Ebola: A Concern

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Abstract

Ebola is considered as a fast spreading virus that has been in the news for its recent severe outbreak in Africa. It has become a concern for WHO to cure and treat this menace before a more severe pandemic episode threatens the world. The fatality ratio is about 69%. Ebola has been found to spread through body fluids, which can make saliva a vital specimen for the detection and also as a mode of spread of Ebola. It is a major concern for dentists as we are in constant contact with body fluids like blood and saliva. No medicine or vaccination has still been approved for its cure. There are various ongoing research projects to find a vaccine against this virus.

Introduction

Filoviridae is the virus family of which we do not know about the spread, causative agent, incubation period and outcome. After its recent outbreak and spread, researches are still going on to control them.¹

Marburg : The first known Filovirus had first outbreak in 1967.At that time nobody knew anything about it. The laboratory workers were admitted to the hospital with an unusual disease in Marburg, Germany. The causative agent was the import of green monkeys from Africa for use in research and vaccine production. Secondary precautions were taken in many countries against this virus where there was import of monkeys and tests were also conducted to exclude this virus from vaccine substrate. Uptil now there have been only three recurrences of this virus and only those who travelled in rural African areas have been effected and no report on its extensive transmission has been reported.¹

Ebola: The second known Filovirus, first appeared in 1976 in two simultaneous outbreaks, one in Nazara, Sudan, and the other in Yambuku. Democratic Republic of Congo. The latter occurred in a village near the Ebola River, from which the disease takes its name. In 1989 it surprised once gain when it appeared in monkeys imported to Reston, Virgenia, outside of Washington DC.¹ In 1994 it occurred in Mekouka and other gold mining camps and areas and till 1995 it was considered as yellow fever. Between October 2001- july 2002 it occurred in border of Gabon and Republic of Congo. The current outbreak in West Africa (first case was found in March 2014) is the largest and most complex Ebola outbreak since the Ebola virus was first discovered in 1976. There have been more cases and deaths in this outbreak than all others combined. It has also spread across the countries starting in Guinea and then spreading across land borders to Sierra, Leone and Liberia by air to Nigeria and USA and by land to Senegal and Mali.On August 8,2005 the WHO director -general declared the West Africa outbreak as public health emergency of international concern under the international health regulations (2005).²

Marburgvirus , and Ebolavirus. There are five species that have been identified : Zaire , Bunibugyo, Sudan, Reston and Tai Forest. The first three have been associated with larger outbreaks in Africa. The virus causing the 2014 West African outbreak belongs to the Zaire species.¹

Etiopathogenesis

It has been still not known completely about how this virus attacks and spreads in humans, but it has been found that contact with the bodily fluids of the infected animals and humans causes its transmission. It has been found that fruit bats are the natural reservoirs of this virus.³

When infected to humans the virus effects the monocytes and macrophages as its first target. It also extends its effect to dendritic cells, liver cells and endothelial cells. There are different mechanisms by which the virus targets or effects the human immune system. Antibody dependent enhancement (ADE) is one such mechanism which involves in the increase of attachmnent between the host and the virus by the host body itself thus causing the infection to amplify. The antigen antibody binding occurs in which Abs bind to the antibody at their Fc sites while virus binds with the antigen at the free site of Abs. The antiviral responses of the host body are also blocked by the protein which is present in the virus known as VP35, by blocking the interferon pathway of immune system.³

After attacking the host's immune system, virus enters the host-cell. It has still not been confirmed as to what is the exact mechanism of its entry. One such process which can be considered as entry is known as macro-pinocytosis. The exact process of how it occurs is still not clear. It is said to occur when actin polymerization results in formation of plasma membrane and it moves outwards and results in extension formation. These distal loops of the plasma extension fuse to form a macro-pinisome. Once inside, the virus replicates itself and spreads to other parts. After the replication is over, the virus loses its attachment with the cell. The virus which is present in plasma membrane moves and results in assembly formation and finally exits from the host cell.³

The Filoviridae family includes three genera : Cuevavirus,

The Ebola virus is transmitted by fruit bats without causing

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any harm. It enters the body through contact with blood, urine, feaces or other bodily fluids. The incubation period is about 21 days. It attacks the immune system thus destroying the white blood cells. The cells transport the virus throughout the body. It results in the formation of blood clots that damages the organs and also depletes the blood clotting agents. This results to the damage in the immune system and it goes into a dangerous overdrive known as cytokine stage and ultimately it turns against the body. The virus effects all organs including liver, kidneys intestines etc. There is an overall damage to the vascular system. Internal and external bleeding occurs not only from wounds but also from mucous membranes and its orifices. Death is mostly caused by organ failure or by hypovolemic shock.⁴

Symptoms & Oral Manifestations

The incubation period ie; the time virus takes from its onset to show its symptoms is 2-21 days. It begins with fatigue, muscle pain, headache and sore throat. This is later followed by vomiting, diarrhea, rash, impairement of kidney and liver functions, in some cases there is internal as well as external bleeding (oozing from gums, blood in stools).⁵

The oral manifestations of this virus include bleeding from gingival, odonophagia, non specific mucosal lesions, including white and red patches, and presence of ulceration. It has been found that bleeding is also a late feature of this disease.⁶

Ebola & Dentistry

It has been found that patients find it hard and often refuse to give their blood samples during the outbreak period. The population already suffers from the consequences of this virus and in addition to it they find it more hard to provide blood samples or go for other invasive procedures. Saliva as a diagnostic tool is more easy and comfortable way of taking sample. It has got many advantages over other body fluids for taking samples.⁷ It is also known that oral samples are safer and more comfortable and omit the chances of transmitting diseases. It can be collected by the patient himself and are of great use and importance in mass epidemics. Saliva has got various properties. It does not clot like blood and contains various antibodies. For the detection of ebola in saliva we can use RT-PCR, which provides us with a diagnosis in a more convenient manner.⁷

Ebola virus can become a concern for dentistry in future. Uptil now no case has been reported in dental field but as it spreads by means of oral fluids and saliva being one of them, it incubation can effect the dental care workers working in areas of outbreak. In our day to day dental practices we are in constant contact with saliva and blood. This makes us more susceptible to this viral menace. Dental practioners need to be more vigilant and cautious while treating cases and should follow the universal guidelines for sterlisation and disinfection.⁸

Treatment & Vaccination

There has still not been any approved vaccine or medicine for the treatment of Ebola. Supportive treatment is provided to the patients.⁵

- It includes continous intravenous fluids and also to maintain the body electrolyte content.
- The body temperature and blood pressure has to be under control..

• While dealing with body fluids, one has to be more cautious. It has been found that nucleoside analogue inhibitors of the cell which encodes enzyme S-adenosyl homocy-stiene hydrolase (SAH) show some inhibiting factor against Zaire ebola virus. The function of this virus is to inhibit the replication of the virus so that it does not spread further. The use of equine-derived hyperiimune globulins and human-derived convalescent globulins is also implicated sometimes as it gives or provides with passive immunity.⁵

There are also ongoing researches for the vaccines and other modes of treatment for Ebola virus, but most of these are still not confirmed and tested completely. Currently there are two potential vaccinations which are going through human testing procedure.⁵

Prevention And Control

It is very important to control the virus before it extends its severity. Various factors should be kept in mind while preventing its extent.⁵ These factors include :

- The humans should limit their contact with the infected animals specially fruit bats or monkeys/apes. The raw meat should be avoided and the handling of animals should be done with proper care.
- The human to human transmission should also be avoided. Less or no direct contact should be made with infected people. Their samples should be handled with proper care and should maintain proper hygiene.
- The risk of sexual transmission should not be ruled out, so it should be avoided as men and women who have been recovered from Ebola virus. There are chances of virus being present in their body fluids for minimum of three months from the onset of symptoms.
- Proper care should be taken for people who are suffering from this virus and there should be proper burial of dead also as it can also cause spread of virus.⁵

Conclusion

Ebola virus disease is a very severe form of disease which causes high fatality rate and the treatment results are not yet proven. The human population gets effected at a faster rate and the transmission from infected animals and human to human occurs through bodily fluid contact which includes blood, saliva, semen and other agents. It is a potential threat for dentists also as we are in constant contact with blood and saliva. Hence, it merits our attention.

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