Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

A REVIEW ARTICLE ON EBOLA VIRUS DISEASE

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Abstract

Ebola virus disease is a fatal zoonotic disease and it is very rare and dangerous one . It was identified in the year 1976 (almost 40 years back) in the Democratic republic of Congo the reservoir host of EVD is still not clear. These virus has 5 Different types or Species Zaire virus ,Sudan virus ,TIA forest virus , Bundibugyo virus, Reston virus among them Zaire Species is the most dangerous one and which has high mortality rate it is transmitted from non human primates to human and from humans to humans through body fluids ,blood exchanges or close contact with Qarantined persons. According to studies many outbreaks were reported among them the longest outbreaks occurred in the years 2001 – 2003 with fatality rate more than 80%. After that the biggest outbreak was recorded in 2014- 2016 epidemic was West Africa with almost 30,000 cases and over 11,000 fatalities. The signs and symptoms of EVD are fever ,hypovolemia and mainly Gastrointestinal symptoms like diarrhoea, vomiting and other symptoms delirium, seizures .it can be detected by diagnostic methods like RT- PCR, ELISA testing, virus isolation test Immunohistochemistry and other test. The Ebola virus has no cure but symptoms can be controlled. It can be prevented by vaccination and by maintaining or practicing hygienic life style .The supportive care should be provided to infected people.

Key words: Zoonotic disease, Zaire species, Immunohistochemistry, Virus Isolation

Introduction

Ebola virus disease is a severe fatal illness, with an average case fatality rate of 50%. The genus Ebola virus belongs to the family Filoviridae. Formerly it known as Ebola haemorrhagic fever. It was first identified in the year 1976, in the village Yambuku near the Ebola river in the Democratic republic of Congo. This disease mainly effects humans and nonhuman primates. Most of the cases of Ebola virus disease occurred in people of reproductive age group (15 – 44 yrs old) and it effects both males and females equally. According to studies current natural host is fruit bats of Pteropodidae family and it and there is potential risk of Indian population being effected with the virus and its disease. [1][5]

Signs and Symptoms

This disease has incubation period of 2-21 days and following are the primary signs and symptoms of EVD

- Fever, sore throat
- Aches, Pain, which include severe headache and muscle, joint pains
- Loss of appetite, Hypovolemia
- Unexplained haemorrhaging bleeding
- Gastrointestinal symptoms like abdominal pain, diarrhoea and vomiting.
- Others like Conjuctival infection (an early clinical sign). Patients may also acquire neurological signs like convulsions delirium and coma. [2][4]

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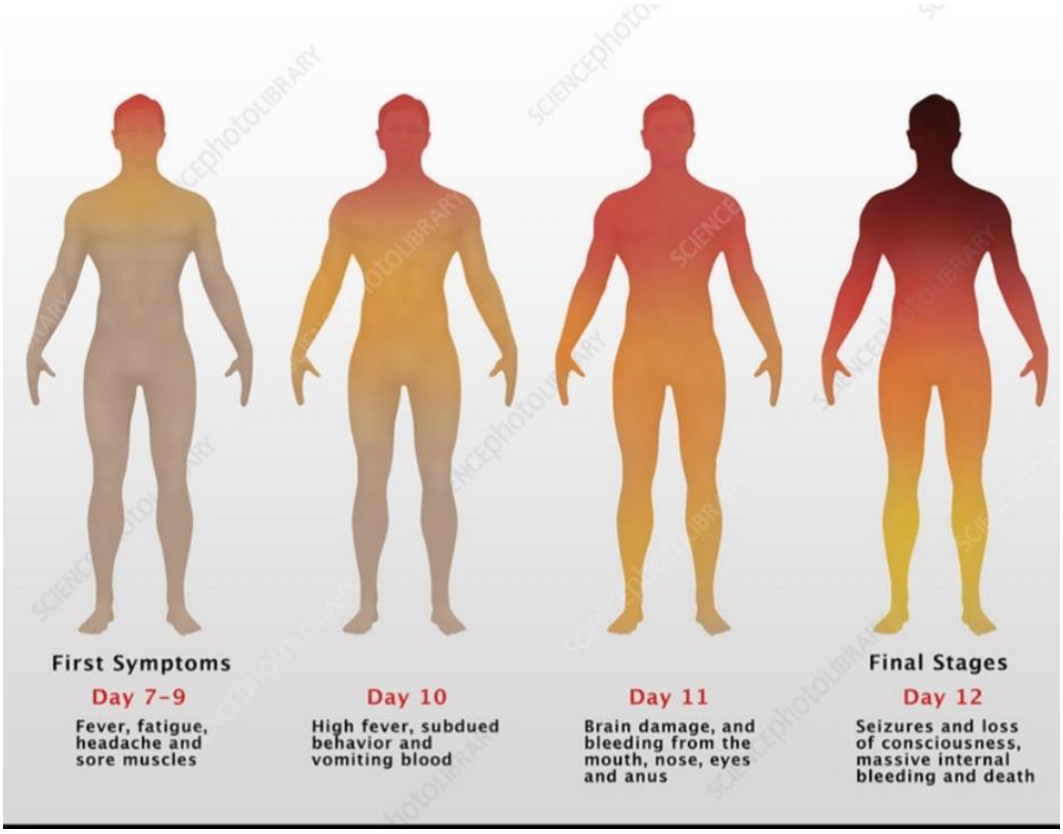

Figure A : symptoms of ebola

Classification of virus

Ebola virus disease is a deadly disease with occasional outbreaks that occurs mostly in African continent. These are of following type

1. Ebola virus (Species Zaire ebola virus)
2. Sudan virus (Species Sudan ebola virus)
3. Tai forest virus (Species Tai forest ebola virus)
4. Bundibugyo virus (Species Bundibugyo ebola virus)
5. Reston virus (Species Reston ebola virus) [3]

Different species	Mortality rate
Zaire spcs	70%
Sudan spcs	50%
Bundibugyo	40%
Tai forest	Unknown
Reston	0%

Table 1 Mortality rate for different species of Virus

MODE OF TRANSMISSION

From person to person: People who have Ebola virus typically don't become contagious until they develop symptoms. The viruses can spread through blood, body fluids, or contaminated items such as bedding, clothing or needles. Family members can be infected as they care for sick relatives or prepare the dead for burial or by practicing funerals of infected dead one. Medical personnel can be infected if they don't use specialized personnel protective equipment.

From animals to humans: virus can spread to humans through infected animals bodily fluids and by killing or eating infected animals can spread the viruses. Close contact is the most important route of Ebola virus transmission. Virus can survive in body fluids of patients for days and invade into recipients bodies via mucous membranes or broken skin. The first patients of past EVD outbreaks often had a history of contact, such as eating

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

or handling infected non human primates or other mammals. Most of the cases were associated with hospital mediated dissemination and intra familial transmission. [5][12]

History and outbreaks

According to studies approximately 27 natural outbreaks of EVD occurred in africa from 1976. The 1st outbreaks of EVD was in the year 1976 . In the year 1994 an outbreak of EVD has been reported almost annualy leading upto massive outbreak of disease I went africa in 2014 .In Gabon 4 confirmed EVD outbreaks has fatality rates upto 82 % . After that In the year 1996 again one outbreak is reported. This outbreak is linked to slaughtering of a chimpanzee found dead in the rain forest Ultimately involves 37 cases with the 21 fatalities .The largest outbreak was reported in the nothing central uganda from 2000- 2001 caused by the Sudan virus . It involved 425 cases but low fatality rate of 53% attend and participation in burial ceremonies were major rishi factors during this outbreak and also healthcare workerswere at high risk 3 additional small outbreaks associated with Sudan virus were reported in 2012 and 2012 . In the past 3 higher fatal EVD outbreaks were reported in the congo from 2001 to 2003 .The average fatality rate during these 3 outbreaks exceeded 80% and included most fatal outbreak till date . In the year 2014 a total of 18500 cases approximately recorded and 6841 deaths have been recorded from 3 countries of West africa (guinea , liberia , sierra leone) .[4][5][9]

Epidemiology

Ebola virus was originally discovered in 1976, considered a rare exotic disease. Since its discovery, over 20 outbreaks have occurred since 1976; many outbreaks were cohealth to areas in Sudan. Endemic outbreaks of virus due to eating contaminated monkey meat. The epidemic spread is usually due to transmission to family members, then community members and funeral practice and several outbreaks were caused by laboratory contamination. In 1976, epidemic of haemorrhagic fevers was reported in 2 adjacent areas; first in Southern Sudan and in Northern Zaire. The most recent outbreaks considered ongoing since June 2020, in the Democratic republic of the Congo. The longest outbreak turned epidemic spanned West Africa, Europe and US in the year 2015.

The mortality rate ranges 25% to 90% based on the strain of virus. The deadliest strain, Zaire strain was once 90% fatal. Due to increased awareness, and early detection the average mortality rate is about 50%. The fatality rate of EVD for the age group of 21 years and under is significantly lower than that in the age group of 45 years and older. The biggest outbreak on record is the 2013-2016 epidemic is West Africa with almost 30,000 cases and over 11,000 fatalities. In the year 2015, the laboratory confirmed case attributed to Ebola virus was 26,969 including 11,135 deaths. Historically, EVD has occurred in areas around the rain forest of Central Africa. [2][4]

Pathophysiology

Ebola virus infection first appears to disable the dendritic cells of immune system and then through cytokine storm, the vascular system leading to haemorrhage, hypotension; followed by shock and death. The dendritic cells are unable to mount an interferon response, impeding macrophages; release of inflammatory proteins and damages blood vessels and endothelial cells leading to blood leakage. The virus also affects organs such as the liver, adrenal gland (destroying the ability to synthesis steroids and leading to circulatory failure) and also affect gastrointestinal tract (vomiting, diarrhoea). These virus disable the major systems by uncontrolled replication it can spread to all system and lead to death. [6]

Diagnosis

The diagnosis of Ebola virus disease needs careful examination, which includes complete history and it is very difficult to diagnose EVD. The direct detection of the Ebola virus can be perform by PCR(Polymerase chain reaction) , ELISA, Immunoflourescent and Immunohistochemistry. Enormous amount of Ebola virus are found in dermal tissue, skin biopsies are considered for detection. Some Supplemantary tests namely, complete blood count, metabolic panels liver enzymes and coagulation studies are also helpful in the diagnosis. [8] [7]

Stages	Methods
Initial days of infection immediately after Symptoms appeared	Antigen-comparing ELISA testing IgM ELISA PCR
Later disease course or after recovery	IgM and IgG antibodies PCR
Retrospectively in diseased Protein	Immunohistochemistry Viral isolation

Table 2 – Diagnostic methods at different stages.

Prevention

When living in or travelling to a region where Ebola virus is present, the people must follow following steps to prevent the disease.

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

- Avoid contact with bats, forest antelope and non human primates blood, fluids or meat prepared from these animals.
- Avoid contact with body fluids and blood of infected persons.
- Avoid contact with items which are used by infected persons.
- Avoid funeral or burial practices that involve touching the body of someone who died from EVD or suspect EVD.
- Do not visit ebola treatment clinics and hospitals.
- Stop or completely terminate intake of blush meat i.e. meat of bats, antelopes,and monkeys.
- Care providers must take extra care to avoid ebola by wearing protective clothing, masks, glooves etc.[11]

Environmental Infection Control:- The infected patients are cared for health care settings, specific precautions should be taken to reduce the potential risk of transmission through contact with contaminated surfaces. Asymptomatic persons who had a possible exposure at any risk level should be monitored for signs and symptoms. Monitoring should continue for 21 days after the last known exposure; and observed clinical symptoms should be reported immediately.

Isolation and Quarantine:- By isolating uninfected people from infected ones helps in preventing the spread of disease. And quarantining the infected people also helps in preventing disease.[10]

Treatment

Ebola is rarely deadly virus as far as researchers have conducted many experiments, there is no cure for ebola. But there are two drug treatment approved for the treatment of ebola virus.

They are 1. Inmazeb

2. Ebanga

1. Inmazeb : Ebola virus has been responsible for several outbreaks but there were not approved therapies to treat it Inmazeb which is combination of three monoclonal Antibodies Atoltivimab , maftivimab ,odesivimab and these drug is the first food and drug administration approved treatment for zaire ebola virus infection in all types of patients. Inmazeb is helpful in prevention of deaths that occurred by EVD

2.Ebanga : it helps in the treatment of ebola virus disease it has been recent treatment approved for the treatment of infection caused by zaire ebola virus . It is given through injection It acts by binding to the glycoprotien of virus thereby blocking virus entry to host cells .[12]

Nowadays treatment focused on by giving supportive care to the patients . The most important aspect of the supportive care is the maintaince of intravascular volume with fluids or oral solutions that contains electrolytes. [11]

Conclusion

Ebola virus is highly dangerous and lethal to humans, not only humans but also non humans primates. The spread of the disease is mainly due to transmission from person to person and also from animals to humans and major risk factor is practicing inadequate hygienic practices in hospital and other places. Among all the types more fatal one is Zaire strain. Once infected the symptoms appears like other fevers and detected by diagnostic test. It should be diagnosed earlier otherwise it will difficult to control symptoms. Infected people should be Quarantined to prevent spread of disease. One must should maintain hygeinic conditions and should isolate from infected ones and getting vaccination is primary step to prevent spread of disease. Bringing awareness among people about disease and disease transmission will help in decreasing mortality rate.

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