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Ayurveda Approach to Ebola Virus Disease

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ABSTRACT

The Ebola virus causes an acute, serious illness which is often fatal if untreated. Ebola virus disease (EVD) first appeared in 1976. It is thought that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest. It can be difficult to distinguish EVD from other infectious diseases such as malaria, typhoid fever and meningitis. Prevention is the best treatment: As far as we know, this virus is transmitted through bodily fluids and it is not air borne. If one is not going to contract this virus in flying or sitting next to Ebola infected person, unless come in contact with blood, vomits, stool, urine or get injected with infected needle, then he or she will not be affected. Healthy nutrition is the best way to keep immune system boosted. Group of studies and others like them are recognizing the central role of the immune system in survival for an infection like Ebola, which has no apparent clinical cure, natural reinforcement of the immune system may represent an oasis of hope in the desert of fear and panic. Exercise is an important foundation of health. Exercising supports the immune system through its physiological and mechanical effects on the body. Ayurveda is the ancient science of health. The word Ebola is obviously not mentioned in the Atharva Veda, however, the sign and symptoms that we see today in Ebola hemorrhagic fever are the same as the disease called Raktasthiwi Sannipat (Raktasthiwi Sannipat). Rakta means 'blood', 'sthiwan' means 'to spit out', and 'sannipat' means the involvement of a different dosha, which is usually a complicated type of disease; difficult to cure and sometimes incurable too. Herbal support is the next line of protection that adds to the benefits of daily activity. Ayurveda offers a wide range of herbs called rasayana. According to the Ayurvedic theory, rasayana herbs are rejuvenative medicines that promote health at all tissue levels of the body. Amla, *Embllica officinalis*, is one of the more popular rasayana. All the above discussion based on *Ayurvedic* textual references inspires the author to go for further review on treatment of Ebola Virus Disease as well as other fatal diseases with *Ayurveda*. This will lead to lower morbidity and mortality rate due to many viral or other infective diseases. Authors made an attempt to emphasize that the Ayurveda herbs may play a vital role for the treatment / management of EVD.

Keywords: EVD, Raktasthiwi Sannipat, Atharva veda, Guduchi, Ashwagandha.

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INTRODUCTION

The Ebola virus causes an acute, serious illness which is often fatal if untreated. Ebola virus disease (EVD) first appeared in 1976 in 2 simultaneous outbreaks, one in Nizaria, 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. The current outbreak in west Africa, (first cases notified 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 between countries starting in Guinea then spreading across land borders to Sierra Leone and Liberia, by air (1 traveler only) to Nigeria, and by land (1 traveler) to Senegal. The most severely affected countries, Guinea, Sierra Leone and Liberia have very weak health systems, lacking human and infrastructural resources, having only recently emerged from long periods of conflict and instability. On August 8, the WHO Director-General declared this outbreak a Public Health Emergency of International Concern. A separate, unrelated Ebola outbreak began in Boende, Equateur, an isolated part of the Democratic Republic of Congo¹. The virus family Filoviridae includes 3 genera: Cuevavirus, Marburgvirus, and Ebolavirus. There are 5 species that have been identified: Zaire, Bundibugyo, Sudan, Reston and Taï Forest. The first 3, Bundibugyo ebolavirus, Zaire ebolavirus, and Sudan ebolavirus have been associated with large outbreaks in Africa. The virus causing the 2014 west African outbreak belongs to the Zaire species²

Transmission

It is thought that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest. Ebola then spreads through human-to-human transmission via direct contact (through broken skin or mucous membranes) with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces and materials (e.g. bedding, clothing) contaminated with these fluids. Health-care workers have frequently been infected while treating patients with suspected or confirmed EVD. This has occurred through close contact with patients when infection control precautions are not strictly practiced. Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola. People remain infectious as long as their blood and body fluids, including semen and breast milk, contain the virus. Men who have recovered from the

disease can still transmit the virus through their semen for up to 7 weeks after recovery from illness.³

Symptoms of Ebola virus disease

The incubation period, that is, the time interval from infection with the virus to onset of symptoms is 2 to 21 days. Humans are not infectious until they develop symptoms. First symptoms are the sudden onset of fever fatigue, muscle pain, headache and sore throat. This is followed by vomiting, diarrhoea, rash, symptoms of impaired kidney and liver function, and in some cases, both internal and external bleeding (e.g. oozing from the gums, blood in the stools). Laboratory findings include low white blood cell and platelet counts and elevated liver enzymes.

Diagnosis

It can be difficult to distinguish EVD from other infectious diseases such as malaria, typhoid fever and meningitis. Confirmation that symptoms are caused by Ebola virus infection are made using the following investigations:

- antibody-capture enzyme-linked immunosorbent assay (ELISA)
- antigen-capture detection tests
- serum neutralization test
- reverse transcriptase polymerase chain reaction (RT-PCR) assay
- electron microscopy
- virus isolation by cell culture.

Samples from patients are an extreme biohazard risk; laboratory testing on non-inactivated samples should be conducted under maximum biological containment conditions.

The Ebola Infection

Upon contraction of the Ebola virus, the illness begins with flu-like symptoms, body aches, fatigue, headaches, and fever. Some may also develop a bruising rash on the skin, described as a hemorrhagic rash. In the later stages, these individuals develop loss of appetite, severe stomach ache, diarrhea with or without bleeding, and vomiting⁴ Hemorrhage and loss of blood are the most devastating aspects of the infection and often result in fatality. The infection runs its course within 14-21 days. During this time, if the virus does not kill the infected person, the immune system of the person is able to overcome the disease. Researchers have been able to shed a lot of light on how the Ebola virus affects the biology of the infected person. This may also shed some light on ways to defend against the infection. Ebola virus contains two very similar glycol-proteins (GPs); which form the

interactive protein structure that appears on the surface of the virus⁴. The GPs bind to the receptor proteins located on the host human cells on various organs. Cells of the gastrointestinal tract, bloodstream, and immune system are the first to be affected by viral invasion. After invading the cell, virus over-takes the cell's protein production and depletes the cell. Infection of circulating immune cells like monocytes and dendritic cells weakens the immune cells; because they are circulatory, these cells carry the virus to all parts of the body. Viral activity also manipulates these cells to create high amount of inflammatory signaling molecules. In response to inflammation, endothelial cells of the blood vessels become more porous causing bleeding problems. The worst effects of the infection are seen on circulatory and immune system of the infected person. These effects result in the symptoms of diarrhea, vomiting, hemorrhage, and immune debility experienced by Ebola patients.

The Role of the Immune system and the Survival Factor

One arm of Ebola's fatality weakens the immune system making it difficult for the body to mount a response. However, the body and the immune system are persistent for survival. Research looking at the immune function of survivors and nonsurvivors is teaching us about nature's best strategy to overcome. The first defensive response of the immune system is to recognize and bind to the viral proteins. This is a double-edged sword, because this is also the easiest way for the cell to become infected. The surveillance immune cells (B-cells) bind to virus and produce IgM antibodies to recruit other immune cells to neutralize the virus. In a study of 2000-2001 Ebola outbreak in Gulu, Uganda; researchers looked at similar parameter of the immune system.⁵ In this study, the researcher looked at the immune responses of blood samples from survivor and non-survivors of this outbreak. It was discovered that survivors had developed antibodies against various proteins on the virus. These antibodies were still active in the survivors after the infection had passed. In a 12 year follow-up study with the survivors, the immune systems still carried IgM antibodies against the viral proteins. These individuals still produced a significant immune response to injected viral proteins over a decade after exposure to the illness. This group of studies and others like them is recognizing the central role of the immune system in survival. For an infection like Ebola, which has no apparent clinical cure, natural reinforcement of the immune system may represent an oasis of hope in the desert of fear and panic. *Prevention is the best treatment:* As far as we know, this virus is transmitted through bodily fluids and it is not air borne. If one is not going to contract this virus in flying or sitting next to Ebola

infected person, unless come in contact with blood, vomits, stool, urine or get injected with infected needle, then he or she will not effected.

Natural strategies for a resilient immune system

Healthy nutrition is the best way to keep your immune system boosted. Diets that are high in a variety of vegetables and fruits are most beneficial. Fruits and vegetables are packed with naturally occurring vitamins and minerals that support healthy enzymatic function in the body. A review of research indicates that fruits and vegetables in the diet support antioxidant, detoxification, immune activity and hormonal metabolism in the body. Dietary mushrooms are source of polysaccharides like β -glucan, that are directly modulate activity of the immune system. An average healthy diet must include up to 4-5 servings of a variety of vegetables every day; and 1-2 servings of fresh fruits every day.

Exercise is an important foundation of health. Exercising supports the immune system through its physiological and mechanical effects on the body. Exercise can help flush out infective agents and cancer-causing toxins by promoting elimination of waste through urine and sweat. It improves circulation of in general – promoting circulation of immune cells and antibodies through all parts of the body. In a research study, moderate exercise performed over 12-15 weeks reduced the number of sick days by half. On the other hand; excessive rigorous exercise can weaken the body's defenses. Moderate exercise includes, 30-40 minutes of brisk walk 4-5 days every week.

Sleep is one the most healing aspects of daily life. It is the one time when the anabolic (building) functions in the body outpace the catabolic (destructive) functions in the body. Undisturbed sleep can be one of the most regenerative activities that an individual can have every day. Sleep is part of the sleep-wake cycle that helps to balance the circadian rhythm of hormones and physiological activity of the body. This aspect of sleep has a powerful regulatory effect on immune function of the individual⁵. More specifically, sleep has been shown to improve communication between immune cells and improve immunological memory.

Stress is a natural part of life that is an essential motivator survival and change. However, excessive stress and inadequate stress management can become detrimental to health. Just like a stretched rubber-band loses its elasticity over time, a stressed system loses its immunity as well. Chronic stress can make a weak immune system even weaker, increasing susceptibility to disease⁶ Simple stress relieving activity like exercise, deep breathing, yoga, and joyful recreational activity must be incorporated into daily life to induce effective transition into a relaxed state.

Ebola and Ayurveda

Ayurveda is the ancient science of health. The word Ebola is obviously not mentioned in the AtharvaVeda, however, the sign and symptoms that we see today in ebola hemorrhagic fever are the same as the disease called Raktasthiwi Sannipat (Raktasthiwi Sannipat). Rakta means 'blood', 'sthiwan' means 'to spit out', and 'sannipat' means the involvement of a different dosha, which is usually a complicated type of disease; difficult to cure and sometimes incurable too. Let's look at the symptoms as given in Yogaratnaakar⁸. Where one spits out blood from the mouth, with fever, vomiting, trisha, delirium, diarrhea, hiccups, burning sensation in eyes, shortness of breath, loss of consciousness, color of tongue is too black or red; these symptoms are associated with the disease Raktasthiwi Sannipata. This is famous for taking away the life. The symptoms that we see today for Ebola virus are similar to the symptoms described for this disease Raktasthiwi Sannipata. Although it is fatal if not treated, there is a remedy for this disease given in the Ayurveda text. It is described as Raktasthiwi Chikitsa in the Yog Ratnaakar⁹.

Herbal support and Ayurveda: Herbal support is the next line of protection that adds to the benefits of daily activity. Ayurveda offers a wide range of herbs called rasayana. According to the Ayurvedic theory, rasayana herbs are rejuvenative medicines that promote health at all tissue levels of the body. The traditional model of tissue formation teaches us that the components of blood related to nourishment like plasma (rasa) and red blood cells (rakta) are formed first. On the other hand, Ojas which represents components of the hormonal system, immune cells, etc. are formed at the end of the process of tissue formation. Rasayana herbs have the capacity to support healthy metabolism at all levels tissue formation – thus, promoting nourishment and protection.

Amla, *Emblica officinalis*, is one of the more popular rasayana. It has been used as part of a traditional formula called Chyawanprash for over 2000 years. Amla is a very useful antioxidant and liver supportive herb. Antioxidant function of this herb has a regenerative effect on the immune system¹⁰. The liver supportive activity of Amla has been shown to restore anti-oxidant system of the liver and restore elevated liver enzymes to normal. It has been observed to protect liver damage due to toxins and protect development of liver cancer.¹¹ Liver is the primary detoxing organ of the body. Optimal function of the liver reduces toxic burden and allows the immune system to deal with real threats.

Ashwagandha, *Withania somnifera*, is an excellent adrenal supportive herb that has tonifying effect on the whole hormone system. Ashwagandha contains glycoside compound of Ashwagandha have been observed to reduce stress on the adrenal gland and stimulate the thyroid gland activity¹². This demonstrates the anti-stress activity and pro-metabolic activity of

Ashwagandha. Both of these reinforce immune activity of the individual, indicated by the mobilization and activation of immune cells.¹³ Ashwagandha has also been observed to reverse immune-suppression caused by steroid use.¹⁴ Ashwagandha herb is one of the best hormonal and immune modulator offered by Ayurvedic tradition. In 1903 plague epidemic, people who were given Ashwagandha survived. Ashwagandha does not have strong antibacterial properties, but it does stimulate host defense.

Turmeric, *Curcuma longa*, this common household spice is emerging as a miraculous anti-inflammatory agent. While healthy, controlled inflammation is a part of a normal immune response; excessive inflammation causes tissue damage and depletion of the immune system. Turmeric contains the compound curcumin, which is recognized for helping control inflammation as effectively as Non-Steroidal anti-inflammatory drugs (NSAID). In animal studies, Curcumin has been observed to be equal Ibuprofen to prevent inflammatory plaque formation in Alzheimer disease. (Lim GP, et al. 2001)¹⁵ Curcumin does this without the risk of toxicity seen with NSAIDs. Additionally, Curcumin's effectiveness has been demonstrated in chronic diseases, inflammatory bowel disease, obesity and other metabolic diseases. (a,b)¹⁶ (Aggarwal BB.2010, Taylor RA, Leonard MC. 2011) When unnecessary inflammation is brought under control this takes a lot of stress from immune system and the adrenal gland – this also protects from inflammatory tissue damage. Altogether, managing inflammation in this way makes the immune system more efficient. Guduchi, *Tinospora cordifolia*, is a versatile herb for supporting immune and liver function. Guduchi is traditionally used in wide variety of conditions for its combination of anti-oxidant, anti-inflammatory, immune modulating and liver supportive actions. (a,b) (Sinha, Kirti and Mishra, N P.2004, Chintawar G, et al. 1999)¹⁷ A review of research indicates that Guduchi produces Its anti-inflammatory effect through blocking the effect of inflammatory signals like histamine, bradykinin, etc. (Sharma AK and Singh RH 1980)¹⁸ Immune supportive activity of this herb is demonstrated in animal studies by elevation and circulation of B-cell and T-cell lymphocytes, which perform surveillance and elimination of infective agents. In a demonstration of its dual functions as liver and immune support, Guduchi treated amoebiasis in animals by reversing liver abscess. (Sohni YR and Bhatt RM.1996)¹⁹

Other Important Ayurveda Herba and Preparations

Parpaticadi kwatha preparation for raktasthiwi sannipata- *Fumaria indica* (*Pittapapada*), *Alhagi camelorum* (*yawasa*), *Adhatoda Vasica* (*Adusa*), *Bhustrina*, *Picrorhiza kurroa* (*kutaki*) and *phula priyangu* all taken in equal amount. This decoction of ingredients should be taken with sugar (*sarkara*); which helps to prevent bleeding from the mouth. (*Adhatodavasica*: 2000)²⁰. *Nagarmotha*

along with padhma kasha, pittapapada, white chandan, jashmin, asparagus, mulethi, sweet neem, sugandhawala, chitrak, and red sandal wood; all are taken in equal amounts and made into a decoction. This also stops vomiting of blood. (Yogratnakara. 2012)²¹

Important Herb for the treatment of Ebola Virus Disease treatment

1. Gambhari – Anti-viral activity, Anti- Pyretic, Analgesic activity, Immunomodulatory activity, Urdhwag Raktapittahar, Daha-prashaman, Chhardinigrahana, Haemorrhagic disorders.²²
2. Yashtimadhu –Anti-viral activity, Potent Immuno-stimulant, Anti-inflammatory²³
3. Kutaki - Anti-viral activity, Hepatoprotective. ²⁴
4. Nagarmotha – Anti-viral activity.
5. Vasa– Thrombopoetic activity hence used in bleeding disorder.²⁵
6. Nimba – Activation of cellular immune response. ²⁶
7. Parpataka – Hepato-protective.²⁷
8. Chandana – Anti-viral activity.²⁸
9. Jati – Cytoprotective, Anti-inflammatory²⁹
10. Dhamasa– Anti-viral activity, blood purifier.³⁰

This short account of research reviews will help to understand the role of Ayurvedokta formulations in Ebola Virus disease and gives base for further research on treatment of this life threatening disease.

Few more remedies are given for symptoms like loss of consciousness, excessive sweating, breathlessness, anorexia etc... They are as follows –

- Sandnyakarak Nasya
- Uddhoolan Chikitsa
- Kshudradi Kwath (Yogratnakara.2012, Bhavprakasha, Vidyotini Commentary2010)³¹

CONCLUSION

All the above discussion based on Ayurvedic textual references inspires to go for further research and conclude that the work on treatment of Ebola Virus Disease as well as other fatal diseases with Ayurveda may play a vital role in human health care in the sense of prevention and treatment, both. This will lead to lower morbidity and mortality rate due to many viral or other infective diseases.

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