

EBOLA VIRUS - AN AYURVEDIC APPROACHTrivedi Atal Bihari¹, Mahajan Nitin², Sharma Raman³¹Associate Prof. H.O.D; ²Asstt. Prof. P.G P.G. Deptt of Kayachikitsa; ³P G Scholar J.I.A.R, Jammu, India**ABSTRACT**

Ebola virus (EBOV, formally designated Zaire Ebolavirus) is one of the five known viruses within the genus Ebola virus. Four of the five known Ebola viruses, including EBOV, cause a severe and often fatal and hemorrhagic fever in humans and other mammals, known as Ebola virus disease (EBD). The illness is characterized with a high temperature of about 39 °C, hematemesis, diarrhea with blood, retrosternal abdominal pain, prostration with heavy articulations, and rapid evolution death after a mean of three days. Various concepts are dealt in *Ayurveda*, which is applicable in different conditions. Among these concepts there are some of the concepts which are related to disease aspects as well. Few of the concepts relevant in this context are:- SankramikaRogaNidana, *NidanarthakaraRoga*, *Raktapitta*, *EkadashaRupiRajyakshama*, *RaktashtiviSannipataJwara*, *DhatugataJwara*. Ebola hemorrhagic fever conceptually can be correlated to *VyadhiSankara*. Mode of progress of disease can be related to *DhatugataJwara* in *Rasa-Asthi-Rakta-ShukragataJwara* sequence and *NidanarthakaraRoga*. Considering signs and symptoms of ebola hemorrhagic fever it can be related to acute exaggeration of *EkadashiRupiRajyakshama*, *Raktapitta* different types and *RaktashtiviSannipataJwara*. Concept mentioned in *Ayurveda*- if a disease is caused due to strong or may etiological factors and the signs and symptoms are fully and severely manifested then it will lead to loss of consciousness, orientation and kill the patient can be related to severity, fatality of Ebola Hemorrhagic Fever.

Keywords: Ebola, *Sankramana*, *Nidanarthakara*, *Ayurveda*.

INTRODUCTION

Ebola, previously known as Ebola Hemorrhagic Fever, is a rare and deadly disease caused by infection with one of the Ebola virus species. Ebola can cause disease in humans and non-humans primates (monkeys, gorillas and chimpanzees).

Ebola is a rare disease caused by infection with a virus of the family Filoviridae, genus Ebola virus. There are five identified Ebola virus species. Four of the five have caused disease in humans:- Ebola virus (Zaire ebolavirus); Sudan virus (sudanebolavirus); Tai Forest Virus (Tai Forest ebolavirus, formerly cote d'Ivoire ebolavirus); and *Bundibugyo* virus (Bundibugyoebolavirus). The fifth Reston virus (Reston ebo-

lavirus), has caused disease in non human primates but not in humans¹.

Ebola viruses are found in several African countries. Ebola was first discovered in 1976 near Ebola River in what is now the Democratic Republic of the Congo. Since, then outbreaks have appeared sporadically in Africa.

The natural reservoir host of Ebola viruses remains unknown. However, on the basis of evidence and the nature of similar viruses, researchers believe that the virus is animal born and that bats are the most likely reservoir. Four of the five subtypes occur in an animal host native to Africa. A Similar host, most likely in the Philip-

pines, is probably associated with the Ebola-Reston subtype, which was isolated from cynomolgus monkeys that were imported to the United States and Italy from the Philippines. The virus is not known to be native to the other continents, such as North America².

Mode of Transmission of Ebola Hemorrhagic Fever:

It is thought that fruit bats of the Pteropodidae family are natural Ebola virus host. Ebola is introduced into the human population through close contact with the blood, secretion, organs, or other body fluids of infected animals such as chimpanzees, gorillas, fruit bats, forest antelope and porcupines found ill or dead or in the rain forest. Ebola then spreads through human to human transmission via direct contact with the blood secretions, organs or other bodily fluids of infected people, and with surfaces and materials contaminated with these fluids. Semen is infectious in survivors for up to 50 days. Transmission through oral exposure and through conjunctiva exposure is likely.

Ebola virus incubates in infected humans for 2-21 days, with the majority of patients becoming symptomatic after 8-9 days. Once infected, patients can experience severe symptoms within 1-2 days³.

Early signs and symptoms of Ebola Hemorrhagic Fever:-

The onset of illness is abrupt and is characterized by fever, headache, joint and muscle aches, sore throat, difficulty in breathing, swallowing, hiccups and weakness, followed by diarrhea, vomiting and abdominal pain⁴.

Second stage signs and symptoms of Ebola Hemorrhagic Fever:-

More severe symptoms, such as coagulopathy with thrombocytopenia can develop in as soon as 24-48 hrs, leading to bleeding from the nasal or oral cavities,

along with hemorrhagic skin blisters. Bleeding into the skin may create petechiae, purpura, ecchymosis, and hematomas (especially around needle injection sites). Heavy bleeding is rare and usually confined to gastrointestinal tract⁵.

Late stage of Ebola Hemorrhagic Fever:

The development of renal failure, leading to multisystem organ failure along with disseminated intravascular coagulation, can then rapidly insure over 3-5 days, along with significant volume loss. Patient who develop a fulminant course often die within 8-9 days. Those who survive beyond two weeks have a better prognosis for survival⁶.

Ayurvedic Concept:- *Ayurveda* is considered as the Science of Life. In the history of ayurveda it is mentioned that *Punarvasu Atreya* taught the knowledge of *Ayurveda* to his six disciples. Among them *Agnivesha* composed a treatise known as *Agnivesha Tantra* which is later recomposed by *Charaka* and popularly known as *Charaka Samhita*. It is being told that whatever is there in this *Samhita* is everywhere and at the same time what is not found elsewhere⁷.

The knowledge of other *tantras* is a mere waste if he has not studied *Sushruta Samhita*, at the same time who has not gone through *Charaka samhita* can not be a successful *vaidya* (physician). It refers that to *become a uttama vaidya* one should be well versed in all disciplines of *Ayurveda*. Few of the concepts relevant in this context are mentioned below:-

Many diseases may have one common manifestation; like *Jwara* is the common manifestation seen in many diseases. Many diseases have many manifestations; like other features than *Jwara* in this example. One disease may have one manifestation like in *JwaraShareeraManaTapa* might be the only manifestation. One dis-

ease may have many manifestations like other *linga* and *upadrava* in case of *jwara*. This concept of *Ayurveda* is considered as *VyadhiSankara*⁸. The same concept can be applied in case of etiological factor. Many etiological factors can cause one disease or may cause many diseases. This concept of *Ayurveda* is considered as *HetuSankara*⁹.

Sexual intercourse, close body contact via breath, via various body secretions, by using clothing, utilization of sitting, sleeping place of diseased person all these are the etiological factors for the *SankramikaRogalikekustha*, *Jwara*, *Sosha*, *Netrabhishyanda*¹⁰. The concept of *janapadodwansa* also should be considered by Vayu, Jala, Desha, kala factors

The concept of *NidanarthakaraRoga* is a unique concept of *Ayurveda*. For example, *Jwara* will lead to the disease *Raktapitta*, *Raktapitta* may lead to *Jwara* and it may lead to *Sosha* and finally death¹¹.

In *RasagataJwara* features like Pyrexia, Myalgia, Excessive yawning may be present. In *AsthidhatugataJwara* there will be body pain, restlessness, breathing difficulty. In *RaktadhatugataJwara* features like petechiae, excessive thirst, hemoptysis, burning sensation, discoloration, impaired orientation, and consciousness, etc are seen¹². *Raktapitta* is a disease in which blood will be coming from external orifices. In case of *UrdhwagaRaktapitta* blood comes out from mouth, eyes, etc. In *AdhogaRaktapitta* blood comes out through *Guda*, *Mutramarga*. In *Tiryagata Raktapitta* blood tends to come out of *romakupa*¹³.

The features of *EkadashiRupaRajyakshama* are- Heaviness in head, sore throat, cough, breathing difficulty, diarrhea, back pain, myalgia, tastelessness, sputum, hemoptysis¹⁴.

In *RaktastiviSannipataJwara* features like blood coming out of mouth, fever, vomit-

ing, excessive thirst, confusion, pain, diarrhea, hiccup, distension of abdomen, giddiness, burning sensation in eyes, breathing difficulty, unconsciousness, blackish-red discoloration of tongue with petechiae¹⁵.

If a disease is caused due to strong or many etiological factors and the signs and symptoms are fully and severely manifested then it will lead to loss of consciousness, orientation and kill the patient¹⁶.

If the *DoshikaJwara* is being manifested with all its features are mentioned then it will kill the individual in seven, ten and twelve days in case of *vataja*, *pttaja* and *kaphajaJwara* respectively and major features observed will be inappropriate talking, giddiness, breathing difficulty respectively.

Materials And Methods:-

The Ebola Hemorrhagic fever was studied from modern Medical Textbooks and from Internet sources. Later the *BruhTrayi* and other classical Textbooks of *Ayurveda* were scrutinized regarding the references for various disease conditions and various concepts regarding disease. Later, supportive correlation was done between *Ayurvedic* and Modern views to build valid and reliable hypothesis regarding the concepts of *Ayurveda* in relation to Ebola Hemorrhagic Fever.

DISCUSSION

Agni in *Sanskrit* means fire. In *Ayurveda*, *Agni* is the digestive and metabolic "fire" produced by the *doshas* that grasps the essence of nourishment from food, feelings and thoughts and transforms it into a form your body can use *Agni* helps various tissues of the body produced secretions, metabolic reactions, and other processes needed to create energy and maintain and repair the body. *Agni* is also part of the immune system since its

heat destroys harmful organisms and toxins. The activity of *Agni* varies throughout the day and maintaining the strength and natural ebb and flow of your digestive fires is needed for good digestion, good immune function, and resistance to disease. *Agni* is needed to form *ojas*.

Unlike bacteria, viruses invade healthy living cells in order to reproduce making them difficult to destroy without negative side effects there are no medicines that safely kill viruses but many drugs suppress symptoms by inhibiting viral reproduction. The body's own immune system offers the best course of treatment. *ayurvedic* drugs bolsters the body's defenses at the cellular level, stimulating the immune system. Alkaloids present in these drugs stimulate white blood cell activity and increase the number of T-helper cells these cells coordinate the immune response, resulting in the production of antibodies and ridding the body of the infectious agent. Following are the drugs that are having anti-viral, haemostatic, anti-oxidant, immuno-modulator, anti-inflammatory, anti-pyretic, etc. properties which may be beneficial for the patients:

1. *Bhumyamlaki (Phyllanthus ninuri)*:- It mainly contains *lignans*, (eg., phyllanthine, hypophyllanthin, astragaline) alkaloids, and bioflavonoids(eg., quercetin) . It is having anti-bacterial, anti-viral, anti-inflammatory, anti-hepatotoxic, anti-spasmodic, choleric, anti-oxidant properties. It disrupt hepatitis virus polymerase activity, mRNA transcription and replication supports its role as antiviral agent.^{17, 18, 19}

2. *Nimba (Azadirachta indica)*:- It contains protomeliacins, limonoids, nimbin, Salanin, azadirachtin, nimbidin. It is anti-inflammatory, antipyretic, antibacterial, antiviral, anti-malarial, antifungal immunomodulatory properties^{17,18,19}.

3. *Chirayata (Swertia chirayita)*:- It contains amarogentin, amaroswerin beta-sitosterol-3beta-D-glucoside, swertiamarin, terpenoids, 1-hydroxy-3,7,8-trimethoxyxanthone. It is anti-bacterial, anti-inflammatory, anti-oxidant, anti-parasitic, anti-viral, hepatoprotective, bile flow stimulant^{17,18,19}.

4. *Tulsi (Ocimum sanctum)*:- It contains tannins, flavonoids, and an essential oil. Traces of zinc, magnesium and sodium have been found with vitamin A and C. It contains eugenol, methyl eugenol, alpha and beta caryo phyllene, carvacrol, ursolic acid. Anti-inflammatory, anti-bacterial, anti-fungal, anti-viral, anti-allergic, anti-oxidant, anti-ulcer, anti-cancer, cardioprotective, immunomodulator properties^{17,18,19}.

5. *Haridra (Curcuma longa)*:- It contains curcumin, demethoxycurcumin, bisdemethoxycurcumin, turmerone, atlantone, zingiberene. It blocks haemagglutinating activity of HIV virus particles and reduces influenza a virus's replication .it also affects an early stage of virus infection. It is having anti-bacterial, anti-viral, anti-fungal, and anti-inflammatory, hepatoprotective properties^{17, 18, 19}.

6. *Katuki (Picrorhiza kurroa)*:-It contains 2 bitter glycosides ,picrorhizin and kutkin; d-manitol ,vanilic acid ,apocynin, 4-oxy-methoxy-acetoxyphenone kukiol acetate, cathartic acid ,2 glycosides –picroside 1, picroside 2 . It is anti-inflammatory anti-viral, antioxidant, antispasmodic immunomodulator, hepatoprotective and hepato regenerative properties^{17,18,19}.

7. *Kalmegh (Andrographis paniculata)*:- It contains andrographolide, 14-deoxy-11-oxoandrographolide, 14-deoxy-11-dehydroandrographolide, andrographine, neoandrographolide, panicoline, paniculide-A, paniculide-B, paniculide-C. It is anti-viral, anti-inflammatory, anti-pyretic,

immunostimulant, hepatoprotective, anti-bacterial, anti-cancer properties. It is used as immuno stimulant in upper respiratory tract infections, HIV infection^{17,18,19}.

8. *Nagarmotha (Cyperus scariosus)*:- It contains cyperine, pinene, cyperol, cype- rone and iso cyperol and susquitepenes like rotundene, cyperotundene, kubusone, seqeonal and b-selinene. It is anti-inflammatory, anti-bacterial,anti viral ,hepatoprotective ,anti ulcer,anti diarrhoeal^{17,18,19}.

9. *Pitpapada (Fumaria indica)*:-It contains protopine alkaloids namely rutin and proto- pine, flavonoids, glycosides, tannins, saponin s, steroids and triterpenoids. It is a anthelmintic, antidyspeptic, antiperoidic, diuretic cholagogue, sedative, and diaphoretic , blood purifier and haematostatic.^{17,18,19}

10. *Ashwagandha (Withania somnifera)*:-It contains alkaloids and steroidal lactones namely tropine, cuscohygrine, withafarin A. It is anti-inflammatory, immunomodulator ,anti-bacterial, increases W.B.C's count.^{17,18,19}

11. *Amalaki (Embllica officinalis)*:-It contains gallic acid, ellagic acid ,chebulinic acid, citric acid, emblicanin A, amblicanin B, quercetin, glutamic acid ,proline, aspartic acid, vitamin C. It is anti-viral, anti-inflammatory, anti-pyretic, immunostimulant, hepatoprotective, anti-bacterial properties, anti oxidant, nephroprotectic, diuretic , laxative, cardio protective hypolipidemic.^{17,18,19}

12. *Guduchi (Tinospora cordifolia)*:-It contains berberine columbin, palmarin, tinosporon, tinosporic acid, tinosporol. It is anti oxidant, anti inflammatory , diuretic, immuno modulator, analgesic , anti pyretic, anti bacterial, anti cancer, antidiabetic, antitoxic ,anti HIV-properties.^{17,18,19}

13. *Punarnava (Boerhavia diffusa)*:-It contains punarnavoside, lunamarine ,beta sitosterol, alpha - 2-sitosterol, palmitic acid, archidic acid, ursolic acid, punarnavosie, boeravinone A, B, C, D, E and F. repenone , repenol. It is anti inflammatory , hepato protective, nephro protective , cardio protective, expectorant, emetic , laxative and anti oxidant , anthelmintic.^{17,18,19}

14. *Bilva (Aegle marmelos)*:-It contain marmelo- sin, marmelide, marmesin, marmesinin, tanni c acid, umbelliferone, isoimperatorin, isopimpell in. It is anti-viral, anti-inflammatory, antioxidant hepatoprotective, anti-bacterial , antidiarrhoeal , anti-diabetic.^{17,18,19}

15. *Rakta chandan (Pterocarpus santalinus)*:- It contains santalol and sandal oil. It is haemostatic, antipyretic, cardioprotective, anti tus- sive, mucolytic, anthelmintic anti inflam- matory, anti bacterial, diuretic.^{17,18,19}

16. *Padmakastha (Nelumbo nucifera)*:- It contains glutathione, lotusine, nuciferine, roemerine, gallic acid, coclaurine, querce- tin, catechin, nelumbroside A, nelumbro- side B. It is anti-oxidant, anti- inflammatory, anti-viral, anti-pyretic, anti- bacterial, anti-cancer, hepatoprotective, anti-diarrheal properties anthelmintic, diuretic, and haemostatic, cholagogue.^{17, 18, 19}

17. *Chitraka (Plumbago zeylanica)*:-It contains chitranone, plumbagin, 3- chloroplumbagin, droserone, elliptinone, zeylanone, zeylinone, plumbagic acid, B- sitosterol. It is anti-inflammatory, anti- viral, anti-bacterial, anti-fungal, anti- diarrheal, hepatoprotective, anti-oxidant, cardioprotective and neuroprotective prop- erties.^{17,18,19}

18. *Vasa (Adhatoda vasica)*:- It contains vasicine, 2-hydroxy-glucosyloxychalcone, vasicol, vasicinol, vasicinone, lignoceric, linoleic acid, and oleic acids. It is a bronchial antiseptic, bronchodilator, and expectorant, anti spasmotic, anthelmintic, anti-histaminic, increase platelet count in blood, antidiarrhoeal, sedative and anti-inflammatory. It provides significant protection against histamine induced bronchospasm. It also reduces the elasticity and viscosity of tracheal mucus.^{17, 18, 19}

19. *Dalchini (Cinnamomum zeylanicum)*:- It contains cinnamonaldehyde, benzaldehyde, methyl amyl ketone, phellandrene, pinene, cymene, carophyllene. It is anti-viral, anti-oxidant, anti-inflammatory, anti-tubercular, bronchodialator, mucolytic, expectorant, anti spasmotic, anti-bacterial, anti-pyretic.^{17,18,19}

20. *Ela (Elettaria cardamomum)*:- It contains mainly essential oil having alpha-terpineol 45%, myrcene 27%, limonene 8%, menthone 6%, beta-phellandrene 3%, 1,8-cineol 2%, heptanes 2%, borneol, camphene, ascaridole, sitosterol. It is anti-viral, anti-inflammatory, anti-bacterial, anti-pyretic, diuretic, bronchodilator, expectorant, cardioprotective, analgesic, anti-ulser.^{17,18,19}

21. *Mulethi (Glycyrrhiza glabra)*:- It contains glycyrrhizin, anethole, glabrene, glabridin, glycyrrhizic acid, glycyrrhizinate, liquiritin, isoliquiritin, chalcones. It is anti-viral, anti-inflammatory, anti-cancer, hepatoprotective, cardioprotective, anti-ulser, expotarant, mucolytic.^{17,18,19}

22. *Sugandabala (Pavonia adoreta)*:- It contains beta-sitosterol, palmitic, stearic, linoleic, alfa-pinene acid, pavonene. It is anti-bacterial, anti-PROTOZOAL, anti-spasmotic, diuretic, astringent, diaphoretic, carminative, anthelmintic, anti-pyrtic.^{17, 18, 19}

CONCLUSION

Raktashthivi sannipat jwara can be resembled with Ebola hemorrhagic fever, as the signs and symptoms seen in both the conditions are same. *Ayurvedic* medicine against measure disease is a bio friendly alternative. Its compounds are well known for safe and have least side effects the present study was reviewed to find out the better alternative medicine for the EHF. Efforts are under way to develop a vaccine; however none yet exists. Medicinal plants having rasayana property, immune modulatory activity, and anti-viral activity may prevent the adverse effect of the disease. However, these medicinal plants need further research to find out the specific compound for treating this kind of viral disease because it has high potential activity than chemical based compounds.

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Source of support: Nil

Conflict of interest: None Declared