leone,Liberia and other surrounding countriesis the most devere and outbreak with the 28331 reported cases and 11310 reported deaths in se[tember 2025 [10] in texas first develop clinical finding with ebola virus disease approximately the five days after explosing in united state. The patient was a symptomatic prior and during in flight two health care employees involved in the care of ebola virus disease [11]

Virus Reservior :

It's uncertain how the virus first manifests in a human at the starting of an outbreak; the natural reservoir host of Ebola are not be found. The nature are filoviruses' natural reservoir and the way which they transferred from it to people and wild apes remain among the largest unanswered problem. There are different methods for a virus to infect someone when it not affect people.[12,13]

Mode of Transmission

Filoviruses are spread by a variety of pathways, are ingestion, inhalation, or skin breaches, according to the experiments conducted on laboratory animals31. Non-human primates are get the Marburg or Ebola virus by inadvertently contaminating their mouths or eyes with virus droplets, implying that human infections of patients' hands being inadvertently contaminated[14,15]

Person to Person Transmission

Direct contact of injured skin or exposed mucous membranes and bodily fluids carrying viruses, such as blood feces and vomit, can result in the development of sickness symptoms and indications between individuals[16]. When caring for an ailing individual, family members and acquaintances frequently come into intimate contact with blood or bodily fluids, which can transmit the Ebola virus. Urine, semen, and breast milk have also been shown to contain it. The virus is also carried in tears and saliva. Therefore, coming into contact with any of these liquids might be dangerous. The Ebola virus may spread swiftly in medical facilities like clinics and hospitals during an outbreak[17].

Direct contact with objects

Contact with previously contaminated surfaces and items can potentially spread the Ebola virus. There is insufficient evidence to imply that a live virus may persist on fomities for several days. Even if there aren't any high-quality evidence to support transfer from this kind of exposure, appropriate environmental learning can lower the risk[6].

Incubation Period :

The Ebola virus disease symptoms in patient have typically 8-12 days after expose. All symptomatic are assumed to high level of viruses in blodand all body fluid so saftery precaution should be taken[18]

1.1 Symtpoms and Indication

The most of the common sign and symptoms are reported in the west Africa during the 2014 fever(85%), vomatting (68%), diarrhea (66%), Fatigue (76%), loass of apetite (65%)[19]

Non flue like symptoms

Usually the first symptoms of Ebola and Marberg hemorrhagic include the fever, chills, and general malaise. Weakness, anorexia, excruciating headaches, and discomfort in the trunk and lower back muscles are further indications and symptoms[20]38. Proration, nausea, vomiting, stomach pain, diarrhea, and pancreatitis, as well as chest discomfort, coughing, and pharyngitis, are among the subsequent multisystem manifestations.

Gastrointestinal : Gastrointestinal sign and symptoms are develop after the intinitial presentation in these include the watery diarrhea, vomatting, abdominal pain and nausea

Rashes : some patients develop a diffuse eruthematous, nonpruritic macropopular rash by day five to seven of illness. The rashes are usually found on neck face,arm and trunk and desquamate in servivors [20,,21,22]38,42,4

Other findings: Ebola virus disease with patient can persist with different symptoms also such as hiccups,shortness of breath, cinfusion, headache, chest pain, seizures, and cerebral edema. Multiorgan disfunction, conjuctival infection, liver failure and dark red discoloration of the palate are other physical function.[22]

In non fetal cases, patients are improve after six days approximately oneset of action. The antigen antibodies complex are forming during the recovery that cause acute arthralgia and other symptoms. Fatal disease are characterized by different clinical signs early during infection and progressing to multiorgan failure and septic shock death typically occurs between the six to sixteen days[23]

Ebola virus life cycle and pathogenicity in humans:

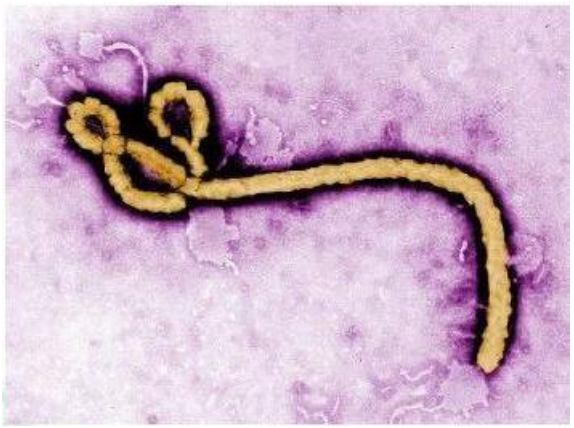

Figure of Ebola virus [34] the much talk about is an encapsulated single stranded (ss) negative RNA virus belonging to the family filoviridae [24]

Cell and molecular biology

According to research using electron microscopy, the Ebola virus is usually 800 nm long and 80 nm in diameter, giving it a filamentous look. A nucleocapsid made up of the negative ssRNA genome encircled by the nucleoprotein NP, the polymerase cofactor VP35, the virus-specific transcription activator VP30, and the viral RNA polymerase L protein makes up each viral particle or virion (fig 1). The outer viral envelope encasing this nucleocapsid originates from the host cell membrane and has distinctive spikes of viral glycoprotein (GP) measuring 10 nm in length. The viral proteins VP40 and VP24 occupy the matrix that lies between the nuclecapsid and the outer viral envelope[24].

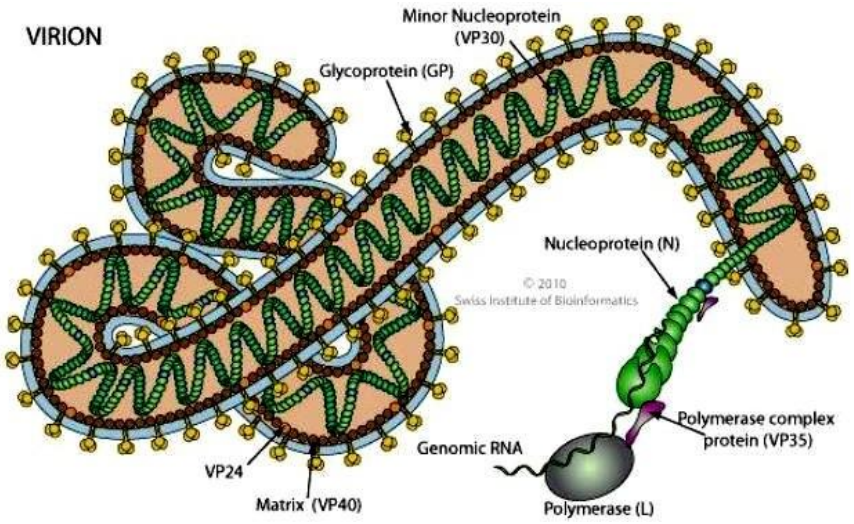

Figure 1 : schematic representation of ebola virus

The virus genome is 19 kb (kilobases) in period, and encodes seve n structural and one non-structural protein. The fig under indicates the virus genome with the gene order.[34]

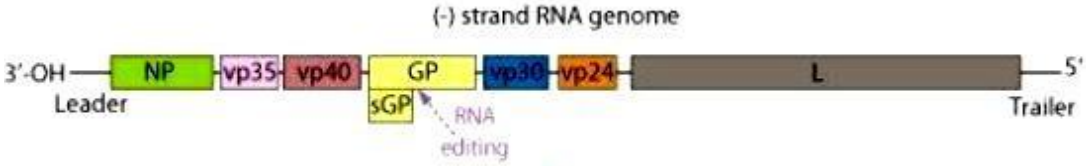

Figure 2 : Digramatic representation of the Ebola virus genome[34]

The nucleocapsid, which is composed of the ssRNA genome and the proteins NP (big green spheres), VP35 (purple), VP30 (blue), and L (grey), is shown in green. It should be noted that for improved visibility, the NP or N, VP35, and L proteins are displayed outside the virion. The exterior membrane of the nucleocapsid, which is light blue in color, is generated from the host cell membrane and is adorned with yellow studs that represent viral GP spikes. The VP40 (brown) and VP24 (orange) proteins form the matrix that sits between the nucleocapsid and the outer membrane. Viral Zone (ExPASy) is the source. Untranscribed sequences known as the leader and trailor regions control transcription, replication, and the packaging of genomes into new virions.

To start the sequential transcription of each gene, the viral RNA polymerase attaches itself at the leader end. During this step, the L protein caps and polyadenylates the freshly transcribed mRNAs. Notably, the GP gene's initial mRNA transcription produces sGP, a tiny, soluble, non-structural protein that is secreted into blood by infected host cells. RNA editing produces the fully functioning glyprotein, which is expressed as GP spikes[25] on the cell surface. These GP spikes are essential to the pathogenicity of the ebola virus because they aid in the virion's membrane fusion and anchoring to the host cell.

Preserving the virion's structural integrity requires the matrix protein VP40. It has the capacity to escape from cells even in the absence of other viral proteins and is also linked to endocytosis and virus budding[26]. The host cell's46 generation of interferon is inhibited by the second matrix protein, VP24. The remaining proteins, which are the nuclecapsid's structural components NP, VP35, VP30, and L proteins. Furthermore, these proteins catalyze the transcription and replication of genomes.[27]

1.3 The Life cycle of the virus

(1) Host immune system attack

The early goals of the virus are the monocytes and the macrophages of the host immune gadget and other target cells are liver cells, and endothelial cells. Ebola virus employs special mechanisms to interfere with or even ignore the host immune device completely. most of those host immune device attack procedures involve the virus structural proteins. One such mechanism is known as the antibody-based enhancement (ADE) in which the host antibodies (Abs), facilitate or beautify the virus's attachment to the host cells growing contamination in these cells. The Abs bind to antibody receptors at their Fc web sites while the virus binds to the antigen-binding web page at the loose end of the Abs[28]48. In vitro research in Ebola showed that the virus turns on the classical pathway of the supplement machine. initially, the Ebola virus binds to its receptor on the host mobile surface. Following this, Abs bind to the glycoprotein (GP) spikes of the virus, and the C1q thing of the complement complements the Ab-GP complicated to bind to C1q ligands on the host cell floor hence increasing the interaction of the host cell floor. This manner, the GP spikes on the virus use the host immune system (Abs and the supplement additives) to enhance its attachment to the target cells[29].

The virus is transmitted by means of contact with contaminated frame fluids. discern three: Ebola virus transmission from fruit bats to humans.similarly to ADE, the virus protein VP35, blocks the immune system's interferon (IFN) pathways comprising of diverse cytokines that exert anti-viral responses.VP35 blocks IFN response by means of competing with the protein along with retinoic acid -inducible gene 1 (RIG1) protein to set off the

IFN pathway50. in conjunction with VP35, VP24 also blocks IFN pathway activation. VP24 blocks transcription elements like STAT1 that adjust transcription of the immune system genes

The mentioned, primary mRNA transcript of the G Protein gene encodes the soluble single G Protein which is speculated to have an anti-inflammatory role during infection which further enhances the virus' escape from host immune system response. Much more than a single gram of protein Since G Protein resembles epitomes more than host Abs, it may be able to absorb or sequester them in order to prevent their downstream effects. In order for the viral proteins to bind to the host cell after they permeate it, they must interfere with several immune system components.In this way, it attacks the immune system of the host cell

2) virus entery in to host cells

There is currently little knowledge about the precise method by which the Ebola virus enters host cells. Endocytosis is a common process used by most enveloped viruses, including the Ebola virus, to infect host cells. According to research, the virus enters the body by an endocytic pathway that is lipid-dependent, non-clathrin and dynamin-independent. The method that the Ebola virus most likely uses is macropinocytosis [32]. The plasma is extended outward during this process. membrane made possible by the folding back on itself of actin polymerization. A macriopinosome can be formed by the fusion of the distal loop ends of these extensions or membrane ruffles. This implies that actin and the polymerizing proteins that are linked to it are essential for viral entrance. Unknown is the precise method by which the virus causes macropinocytosis. It's hypothesized that interactions between GP and receptors on the cell surface of the host might start macropinocytosis, which in turn starts viral entry[32].

The Ebola virus enters the human host through damaged skin and mucosal surfaces, including the eyelids, lips, nostrils, ears, anus, and the genitalia of men and women. It is found in the fluids and excretions of infected animals and humans. Within the mononuclear phagocytic system, dendritic cells, macrophages, and monocytes are the first targets of Ebola virus entrance and replication. The infection then becomes systemic due to a number of processes, such as the migration of infected mononuclear phagocytic cells and the release of virions into the lymphoid system or blood stream.

In addition to macrophages, monocytes, and dendritic cells, other tissues and organs of the host body that become infected include hepatocytes, adrenal cortical cells, fibroblasts, endothelial and epithelial cells, and necrosis of infected cells, which can lead to lethal infection[30] Virion uses the glycoprotein GP1 on the virus envelope to bind to receptors on the surface of the vulnerable host cell in order to enter the host cell. This process is facilitated by the contact between the Ebola virion and the phosphatidylserine found on cell membranes.

There are variations in the range of Ebola receptors on the surface of host cells. The C-type lectin family proteins, which include DC-SIGN, L-SIGN, L SECT, hMGL, and asialo-glycoprotein, as well as T-cell immunoglobulin, are among the receptors.G protein coupled receptors, integrin β, Tyro3/Axl/Mer(TAM) family proteins, mucin domain (TIM-1) protein, etc.[31]

1.4 Virus Replication :

After entering the host cell, then virus binds the polymerase complex is start transcription at the leader end of the genome5. While VP24 inhibit the transcription of the viral genome, VP30 is a crucial transcription activating factor. Though the precise mechanism behind VP24-dependent transcription termination remains unclear, it appears to be crucial for changing the virus from one that is transcriptional or replicational actively engaged to one that is primed for virion assembly and host cell exit[33].

Virus budding and exit from host cell

After replication, the cell are separated from its substrate and stops communicating with other cells. In the meanwhile, with the aid of the matrix protein VP40, the freshly generated genomes are bundled into new buds or virions and exit from the host cell surface. Multiple copies of ubiquitin molecules are linked to VP4057 by interaction between VP40 and ubiquitin ligase Nedd4, an enzyme involved in the human ubiquitination system. The COPII transport system[33] carries VP40 itself to the plasma membrane of the host cell. Once in the plasma membrane, in the virus moves through lipid then in the plasma membrane, then virus moves through lipid rafts where the final assembly and budding of the virions occur, before their final exit from the host cell.Although the structural components of the virus are known, the exact mechanisms by which it causes disease in humans are not completely understood. This poses a major challenge for treatment and to date prevention is the best mode of action to avoid an Ebola outbreak.[34]

2.0 Diagnosis :

These are difficult to distinguish the EVD from different other diseases such as malaria, meningitis, typhoid fever a confirmation symptoms are caused by Ebola virus disease infection are made by using the following investigation[35,36]

Infaction timeline	***Test for diagnostic available***
Few days after or with in few days symptoms	• Antigen capture enzyme linked immunosorbent assay (ELISA) testing • igM ELISA • virus isolation • polymerase chain reaction

After recovery or Later disease course	• igG and igM antibodies
Retrospectively in deceased patients	• PCR • Immuno histochemistry testing • Virus isolation

2.1 Theraputic Drugs and Development of Vaccines:

In 2014 outbreak of Ebola virus highlights the emergency needs to develop an effective vaccines for the prevent to spread of the virus, and effective therapies to improve survival rate of patients. A DNA vaccines have being the clinical trials on this years and investigational drugs for to treat patientsa from hemmorhagic fever which include monoclonal antibodies, siRNA-based and antiviral small molecules drugs [37]

2.2 Previous Research Reports on Ebola : [34,37]

- In April 2014, a group of researchers from the CDC published a study on High-throughput, luciferase-based reverse genetics systems for identifying inhibitors of Margburg and Ebola viruses, using codon-optimized Ebola virus genes synthesized by Genscript.
- A 2013 Molecular therapy paper report pre-clinical results for a DNA vaccine that protects against Ebola and Marburg in guinea pigs and rodents. Inovia Pharmaceuticals is using its SynCon platform to develop synthetic gene-based vaccine against Ebola, HIV, cancer-causing viruses, and influenza.
- London, Jan 06 (IANS) Oxford University doctors and scientists are starting the first safety trial of an experimental preventative Ebola vaccine, aiming to have vaccinated all 72 healthy adult volunteers by the end of January. Volunteers for the trial, aged from 18-50, will be the first humans to receive the vaccine, which is developed by Janseen Pharmaceutical Companies of Johnson and Johnson, Xinhus reported citing a press release in the university issued. The study involves a prime-boost vaccine regimen, which does not contain any replicating virus, so it in not possible to be infected with Ebola, according to the researchers. Patients are first given a prime immune system to stimulate an initial immune response, and then a boost intended to further enhance the level of the body's immune response over time[34,37]

Current on going Drug Development efforts[37]

- Newlink Genetics Crop is poised to begin the first clinical trials of an Ebola vaccine an attenuated live virus, vesicular stomatitis virus (VSV), a common livestock pathogen, into which an Ebola viral coat protein has been introduced[37].
- A vaccine currently poised to begin clinical trials as soon as 2014 is a DNA vaccine, containing synthetic genes encoded by the Ebola virus delivered in a non-replicating adenoviral vector. DNA vaccine stimulates a robust immune response to high-level expression of specific antigenic proteins delivered in vector optimized for safety[37].
- DNA vaccine efficacy can be enhanced through co-delivery of synthetic genes encoding adjuvants such as cytokinins, chemokines, or synthetic genes encoding[37] Researchers at the NIH's Vaccine Research Center (VRC) have designed a DNA vaccine against Ebola virus which infection the animals in collaboration with Okairos, This vaccine is acquired by GSK pharmacuticals. This vaccine candidate is composed of a non-replicating chimpanzee adenovirus vector vaccine into which two Ebola genes have been inserted. Clinical trials are expected to begin in fall 2014 with approval coming soon as in 201563.
- Several investigational drugs have received FDA permission to be administered to patients infected with Ebola virus, including the monoclonal antibodies cocktail ZMapp and the RNA based therapeutic TKM Ebola[37].

Ebola Virus Diagnosis :

Clinical symptoms, antigen/virus detection, and antibody levels are used to diagnose EVD[41,40]. Early infection stages can benefit from the use of antigen/virus detection, whereas late infection stages can benefit from the use of antibodies.

Clinical symptoms :

Confounding clinical signs are observed in acute episodes of EVD. Most of the time, EBOV infection is diagnosed clinically after EVD symptoms appear. Since the early symptoms of EVD are non-specific and mirror those of multiple other diseases, it is challenging to make a clinical diagnosis in the early stages of infection. In these conditions, prompt laboratory confirmation of this lethal virus infection becomes crucial for managing epidemics of EVD. Blood characteristics that indicate end-stage liver disease (EVD) include low platelet and white blood cell counts along with high levels of hepatic enzymes[42].

Antibodies Detection :

After healing, testing for antibodies can also be performed on individuals. Antibody detection can be carried out when individuals are still recovering from their symptoms. The majority of antibody detection methods use an ELISA test to detect IgG or IgM antibodies[43,44]. Since antibodies can only be developed in the later stages of the disease—and because the early stages of infection are highly lethal—negative results in antibody detection tests do not indicate that the patient is free of EBOV. Conversely, positive results in these tests indicate EVD. The western blot and indirect immunofluorescence test are two more helpful serological or antibody detection assays for EVD[44]. Additionally, cross-reactivity with other infections in the serology assay

2.3 Prevention and control:

In order to properly address this public health disaster, the United Nations (UN) quickly responded to the present Ebola outbreak by establishing the UN Mission for Ebola disaster Response (UNMEER). The mission coordinated and concentrated enormous UN agency resources to support the WHO's technical know-how and experience in controlling Ebola epidemics. But since there is now no viable vaccine, international health organizations' sole option is to carefully enforce and reinforce adequate preventive and control measures in order to contain the spread of EBOV. procedures, such as routine tracking, monitoring, and surveillance of the viruses in circulation, sick individuals, possible suspects, and residents or visitors to regions impacted by the pandemic, particularly in African nations [38].

The neighborhood and worldwide methodologies surrounded to combat the Ebola virus had included state-of-the craftsmanship early precaution frameworks for following worldwide development of individuals voyaging through outbreak of affected nations, quick screening of the patients and suspects, quick restorative care to the patients, secure and transfer of dead people and their releases through devoted wellbeing faculty, and catastrophe administration arranging and actualizing offices working at national or universal levels. Biomedical squander and utilized things such as sheets, articles of clothing, outfits, cleaning supplies, or anything that came into contact with the quiet or their real liquids must be sterilized some time recently they are expelled from the clinic or cleaning location. Endorsed rules of the WHO/CDC ought to be taken after for total sterilization of utilized gear, clean and secure collection of blood tests, cleansing of contaminated zones, and appropriate transfer of patients who kicked the bucket of EBOV disease. Sterilization can be accomplished in an autoclave or by cremation, as both slaughter the infection. Healing centers without these offices ought to triple-pack the squander in water tight holders some time recently it is carted absent for last transfer. Fecal squander can be flushed down the latrine, given the sewer framework is outlined to deactivate irresistible operators. EBOV-infected people must be recognized early and separated. Treatment of the tainted people ought to be done in an confined range, ideally in extraordinarily outlined segregation wards with offices for legitimate transfer of the possibly contaminated materials and releases exuding from such premises, as these can act as a nidus of contamination. The disposal/burial of contaminated dead bodies in a entirely sterile and legitimate way as well as compliance with great sterile, phytosanitary, and sterile measures must be guaranteed in arrange to check the spread of the infection from casualties of the EBOV disease to solid people or clean places, and to disturb the infection transmission chain.Checking the wellbeing of a individual suspected to be sick or a carrier of EBOV for a least period of 21 days and looking for quick restorative care in cases where indications of EVD have been watched, is exceptionally vital. In clinic settings, therapeutic specialists, healthcare laborers, and other people who come in contact with people suspected or treated for EBOV disease ought to wear defensive clothing such as veils, gloves, outfits, and goggles, and ought to hone boundary nursing strategies that are vital for anticipation of the infection. The test preparing from EBOV-infected people ought to be done as it were in BSL-4 research facilities to anticipate the spread of the infection. Climatic changes and the unordinary varieties in rainfall/dry season design may too alter the exercises of bats to a extraordinary degree, in this manner driving to an increment in the cases of Ebola hemorrhagic fever and closely related Marburg fever infection contamination among people, gorillas, and chimpanzees, as well as the development or re-emergence of maladies being transmitted by them, counting EBOV [39].

Contact following, a great research facility benefit, secure burials and social mobilization[5]. Raising mindfulness of chance figure among individuals against EBOLA infection and their preventive measures if you must travel to an zone influenced by the 2014 EBOLA episode, ensure yourself by doing the following[5]:

- Wash hand habitually or utilize an alcohol-based hand sanitizer.
- Maintain a strategic distance from contact with blood and body liquids of any individual, especially somebody who is sick.
- Do not touch the one who has kicked the bucket from Ebola.
- Do not touch bats and nonhuman primates or their blood and liquids and do not touch or eat crude meat arranged from these animals.
- Other defensive measures moreover are taken by people in an successful way to decrease human transmission. Chance diminishment informing ought to center on a few factors[45,46]
- Lessening the hazard of wildlife-to-human transmission from contact with contaminated natural product bats and monkeys/apes and the utilization of their crude meat. Creatures ought to be dealt with with gloves and other suitable defensive clothing. Creature items (blood and meat) ought to be altogether cooked some time recently utilization
- Decreasing the chance of human-to-human transmission with coordinate or near contact with individuals with EVD side effects, especially with their body liquids. Gloves and fitting individual defensive types of gear ought to be worn when taking care of sick patients at home.
- Flare-ups control measures counting provoke and secure burial of dead, distinguishing individuals who may have been contact with somebody contaminated with Ebola, observing the wellbeing of contacts for 21 days, the significance of isolating the sound from the wiped out to avoid advance spread, the significance of great cleanliness and keeping up a clean environment.
- Data for patients- upto date offers two sorts of persistent instruction materials, ―The Basics‖ and ―Beyond the Basics.‖ The Nuts and bolts quiet instruction pieces are composed in plain dialect, at the 5th to 6th review perusing level, and they reply the four or five key questions persistent might have almost a given condition. Past the Essentials understanding instruction pieces are longer, more modern, and more nitty gritty. These articles are composed at the 10th to 12th review perusing level and are best for patients who need in-depth data and are comfortable with a few therapeutic language.

3. Conclusion:

Ebola virus disease (EVD) remains a significant public health threat, particularly in sub-Saharan Africa. This review has delved deeper than established characteristics, exploring the intricate interplay between the Ebola virus, its host, and environmental factors that contribute to outbreaks. It highlights promising avenues for future interventions, such as DNA vaccines and monoclonal antibodies. Additionally, the review critically examines the effectiveness of current prevention and control measures, proposing areas for improvement based on recent outbreaks.By offering a deeper understanding of the complexities surrounding EVD, this review aims to inform targeted interventions and pave the way for more effective control strategies. Here are some key takeaways:

There is no specific cure for EVD, but early diagnosis and supportive care can significantly improve survival rates.

Public health efforts focus on prevention through education, surveillance, and vaccination where available.

Avoiding contact with infected individuals and animals, practicing good hygiene, and safe burial practices are crucial in preventing the spread of EVD.

Research and development of effective vaccines and therapeutic drugs are ongoing.

Improved surveillance and contact tracing are essential for containing outbreaks.

Community engagement and education are critical for promoting preventive behaviors.

By implementing these strategies, we can better prepare for and respond to future Ebola outbreaks, ultimately saving lives

Acknowledgement

We would like to express my special thanks of gratitude to our teacher Dr. Aamir Quazi sir who gave us an opportunity to make these review article on the topic of Comprehensive study on ebola (EBOV) virus a threat to human existence which helped in doing a lot of research and we came to know about many new things. So very thankful to them.

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