PHARMATUTOR
PHARMACY INFOPEDIA
ISSN: 2347-7881

Review Article

A Review on Ebola Virus Disease

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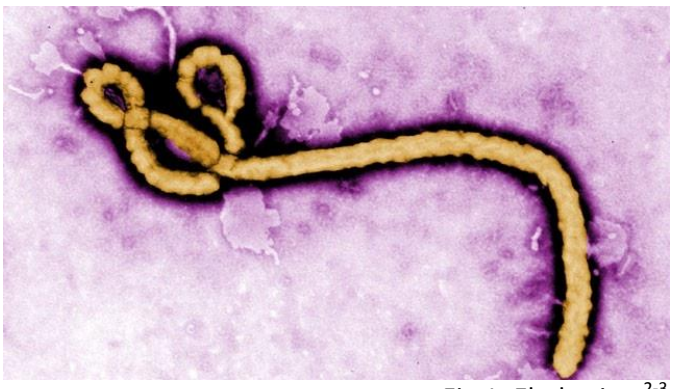
ABSTRACT

The Ebola virus (formerly officially designated Zaire ebolavirus, or EBOV) was first seen infecting humans in African continent; especially Sudan, Democratic Republican of Congo, Zaire and nearby countries. Fruit bats of the Pteropodidae family are considered to be the natural host of the Ebola virus. In the current outbreak, most cases are the result of human-to-human transmission, when there is direct contact with bodily fluids, secretions, the mucous membrane or broken skin of an infected person. The disease typically occurs in outbreaks in tropical regions of Sub-Saharan Africa. The virus is transmitted to people from wild animals and spreads in the human population through human-to-human transmission. But now, the virus seems to have enthralled the global interest due to its lethal prospective. EVD outbreaks have a case fatality rate of up to 90%. The research is ongoing on development of making vaccine to curb this virus yet licensed success or specific treatment is not achieved. Severely ill patients require intensive supportive care.

Keywords: Ebola virus, Ebola hemorrhagic fever, EBOV, Ebola HF, Outbreak of Ebola, EVD

INTRODUCTION

The Ebola virus disease (EVD), previously known as Ebola hemorrhagic fever (Ebola HF) is a severe condition caused by a virus belonging to genus *Ebolavirus*, family *Filoviridae* and order *Mononegavirales* [1-5].



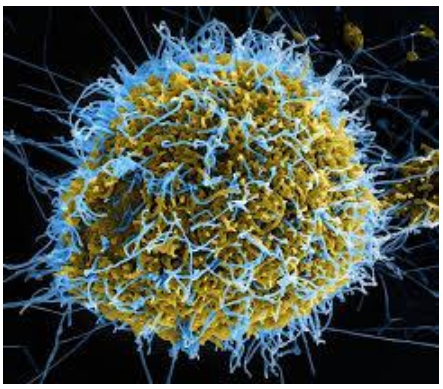


Fig.1: Ebola virus[2-3]

These five viruses are-

· Bundibugyo virus (BDBV),

· Ebola virus or Zaire ebolavirus (EBOV), this is most fatal among all five

· Sudan virus (SUDV),

How to cite this article: KS Rathore, R Keshari, A Rathore, D Chauhan; A Review on Ebola Virus Disease; PharmaTutor; 2014; 2(10); 17-22

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PHARMACY INFOPEDIA
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· Taï Forest virus (TAFV).
· The fifth virus, Reston virus (RESTV), is not thought to be disease-causing in humans.
This virus spreads through direct contact with the bodily fluids of an infected person or animal, known to be a condition that is transmitted from animals to humans. The World Health Organization calls it one of the world's most virulent diseases. Medecins Sans Frontieres (MSF) describes Ebola as it is one of the world's most deadly diseases.

TRANSMISSION OF THE VIRUS

Apropos of the scientists there are five different types of the virus, all of which have the potential to infect humans. According to the WHO (World Health Organisation) this disease can be transmitted from close contact with the blood, secretions, organs or other bodily fluids of infected animals (commonly monkeys, gorillas, chimpanzees, baboon and fruit bats). In humans the disease can be transmitted by the following methods [6-8].

- Coming into contact with the blood, secretions, organs or other bodily fluids of an infected person.
- Contact with the bodily fluids of an infected person who has passed away.
- Handling the meat from infected animals.
- Exposure to objects (such as needles) that have been contaminated with infected secretions.
- Healthcare workers may contract the disease through transmission as well through contact with infected bodily fluids.

RISK POPULATION

The disease is contagious, so travelers are most likely to get infected and spread the virus. Captivatingly, this condition is also a hospital acquired infection (nosocomial infection) and is commonly transmitted to healthcare staff. Apart from that, high risk individuals include immunocompromised patients, diabetics, patients with kidney and liver failure and HIV infected people [9].

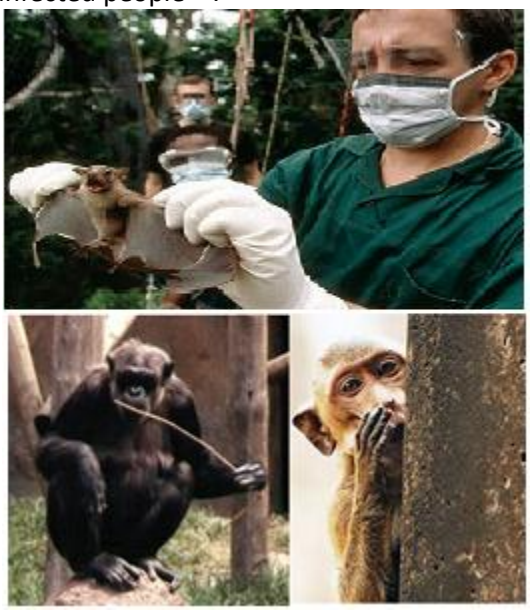

Fig.2: Animals susceptible to spread Ebola virus[4-5]

SYMPTOMS

Symptoms typically start two days to three weeks after contracting the virus. The incubation period for this disease is about one week (or the time between when the actual infection takes place to the time when a person sees symptoms of this condition). After this period a person will commonly see the signs that are considered as 'early symptoms'[1, 4, 10].

The early symptoms:
- Nausea,
- Vomiting,
- Fever,
- Muscle pain
- Sore throat
- Headache,
- Rashes, and
- Stomach Pain.

Apart from that a person may also experience symptoms like pain in the lower back, arthritis

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like pain all over the body, loss of appetite, hiccups, shortness of breath and trouble swallowing and diarrhea. These symptoms can appear two to 21 days after infection. The WHO says these nonspecific early symptoms can be mistaken for signs of diseases such as malaria, typhoid fever, meningitis or even the plague[1, 6].

Fig.3: Symptoms of EVD [5, 9- 12]

Once the condition has progressed a person may notice symptoms like:

- Bleeding: All people infected show some symptoms of circulatory system involvement, including impaired blood clotting. In 40–50% of cases, bleeding from puncture sites and mucous membranes (e.g. mouth, gastrointestinal tract, nose, ears, vagina and gums), even reddening of eyes and bloody vomit has also been reported[13-15].
- Conjunctivitis
- Genital swelling
- Increased sensitivity to pain on the skin,
- Rashes all over the body,
- And reddening of the roof of the mouth.

DIAGNOSIS

Usually a physician will be able to diagnose the condition with the symptoms alone, but in order to confirm the diagnosis he/she may prescribe tests like-

· Complete Blood Count (CBC),
· Coagulation studies (a test to check for the amount of time a person's blood needs to clot),
· Viral antigen testing (a test to check for the presence of the viral antigen) and
· Liver function test (LFT).

The diagnosis is confirmed by isolating the virus, detecting its RNA or proteins, or detecting antibodies against the virus in a person's blood. Isolating the virus by cell culture, detecting the viral RNA by polymerase chain reaction (PCR) and detecting proteins by enzyme-linked immunosorbent assay (ELISA) is effective early and in those who have died from the disease[16-19].

TREATMENT

There is no definitive treatment, and common anti-viral therapies do not work on the Ebola virus. MSF says patients are isolated and then supported by health care workers. Efforts to help persons who are infected include giving either oral rehydration therapy (slightly sweet and salty water to drink) or intravenous fluids, maintaining their oxygen status and blood pressure and treating them for any complicating infections. Therefore the goal of the treatment is to treat the symptoms and prevent secondary infections or complications like pneumonia and liver failure. DNA vaccines, adenovirus-based vaccines, and VSIV-based vaccines have entered clinical trials so hopefully very soon these will available in pharmacies [4, 14, 19].

Two American missionary workers infected with Ebola were given an experimental drug called ZMapp which seems to have saved their lives. The drug, developed by a San Diego firm, had never been tried before on humans, but it showed promise in small experiments on monkeys. There are other experimental drugs out there. Tekmira, a Vancouver-based company that has a $140 million contract with the U.S. Department of Defense to develop an Ebola drug, began Phase 1 trials with its drug in

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ISSN: 2347-7881

January. But the FDA recently halted the trial, asking for more information [20].

PROGNOSIS

According to the WHO reports, the disease has high mortality rate: often killing between 50% and 90% of those infected with the virus.. Their death is usually due to a drop in their blood pressure and failure of organs [2, 21].

PREVENTION

There aren't any vaccinations available as of now, so basic hygiene is of importance and a must be followed in order to prevent the onset of the condition can all serve as precautionary measures [1-4, 15, 22-25].

Simple activities like-

· Drinking water from a clean source,
· Cooking your meat well,
· Avoid bush meat,
· Maintaining general hygiene,
· Washing your hands well with soaps or detergents,
· Avoid crowded places,
· Sterilizing equipment and wearing protective clothing including masks, gloves, gowns and goggles,

Follow infection-control procedures,

· Don't handle remains of patients died of Ebola or Marburg disease[14],
· Isolate people who have Ebola symptoms,
· Disinfecting your surroundings,
· Culling of infected animals, with close supervision of burial or incineration of carcasses.
· Yet, not travelling to the areas or countries where the virus is found is the best way to avoid Ebola and
· If any early symptoms noticed, should visit a doctor immediately.

Fig.4: Preventive steps for Ebola virus disease[1, 5, 17]

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CONCLUSION

The current Ebola outbreak in Africa is dominating headlines globally. For people in West Africa who are currently trying to get through this terrible outbreak that will be of little comfort. Even so, if casting the international fuss onto Ebola helps to bring our concept of risk perception into sharper spotlight then that can't be a bad thing - not just in terms of boosting immunization rates at habitat.

But also if it helps to ring a bell us that Ebola is not the exception, but rather just one case of the terrible custom - where thousands of men, women and children are dying from a range of ghastly diseases every day - then perhaps that will bring the world a step closer to doing more about it.

ACKNOWLEDGEMENTS

We are profusely thankful to Dr.NN Singh Rathore Managing Director, BN Institutions, Dr.Chetan Singh Chauhan, Principal, BNIPS, Udaipur and Mr.Bhupendra Vyas, HoD, Dept. of Pharmacognosy, BN College of Pharmacy, Udaipur for their constant motivation to write on deadly Ebola virus.

↓ REFERENCES

1. Feldmann H, Geisbert TW. Ebola haemorrhagic fever. The Lancet, 2011; 377 (9768): 849–862.
2. itv.com/news/2014-07-07/could-the-deadly-ebola-virus-spread-to-britain/ Accessed on Aug.3, 2014.
3. hngn.com/articles/38326/20140806/ebola-tobacco-drug-could-be-possible-through-genetic-engineering-like-process.htm; Accessed on Aug.3, 2014.
4. bbc.com/news/health-28663217. Accessed on Aug.4, 2014.
5. http://www1.american.edu/ted/ebola.htm. Accessed on Aug.4, 2014.
6. Flemming A. Achilles heel of Ebola viral entry. Nat Rev Drug Discov, October 2011; 10 (10): 731.
7. Kuhn, Jens H, Becker, Stephan, Ebihara, Hideki. Proposal for a revised taxonomy of the family Filoviridae: Classification, names of taxa and viruses, and virus abbreviations. Archives of Virology, 2010; 155 (12): 2083–103
8. Bowen, ETW, Lloyd, G, Harris. Viral hemorrhagic fever in southern Sudan and northern Zaire. Preliminary studies on the etiological agent. Lancet, 1977; 309 (8011): 571–3.
9. itg.content-e.eu/Generated/pubx/173/filoviruses/ebola_virus.htm, accessed on August4, 2014.
10. article.wn.com/view/2014/04/19/Ebola_virus_in_Guinea_is_new_strain/Accessed on August4, 2014.
11. crashcade.com/strange/2014/08/the-ebola-virus-hits-atlanta-a-love-story-9218.html. Accessed on Aug.4, 2014.
12. ebolavirus2014.com/ebola-virus-symptoms-pictures-images.html.
13. Wamala JF, Lukwago L, Malimbo M. Ebola hemorrhagic fever associated with novel virus strain, Uganda, 2007-2008. Emerging Infect. Dis., 2010; 16 (7): 1087–92.
14. Feldmann, HK. Molecular biology and evolution of filoviruses. Archives of virology. Supplementum, 1993; 7: 81–100.
15. Taylor, D, Leach, R, Bruenn, J. Filoviruses are ancient and integrated into mammalian genomes. BMC Evolutionary Biology, 2010; 10: 193.
16. Carette JE, Raaben M, Wong AC. Ebola virus entry requires the cholesterol transporter Niemann-Pick C1. Nature, September 2011; 477 (7364): 340–3.
17. nairaland.com/1835035/prevention-ebola-virus. Accessed on August4, 2014.
18. Côté M, Misasi J, Ren T, Bruchez A. Small molecule inhibitors reveal Niemann-Pick C1 is essential for Ebola virus infection. Nature, September 2011; 477 (7364): 344–8.

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PHARMACY INFOPEDIA
ISSN: 2347-7881

19. Miller EH, Obernosterer G. Ebola virus entry requires the host-programmed recognition of an intracellular receptor. EMBO Journal, March 2012; 31 (8): 1947–60.
20. businessinsider.in/Heres-Everything-We-Know-About-The-Secret-Serum-Used-To-Treat-An-American-With-Ebola/articleshow/39639894.cms Accessed on Aug.5, 2014.
21. Johnson, KM, Webb, PA, Lange, JV, Murphy, FA. Isolation and partial characterization of a new virus causing hemorrhagic fever in Zambia. Lancet, 1977; 309 (8011): 569–71.
22. Netesov, SV, Feldmann, H. Family Filoviridae. In van Regenmortel, MHV, Fauquet, CM, Bishop, DHL, et al., Virus Taxonomy—Seventh Report of the International Committee on Taxonomy of Viruses. San Diego, USA: Academic Press, 2000; pp. 539–48.
23. Pringle, CR. Virus taxonomy-San Diego 1998. Archives of Virology, 1998; 143 (7): 1449–59.
24. Pattyn, S, Jacob, W. Isolation of Marburg-like virus from a case of hemorrhagic fever in Zaire. Lancet, 1977; 309 (8011): 573–4.
25. Feldmann, H; Geisbert, TW. Family Filoviridae. In Fauquet, CM, Mayo, M A, Maniloff, J, Desselberger, U, Ball, LA. Virus Taxonomy—Eighth Report of the International Committee on Taxonomy of Viruses. San Diego, USA: Elsevier/Academic Press, 2005; pp. 645–653.