



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2016; 5(2): 47-51
Received: 18-01-2016
Accepted: 19-02-2016

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Review on – Herbal drug treatment on Ebola virus

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Abstract

Ebola haemorrhagic fever (Ebola HF) is a severe, often-fatal disease in humans and nonhuman primates (monkeys and chimpanzees) that has appeared sporadically since its initial recognition in 1976. The disease is caused by infection with Ebola virus, which was first discovered in Africa. Ebola haemorrhagic fever is fatal in between 50-90% of cases. No specific treatment or vaccine has yet been developed. It is important to reduce contact with high-risk animals (i.e. fruit bats, monkeys or apes) including not picking up dead animals found lying in the forest or handling their raw meat. The incubation period of Ebola virus disease ranges from 2 to 21 days. Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing, IgM ELISA, polymerase chain reaction (PCR), and virus isolation can be used to diagnose a case of Ebola HF within a few days of the onset of symptoms. The chief Drug that is used in the symptomatic treatment of Ebola virus are: Belladonna, Arsenic, Nitric acid, Aconite, Gelsemium, Bryonia. Any cases of persons who are suspected to have the disease should be reported to the nearest health unit without delay. It is also important to control spread of the disease and infection control procedures need to be started immediately. They are frequently dehydrated and need intravenous fluids or oral rehydration with solutions that contain electrolytes. There is currently no specific treatment to cure the disease.

Keywords: Ebola haemorrhagic fever (Ebola HF), Symptomatic Treatment, Gelsemium.

Introduction

Sudden onset of fever, intense weakness, muscle pain, headache and sore throat are typical signs and symptoms. This is followed by vomiting, diarrhoea, rash, impaired kidney and liver function, and in some cases, both internal and external bleeding. Laboratory findings include low white blood cell and platelet counts, and elevated liver enzymes. Diagnosing Ebola HF in an individual who has been infected only a few days is difficult because early symptoms, such as red eyes and a skin rash, are nonspecific to the virus and are seen in other patients with diseases that occur much more frequently. However, if a person has the constellation of symptoms described above, and infection with Ebola virus is suspected, isolate the patient and notify local and state health departments. Antigen-capture enzyme-linked immunosorbent assay (ELISA) testing, IgM ELISA, polymerase chain reaction (PCR), and virus isolation can be used to diagnose a case of Ebola HF within a few days of the onset of symptoms. Persons tested later in the course of the disease or after recovery can be tested for IgM and IgG antibodies; the disease can also be diagnosed retrospectively in deceased patients by using immune his to chemistry testing, virus isolation, or PCR.

Ebola haemorrhagic fever (Ebola HF) is a severe, often-fatal disease in humans and nonhuman primates (monkeys and chimpanzees) that has appeared sporadically since its initial recognition in 1976.

While all Ebola virus species have displayed the ability to be spread through airborne particles (aerosols) under research conditions, this type of spread has not been documented among humans in a real-world setting, such as a hospital or household. The incubation period of Ebola virus disease ranges from 2 to 21 days. The onset of illness is sudden, with fever, headache, joint and muscle pain, sore throat and intense weakness. This is then followed by diarrhoea, vomiting, rash, impaired kidney and liver function and stomach pain. Some patients may develop a rash, red eyes, hiccups, internal and external bleeding. Ebola haemorrhagic fever is fatal in between 50-90% of cases. No specific treatment or vaccine has yet been developed. It is important to reduce contact with high-risk animals (i.e. fruit bats, monkeys or apes) including not picking up dead animals found lying in the forest or handling their raw meat.

There is no specific prophylactic (vaccine) or therapeutic (antiviral drugs) options available to treat human infections, and care is largely supportive. There is no standard treatment for Ebola

HF. Patients receive supportive therapy. This consists of balancing the patient’s fluids and electrolytes, maintaining their oxygen status and blood pressure, and treating them for any complicating infections.

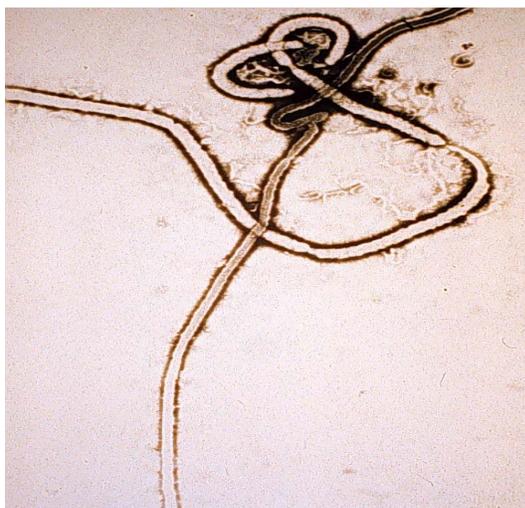


Fig 1: an Electron Micrograph of the Ebola Virus Courtesy: Centers for Disease Control and Prevention

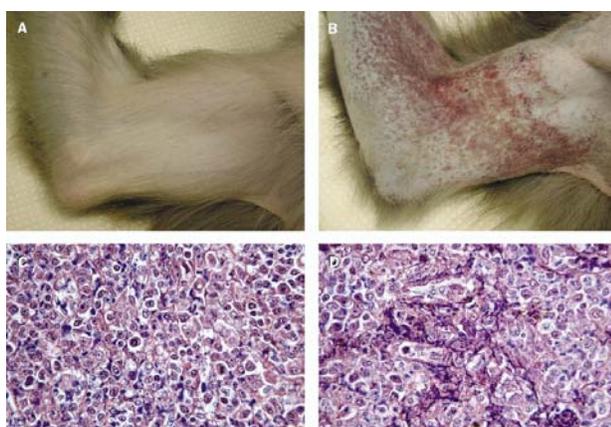


Fig 2: Gross appearance and histological characteristics associated with rNAPc2- Treatment of rhesus monkeys infected with Ebola virus.

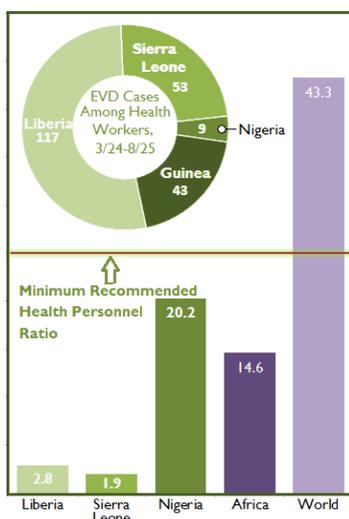


Figure. Health Personnel Ratios and EVD Cases among Health Workers (Health personnel per 10,000 populations)

All of the outbreak-affected countries lack sufficient financial resources to fund their national plans. Several groups have pledged to provide support to the affected countries, see “International Responses.” Sierra Leone estimates it will cost nearly \$26 million between July and December 2014 to arrest the spread of EVD in the country.

| Time Frame | Symptoms that occur in most Ebola patients | Symptoms that occur in some Ebola patients |
|--|---|---|
| Within a few days of becoming infected with the virus: | high fever, headache, muscle aches, stomach pain, fatigue, diarrhea | sore throat, hiccups, rash, red and itchy eyes, vomiting blood, bloody diarrhea |
| Within one week of becoming infected with the virus: | chest pain, shock and death | blindness, bleeding |

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Treatment

If a person has been in an area known to have Ebola virus disease or in contact with a person known or suspected to have Ebola and they begin to have symptoms, they should seek medical care immediately. Any cases of persons who are suspected to have the disease should be reported to the nearest health unit without delay. Prompt medical care is essential to improving the rate of survival from the disease. It is also important to control spread of the disease and infection control procedures need to be started immediately. Severely ill patients require intensive supportive care. They are frequently dehydrated and need intravenous fluids or oral rehydration with solutions that contain electrolytes. There is currently no specific treatment to cure the disease. Some patients will recover with the appropriate medical care.

To help control further spread of the virus, people that are suspected or confirmed to have the disease should be isolated

from other patients and treated by health workers using strict infection control precautions. Currently there is no licensed vaccine for Ebola virus disease. Several vaccines are being tested, but none are available for clinical use right now. Raising awareness of the risk factors and measures people can take to protect themselves are the only ways to reduce illness and deaths. While initial cases of Ebola virus disease are contracted by handling infected animals or carcasses, secondary cases occur by direct contact with the bodily fluids of an ill person, either through unsafe case management or unsafe burial practices. During this outbreak, most of the disease has spread through human-to-human transmission. Several steps can be taken to help in preventing infection and limiting or stopping transmission.

- Understand the nature of the disease, how it is transmitted, and how to prevent it from spreading further. (For additional information, please see the previous questions about Ebola virus disease in this FAQ.)
- Listen to and follow directives issued by your country's respective Ministry of Health.
- If you suspect someone close to you or in your community of having Ebola virus disease, encourage and support them in seeking appropriate medical treatment in a care facility.
- If you choose to care for an ill person in your home, notify public health officials of your intentions so they can train you and provide appropriate gloves and personal protective equipment (PPE), as well as instructions as a reminder on how to properly care for the patient, protect yourself and your family, and properly dispose of the PPE after use.
- When visiting patients in the hospital or caring for someone at home, hand washing with soap and water is recommended after touching a patient, being in contact with their bodily fluids, or touching his/her surroundings.
- People who have died from Ebola should only be handled using appropriate protective equipment and should be buried immediately.

Additionally, individuals should reduce contact with high-risk infected animals (i.e. fruit bats, monkeys, or apes) in the affected rainforest areas. If you suspect an animal is infected, do not handle it. Animal products (blood and meat) should be thoroughly cooked before eating.

The chief Drug that is used in the symptomatic treatment of Ebola virus are:

- 1) Belladonna
- 2) Arsenic
- 3) Nitric acid
- 4) Aconite
- 5) Gelcemium
- 6) Bryonia

- **Belladonna**

Synonyms: Belladonna leaf, Belladonna Folium, Deadly night shade leaf (European belladonna)

Biological source: Belladonna herb consists of dried leaves and other aerial parts of *Atropa belladonna* Linn. Or *Atropa acuminata* Royle, family-Solanaceae

History: Because of the hallucinogenic effect of this plant, it was used as witch craft in the middle ages. In ancient times, the juice of this plant was used as a cosmetic, because of its

dilatatory effect on the pupil of the eye. This drug was first introduced in the London Pharmacopoeia in 1809.

Geographical Source: It is indigenous to and cultivated in England and other European countries. In India, it is found in the Western Himalayas from Smile to Kashmir and adjoining areas of Himachal Pradesh. Its chief habitat is Jammu and in forests of Sind and Chinabvally.

Chemical constituents

The total alkaloid content of drug is 0.4 to 1% and varies in different parts of parts of plant, roots(.6%), stems (0.05%), leaves (0.4%), unripe and ripe berries (0.19-.21%) and seeds(0.33%).

The main alkaloids are l-hyoscyamine and its racemes from atropine. The drug also contains belladonic, scopolin (l-methyl aesculetin), hyoscyne, and pyridine and N-Methyl praline. The latter two are the volatile bases.

Uses: abscess, apoplexy, boils, brain affection, carbuncle, convulsion, cough, delirium, dysentery, epilepsy, fever, glandular, measles, meningitis, menstrual troubles, mumps, skin affection, pleurisy, disorders of pregnancy rheumatism, uterine affection, vertigo, whooping cough, abdominal affection etc.^{1,6}

- **Arsenic**

Arsenic is a semi-metallic element found in soils, groundwater, surface water, air, and some foods. Arsenic occurs naturally in the earth's crust, with higher concentrations in some geographic areas, and in some types of rocks and minerals. In its pure form, arsenic is a grey-collared, odourless, and tasteless metal; arsenic is usually found combined with other elements. When combined with elements other than carbon, it is called "inorganic arsenic." Arsenic and inorganic arsenic compounds can be emitted into air and then deposited into water and soil during industrial operations such as ore mining and smelting, and during volcanic eruptions and forest fires. One form of inorganic arsenic, chromate copper arsenate (CCA), has been commonly used as a preservative in wood products to prevent rotting from insects and microbial agents. CCA had previously been used in residential settings for decks, play sets, and playgrounds; but such uses have been voluntarily withdrawn by the industry. Arsenic is a naturally occurring semi metallic element with an atomic weight of 74.9. Pure arsenic (which rarely is found in nature) exists in three allotropic forms: yellow (alpha), black (beta), and grey (gamma) (HSDB 2009). Many inorganic arsenic compounds are found in the environment, frequently occurring as the sulphide form in complex minerals containing copper, lead, iron, nickel, cobalt, and other metals. Arsenic compounds occur in trivalent and pentavalent forms; common trivalent forms are arsenic trioxide and sodium arsenate, and common pentavalent forms are arsenic pent oxide and the various arsenates. Arsenic and arsenic compounds occur in crystalline, powder, amorphous, or vitreous forms. Elemental arsenic has a specific gravity of 5.73, sublimes at 613°C, and has a very low vapour pressure of 1 mm Hg at 373°C. Many of the inorganic arsenic compounds occur as white, odourless solids with specific gravities ranging from about 1.9 to over 5. Arsenic trioxide, the most common arsenic compound in commerce, melts at 312°C and boils at 465°C. In water, elemental arsenic is insoluble, calcium arsenate and arsenates are sparingly soluble, and arsenic trioxide, arsenic pentoxide, and other

arsenicals are soluble. Arsenic pentoxide, potassium arsenate, and the sodium salts are soluble in ethanol. Arsenic, arsenic pentoxide, arsenic trioxide, the calcium arsenates, lead arsenate, and potassium arsenate are soluble in various acids. When heated to decomposition, arsenic compounds emit toxic arsenic fumes (HSDB 2009).

Uses: abscess, alcoholism, anaemia, asthma, abdominal disorders, cancerous affection, carbuncle, cholera, cough, delirium, diarrhoea, dropsy, duodenal ulcer, fever, gangrene, gastric ulcer, gout, headache, heart affection, haemorrhoids, kidney affection, locomotors ataxia, lung affection, measles, menstrual disorders, pleurisy, pneumonia, skin affection, throat affection, vomiting, rickets, whooping cough etc.^{1,8}.

• Nitric Acid

Physical and Chemical Properties

Appearance: Clear, colourless to slight brown liquid

Physical state: Liquid

Odour: Acrid, suffocating odour

Odour Threshold: Unknown

Specific Gravity: 1.4200

PH: 1

Uses: abdominal troubles, bright disease, bronchitis, bubo, chronic catarrh, chancres, constipation, cough, diarrhoea, dysentery, ear and eye affection, glandular swelling, haemorrhage, haemorrhoids, haematuria, headache, herpes, menstrual troubles, rickets, syphilis, skin troubles, tongue affection, ulcers, urinary disorders, warts, whooping cough etc.¹.

• Aconite

In former times, Aconite was used as a quick-acting poison. Nowadays, by contrast, it is a valuable medicine in the treatment of highly acute, vehement serious conditions. The complaints are so intense and frightening that the patients (like the victims of poisoning) are certain they will die very soon.



- Homoeopathically, Aconite is suitable for persons who suffer from an oversensitive nervous or cardiovascular system.
- The nervous system reacts after a shock or a fright, the cardiovascular systems reacts to being exposed to cold wind or to heat. Both can produce a strong reaction in the form of an acute, sudden and very intense illness, accompanied by anxieties and an enormous restlessness.
- Aconite is an important remedy for the early stages of many illnesses and is often followed by other remedies as the illness progresses or the symptoms change. Acute infections often start off with complaints typical of Aconite.

- The patients are short of breath, their heart races, their pulse is full and strong. They get a high fever, their head is hot and red, or one cheek only is pale. There is vertigo on sitting up, and they turn completely pale.
- Attacks of chills alternate with fever, and both force the patients to remain in bed despite their great restlessness.
- In contrast to the very similar picture of a Belladonna state, the pupils of these patients are contracted. The person is very thirsty, asks for cold drinks, and the skin is noticeably dry. The fact that another remedy will be required soon is indicated as the patient starts to sweat.
- All complaints are so intense, quick and threatening that the patients are often convinced that they are going to die soon (at a specific time).
- Aconite is indicated not only in the acute stages of an illness; it is also of great importance in the treatment of chronic complaints.
- Owing to a constitutional oversensitivity of the system, these patients suffer from very
- Intense and sudden anxiety attacks, followed by phases without any symptoms until the attacks start again.
- The patients become restless; they walk to and fro and demonstrate their inner torment by shivering or by fleeing from the situation which causes the attack.
- On the one hand, these are situations where the
- Patients feel imposed upon and are forced to flee, e.g. from a crowd of people or from the cinema (they like to sit near the exit). On the other hand, anxieties may come up due to sudden exposure to wide-open spaces, e.g. in large and empty public places, streets or on leaving the house.
- This chronic Aconite condition also has its origins in a former experience of intense fright (a car accident, an earthquake or other sudden dangers accompanied by fear of death).
- During the phases which are symptom-free there is often a subtle fear of death.
- In contrast to the acute phases, however, the patients do not predict the exact time of their death. Rather, they know that they will die soon. As a result, they may prepare their will, and internally, they slowly but decidedly take their leave of life.

Uses: asthma, chest affection, chicken pox, cholera, convulsion, epilepsy, croup, cough, diarrhoea, dropsy, dysentery, amenorrhoea, dysmenorrhoea, bad effects of fear and fright, fever, headache, heart affection, inflammation, menses, pneumonia, suppression of urine, vertigo etc.^{1,11}.

• Gelsemium

Gelsemium is a genus of flowering plants belonging to family Gelsemiaceae. The genus contains three species of shrubs to straggling or twining climbers. Two species are native to North America, and one to China and Southeast Asia. Carolus Linnaeus first classified *G. sempervirens* as *Bignonia sempervirens* in 1753; Antoine Laurent de Jussieu renamed the genus in 1789. Gelsemium is a Latinized form of the Italian word for jasmine, gelsomino. *G. elegant* is also nicknamed "heartbreak grass".



Properties: All three species of this genus are poisonous. In December 2011 Chinese billionaire Long Liyuan was killed when the cat-stew that he was eating was allegedly poisoned with *Gelcemium elegance*. *Gelcemium* has been shown to contain methoxyindoles.

Family: Gelsemiaceae

Genus: *Gelcemium* Juss.

Use: Ataxia, brain affection, cerebro-spinal meningitis, Cold, cough, constipation, convulsion, epilepsy, dengue fever, diarrhoea, diphtheria, eye affection, fevers, headache, heart affection, hysteria, locomotors Ataxia, Menstrual disorders, malign, neuralgia, paralysis, rheumatism, sleep disorders, tremor, urinary affection, vertigo, writer's cramp, etc.^{1,4}

• **Bryonia**

Bryonia is a genus of flowering plant in the gourd family. *Bryonia* is its best-known common name. They are native to western Eurasia and adjacent regions, such as North Africa, the Canary Islands and South Asia.

Description and ecology: *Bryonies* are perennial, tendriling, diclinous or dioeciously herbs with palmately lobed leaves and flowers in axillary clusters. The fruit is a smooth, globular berry. The only English species, *B. dioica* (white bryony), grows in hedgerows as far north as Yorkshire. *Bryonia* is used as a food plant by the larvae of some Lepidoptera (butterflies and moths), including the tortrix moth *Phtheochroa rugosana* (recorded on red bryony, *B. dioica*) and the Cabbage Moth (*Mamestrabraceae*).



Family: Cucurbitaceus

Genus: *Bryonia*

Uses: Alcoholism, asthma, bilious attack, brain affection, constipation, dropsy, dyspepsia, enteric fever, headache, heart affection, measles, meningitis, rheumatism, vicarious, menstruation, breast affection, cough, epistaxis, gastric disorders, pleurisy, pneumonia, respiratory affection, thirst, tongue, toothache, vertigo, whooping cough, etc.^{1,3,8,9}

Conclusion

The symptoms of Ebola include high fever, headache, muscle aches, stomach pain, fatigue, diarrhoea, chest pain, shock, sore throat, hiccups, rashes, red & itchy eyes, vomiting blood, bloody diarrhoea, blindness and bleeding etc. These symptoms are found to be treated by above studied drugs. In that *Gelcemium* treats all symptoms of Ebola. *Belladonna* treats all symptoms of Ebola except blindness & bleeding. Nitric acid treats only vomiting blood & bleeding in Ebola patient. Arsenic treats all symptoms of Ebola except blindness. *Bryonia* treats all symptoms of Ebola except rashes, red & itchy eyes, vomiting blood & blindness. *Aconite* treats all the symptoms of Ebola except red & itchy eyes and blindness.

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