

Review Article

**AN OVER VIEW ON
EBOLA VIRUS
DISEASE**

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Abstract

The Ebola virus Disease (EVD) is a severe, often illness in the human beings. The Ebola virus was first appeared in 1976 in the two simultaneous out breaks, in the different countries like the Nzara, Sudan, and in Yambuku. Monkeys originating from the Philippines become ill and died. Currently there is no a vaccines or the specific treatment is available for the treatment of the Ebola Virus Disease. Ebola is spread through the direct contact (through broken skin or unprotected mucous membranes. The EVD is a severe actual viral illness often a characterized by the sudden on of a fever, intense weakness. Muscular pain, headache and sore throat. No FDA- Approved vaccines or specific treatment. Hence its big challenge for all the researchers to find out or develop a new moiety which can cat against Ebola Virus Diseases.

Keywords: Ebola virus Disease, Monkeys Origin, Ebola Transmission

Introduction

The Ebola virus Disease (EVD) is a severe, often illness in the human beings. The EVD outbreaks have a case of fatality rate is up to the 90 %.The Ebola virus was first appeared in 1976 in the two simultaneous out breaks ,in the different countries like the Nzara, Sudan, and in Yambuku, and the Democratic Republic of the Congo [1,2]. The letter was in a village which is situated near to the Ebola River, from which the disease takes its name Ebola [2] It has not been reported in the

humans in the Asia Pacific region as up to the 31 July 2012. However, with the global travel, it is possible that outbreak in the Africa region could result in the spread of the Ebola virus to the Asian region. There are the different species of the Ebola virus. Of these, the Reston of the Ebola virus was first discovered in the laboratories in the Reston, Virginia, and United States Of America (USA) in 1989 after some quarantined, crab – eating macaque monkeys originating from the Philippines become ill and died [3,4].In 2008, a virus identified in pigs was found to be very similar to the virus identified %.The Ebola virus was first appeared in 1976 in the two simultaneous out breaks ,in the different countries like the Nzara, Sudan, and in Yambuku, [3] In the 2009, six people tested positive for Reston Ebola virus antibodies after the contact with sick pigs in the Philippines, but had no significant symptoms. The threat to the human health is likely to be low for healthy adults but it is unknowns for all the other population groups. Therefore, the Ebola rest on virus is not as great as threat as the other Ebola viruses that are known to be highly pathogenic for the human. However, it is of public health concern in the Asia- pacific region because, of the although it is very rare disease, it is a newly emerging disease in the animal and humans beings [5]. Currently there is no a vaccines or the specific treatment is available for the treatment of the Ebola Virus Disease [3]

Geographical Distribution

The Ebola virus Disease (EVD) out breaks occurs in remote villages in the area of Central and West Africa near to the tropical rainforest. The generally Ebola virus is transmitted to people from wild animals and spread in to the human population through human –to-human transmission [8] Since 2008, Reston Ebola virus has been detected during several outbreak of deadly disease in the pigs in the peoples mostly Republic of china and in Philippines, but the no illness or death in the human from this species has been found or reported to till date. [6]

Causative Agent

The Ebola Virus Disease is generally caused by the infection with a virus species of the family Filoviridae, having a genus Ebola virus. When

the infection of the Ebola virus occurs, symptoms usually begin abruptly.^[7,8] The first Ebola virus species was discovered in 1976 in what is now the Democratic Republic of the Congo near the Ebola River. Since then, about 24 outbreaks (1976-2012) have appeared sporadically mostly in the Central African Countries of Democratic Republic of the Congo (DRC), Gabon, South Sudan, Ivory Coast, Uganda and Republic

of the Congo (ROC).^[4,5] The current outbreak is in west Africa involving countries of Guinea, Liberia, Sierra Leone and Nigeria (as on 6th August 2014).^[7] There are five identified subspecies of Ebola virus. Four of five have caused disease in human. The Ebola virus, formerly cote d'Ivoires Ebola virus; Tai Forest virus, formerly cote d'Ivoires.

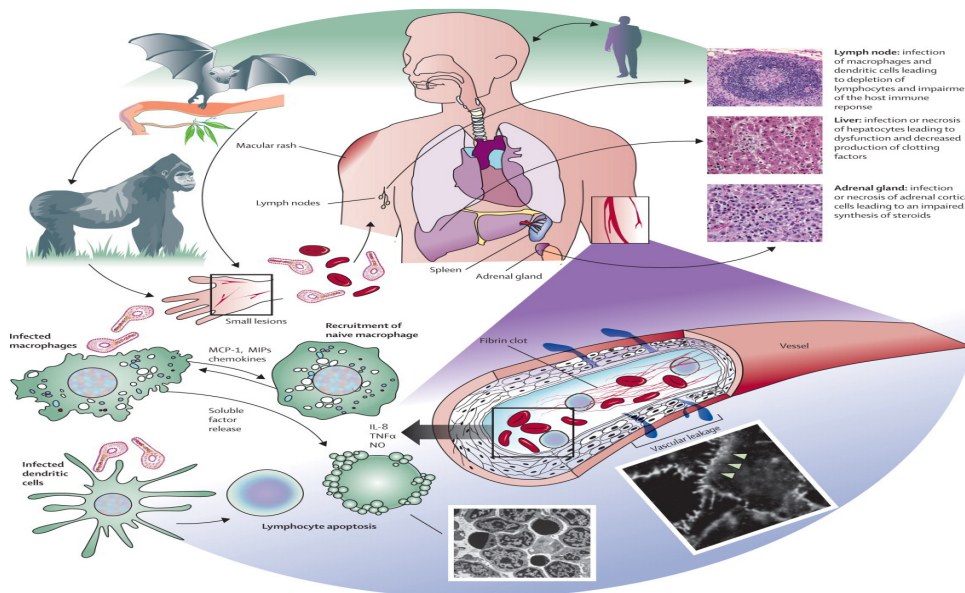


Fig.No.01: Pathogenesis of Ebola Virus Disease

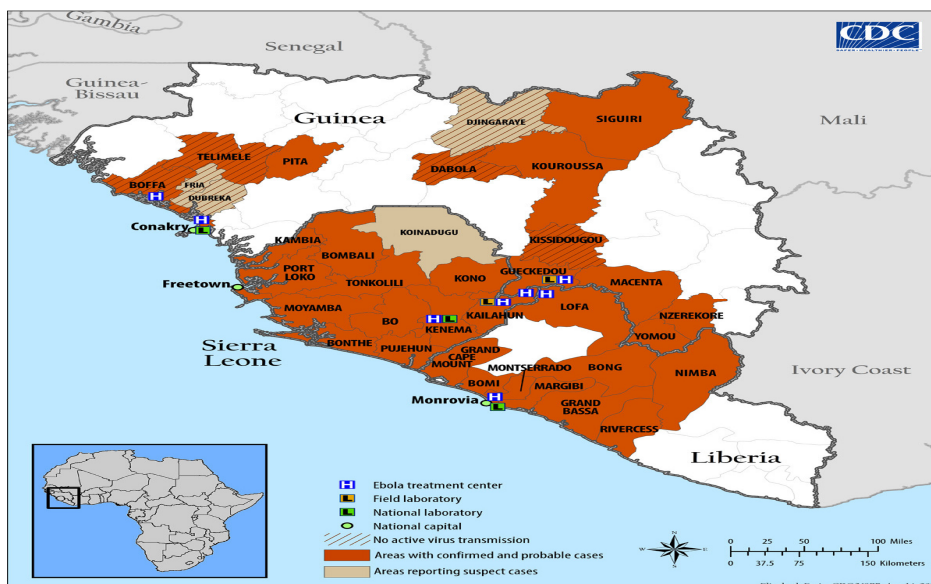


Fig.02: Area of West Africa Affected By Ebola Virus Disease.

Transmission

Because the natural reservoir of the Ebola Virus has not yet been identified, the way in which the virus which the virus first appear in a human at the starts of an outbreak is unknown. However, researchers believe that the first patient become infected through contact with an infected animal such as a fruit bat or nonhuman primate. When an infection does occur in humans, the virus can spread in several ways to other. Ebola is spread through the direct contact (through broken skin or unprotected mucous membranes in, for examples the eyes, nose, or month with the contact including as follows.^[8]

- Blood or body fluid (including but not limited to feces, saliva, sweat urine vomit bar-est milk, and semen) of a person who are infected with the Ebola virus disease.
- Objects (like a needles & syringes) that have been contaminated with the virus are also responsible for the transmission of the Ebola virus diseases.
- Also the infected fruits bats or primates (apes and monkeys).^[7,8]

The Ebola virus is not spread through the air or by the water, or in general, by the food. However, in the Africa region the Ebola may be spread as a result of handling the "bush meat" (wild animal hunted for the food purpose) and in a contact with the infected bats get transmitted the Ebola virus Disease.^[2]

There is no any evidence that mosquitoes or other insects can transmit the Ebola virus. Only a few species of mammals (for examples humans, bats, monkeys, and apes) have shown the ability to become get infected with spared the Ebola virus. ^[5, 9] once people recover from the Ebola, they can no longer spread the virus to people in the community. Although Ebola virus has been detected in semen after the patients have recovered from the Ebola virus disease ^[10] it is not known if the virus can be spread through the sex (including a oral sex) .As the precaution, men who have recovered from the Ebola virus disease are advised to abstain from sex (including Oral sex) for a period of a three months ^[8, 4]. If abstinence is not possible, the use of the condoms may helps to get prevent form spreading of the Ebola virus disease.^[9]

Clinical signs and symptoms

The EVD is a severe actual viral illness often a characterized by the sudden on of a fever, intense weakness. Muscular pain, headache and sore throat .This is followed by symptoms of the infection like a vomiting, diarrhea, rash, impaired kidney, and liver function, and in some cases, both internal and external bleeding. ^[3] The laboratory findings result include low white blood cell and decreases the platelet counts and elevated the liver enzyme activity.^[6] People are infectious as long as their blood and the secretions contains the virus. Men who have recovered from the disease can still have the ability to transmit the virus through their semen up to the 7 weeks after recovery from the illness. ^[10] The incubation period of the Ebola virus is 2 to 21 days.^[2]

Risk of Exposure

Healthcare providers caring for the Ebola patients and the family and friends in close contact with Ebola patients are at the risk of getting sick because they may come in contact with infected food and body fluid. During the outbreak of the Ebola, the disease can spread quickly within the healthcare setting (such as a clinic or hospital) .Exposure to the Ebola viruses can occur in healthcare setting where hospital staff are not wearing appropriate protective clothing including masks, gowns, gloves, and eye protection.^[7]

Diagnosis

Diagnosing the Ebola virus in an individual who has been infected for only a few days is difficult because the early symptoms ,such as fever, are nonspecific to the Ebola virus infection and are seen often in patient with more common diseases, such as malaria and the typhoid fever are commonly seen in to the Ebola virus disease.^[10]

However, if a person has the early symptoms of Ebola and there are reasons to believe that Ebola should be considered, the patient should be isolated & public health professionals notified. Samples from the patient can then be collected & tested to confirm the infection. ^[7]

Ebola virus is detected in the blood sample only after onset of symptoms, most notably fever, which accompany the rise in circulating virus within the patient's body. It may take up to three days after symptoms start for the virus to reach delectable level of disease. ^[6]

Infection Prevention and control ^[5]

Human-to –human transmission of the Ebola virus is Primarily associated with direct or indirect contact with the blood and body fluid .Transmission to health –care workers has been reported when appropriate control measure have not been observed.

Standard Precaution ^[3, 4]

It is not always to identify patient with EBV early because initial symptoms may be non-specific. For this reason, it is important that health-care workers at all level apply standard precaution consistency with all patients regardless of their diagnosis- in all work practices at all time. This include: ^[9]

- Hand hygiene
- Safe handling and disposal of sharp instrument.
- Use of personal protective equipment (PPE) according to the risk management.
- Clean and disinfect spills, environment, & reusable equipment safety.

Precaution for direct patient contact: ^[8]

- Restrict the number of staff dedicated to patient care for those who are infected with Ebola virus.
- Limit the number of visits.
- Keep log books to register staff caring for the patient as well as visitors.
- Use of PPE by both health care personnel & visitors.
- Wash hand.
- Use of surgical masks, goggles,-preferably with anti-fog visor, waterproof apron, gloves and closed shoes before the entering in patient's room.
- Remove PPE before leaving the isolation area. Special care should be taken when removing PPE to prevent contact with eyes & mucous membranes.
- Designate staff dedicated to monitoring the correct use of PPE in both health personnel & visitors.
- General use of disposable personal protective equipment .Where it is not possible to obtain disposable equipment ,the following items can be re-used following appropriate disinfection:

- ✓ Goggles or eye wear must be washed with water & soap in advance & then disinfected with 70% alcohol after.
- ✓ Impervious gowns or apron that cannot be send to the hospital laundry facilities must be disinfected with hypochlorite 0.05%.^[9]

Cleaning in the hospital & households of patients symptomatic of EVD ^[4]

At home: If a patient develops symptoms at home before being isolated, the home should be disinfected, & the clothing & the patient's bedding & clothing should be incinerated.

Disinfection of the environment:

- Clean surfaces with blood or other body fluids with water & detergent prior to the disinfection.
- Disinfection should be done with hypochlorite solution 0.05%.
- Use gloves, gowns & closed shoes for cleaning & disinfecting surface with blood & / or body fluids.

In the hospital both bleeding & clothing of the patient should be placed in a bag before washing & routed separately to the hospital laundry facilities where staff is to adequately protect. Hand washing these items are not recommended.^[4,8]

Wash management in the hospital setting ^[7]

- All the sharp-edged objects must be disposed of in puncture-resistant containers. These containers should be discarded when 75% of their capacity is reached.
- All solid waste, with no sharp edges, must be disposed of in a appropriate medical waste disposal plastic bags.
- All solid waste & sharp –edged objects related to a patient suspected or confirmed for EVD must be incinerated.

Infection control in the aircraft ^[9]

If the presence individual is suspected with illness compatible with EVD on board, the crew will have to implement recommendation made by IATA with respect to infection control & meet the ICAO requirement regarding the notification. ^[3] This cabin crew should be using the Universal Precaution Kit such as that recommended by the International Civil Aviation Organization (ICAO) .Along with provided the quid line the official

website <http://www.capsca.org/CAPSCRefs.htm>.

Cleaning of affected aircraft since disinfection of aircraft surface depend on the disinfecting product compatibility with the material of the surface to be disinfected, the aircraft manufactures should be consult.

While the most probable scenario for the introduction of the Ebola virus would by air travel, there is a high volume of cruise ships in the region of the Americas, as such prevention & control measure on board.

Safe disposal of dead bodies ^[4, 5]

The dead body must be kept whole & its handling should be limited. For that purpose the quid lines are available at; ^[3] IATA guidelines for air crew to mänge a suspected communicable disease or other public health emergency on board.

The WHO guidelines ^[3] which include the information on sanitizing of aircraft regardless of the funerary practices of family or friends of the patients , the body must not be embalmed .It should be disinfected with the hypochlorite solution 0.05% ,placed in resistant fluid for extravasations body bags, which must be properly closed & placed in a closed casket before burial.

The staff for the management of dead bodies should be designated, equipped, trained & supervised by national public health authorities to carry out the management of dead bodies under the biosafety conditions. Personnel should be use PPE at all times when handling a dead bodies ,which includes apron , overalls ,waterproof gowns, surgical masks, eye protection (prefera-

bly with an anti -fog visor)& closed shoes^[3,9].

Treatment

No FDA- Approved vaccines or specific treatment (e.g. Antiviral drug) is available for Ebola. Symptoms of Ebola & complications are treated as they appeared .The following basic intervention, when used early, can significantly improved the chances of survival.

- Providing intravenous fluids & balancing electrolytes (body salts).
- Maintaining oxygen status & blood pressure.
- Treating other infection if they occur.^[7]

CONCLUSION

By overall study of Ebola virus disease it is concluded that:

The Ebola Virus Disease is a natural reservoir pathogenic diseases has not yet been identified .But it is transmitted by the blood or body fluids from effected to the healthy person but including not limited to its saliva urine omit of a person sick with the Ebola Virus Diseases or other objects such as (needle, syringes).

But diagnostic of Ebola virus Diseases is an individual who has been infected for only within the few day is difficult to identify. By the extensive research is directed towards a treatment of an Ebola Virus Diseases is resulted into the development of vaccine which is the only available option till date if passes the successful clinical trials.

Hence its big challenge for all the researchers to find out or develop a new moiety which can cat against Ebola Virus Diseases.

Table No 01: Laboratory tested used in diagnoses include: ^[3]

Timeline of Infection	Diagnostic test available
Within a few days after symptoms begin	<ul style="list-style-type: none"> • Antigen- capture enzyme-linked immunosorbent assay (ELISA) testing. • IgM ELISA • Polymerase chain reaction (PCR) • Virus isolation
Later in disease course or after recovery	IgM and IgG antibodies
Retrospectively in deceased patients	<ul style="list-style-type: none"> • Immunohistochemistry testing • PCR • Virus isolation
Completely infected patient	<ul style="list-style-type: none"> • ELISA

Table No .2 Therapy

Therapy	What it does? State Or Research	Safety	Availability/Fesibility
Convalescent plasma	Studies suggest blood transfusions from EVD survivors might prevent or treat Ebola virus infection in other, but the results of the studies are still difficult to interpret. It is not known whether antibodies in the plasma of survivors are sufficient to treat or prevent the disease. More research is needed.	Safe if provided by well- managed blood bank. Risks are like those associated with the use of any blood product, such as the transmission of blood-borne pathogens that cause disease. There is a theoretical concern about antibody development of EVD infection ,which can increase infectivity in the cell.	Blood transfusion is culturally acceptable in west Africa. Potential donors are Ebola survivors, but the logistics of blood collection are an issue. Options to conduct studies in patients are being explored. The first batches of convalescent plasma might be available by the end of 2014.
ZMapp Cocktail of three chimeric mousehuman monoclonal antibodies (MAPP) Pharmaceutical	The three antibodies in this mixture block of neutralize the virus, by binding to or “enveloped” of the virus. Studies in monkey showed a strong survival up to five days after infection, when virus and/or fever were present.	There have been no formal safety studies in human. Very small numbers of EVD infected people have been given ZMpp on a compassionate basis& no safety issue have been reported to date. Clinical effectiveness is still uncertain.	A very limited supply (fewer than 10 treatment course) has been deployed to the field .Efforts to scale up the production may yield increase supplies of potentially few hundred does by the end of 2014.

Table no 3: vaccines^[6]

TYPE OF INTERVENTION	ADMIN ROUTE	NO DOSE/TIME	NO TOTAL TREATMENT AVAILABLE	STORAGE	REMARK
Immunoglobulins Convalescent plasma	IM, IV equipment &supplies for sterile injection.	1 st batches could be available by end 2014.	Unknown (MSF/ WHO) have identified several convalescent patients.	Commercial IVIGs may be stored at room temperature these contain pH controlled may require refrigeration.	Identified the PCR negative donors.
Antiviral small inhibitory RNA TKM- 100802 (Lipid nano partial siRNAs.	IV administrators.	Survival better with 7 vs. 4 PI treatment doses.	3o treatment courses available.	Lyophilized LNP stable at 40°C.	FDA authorized emergency use in infected patients.
AVI 7537 (phosphorodimidate siRNA) antisense RNA	IV administrators.	75% survival in rhesus macaques (40mg	Unclear	Product is stored in bulk at 2-8 °C , for	Requires IV infusion equipment &

		/kg.)		stability.	staff.
Chimp Adeno 3	IV administer	Single dose	15, 000 doses by significant investment.	Storage at – 70°C.	Tested in 16 NHP with 100% protection.

References

1. S. Baize S, Leroy EM, Georges AJ, Georges Courbot M---c , CapronM, Bedjabaga I, Lansoud--- Soukate J, & MavoungouE. Inflammatory responses in Ebola Virus infected patients. ClinExpImmunol page no.128:163-168, year 2002.
2. Leroy EM, Baize s, Debre P, Lansoud—Soukate J, & Mavoungou E. Early immune responses accompanying human asymptomatic Ebola infection. CliExpImmunol page no 124:453-460, Year-2001.
3. WHO Aviation Guide which include information on sanitizing of aircraft . Available at : <http://www..Who.int/water-sanitation> – health/publication/aviation-guide.
4. IATA guidelines for air crew to manage a suspected communicable disease or other public health emergency on board.
5. IATA guideline for cleaning crew for an arriving aircraft with a suspected case of communicable disease.
6. ICAO Health related document (1) procedures for Air Navigation services; (2) Annex Medical Supplies.
7. European Centre for Disease prevention & control .Risk assessment guidelines for infectious diseases transmitted on aircraft. June 2009.
8. Risk assessment guidelines for diseases transmitted on aircraft (RAGIDA) . Part 2: operational guidelines.
9. Aide Memoire: Standard precautions in health care. Infection Control .2007 PAHO/WHO. Cleaning & disinfection of hospital surfaces.2010 ANVISA.
10. Interim Infection control Recommendation for care of patient with suspected or confirmed Filovirus (Ebola, Marburg) Hemorrhagic Fever .March 2008.WHO.