



ISSN: 0976-3376

Available Online at <http://www.journalajst.com>

ASIAN JOURNAL OF
SCIENCE AND TECHNOLOGY

Asian Journal of Science and Technology
Vol.06, Issue, 11, pp. 1941-1944, November, 2015

REVIEW ARTICLE

EBOLA – AN INTERNATIONAL PUBLIC HEALTH EMERGENCY- RAN HAVOC IN 2014

^{1,*}Bhattacharya, M. K., ¹Moitra, S., ²Acharyya, M., ³Sharma Sarkar, B. and ¹Bhattacharya, A.

¹National Institute of Cholera & Enteric Disease, Kolkata, India
²Infectious Diseases and Beliaghata General Hospital, Kolkata, India
³BankuraSammilani Medical College, West Bengal, India

ARTICLE INFO

Article History:

Received 24th August, 2015
Received in revised form
15th September, 2015
Accepted 19th October, 2015
Published online 30th November, 2015

Key words:

Ebola,
Threat and Health problem.

ABSTRACT

In March 2014 witnessed surge of cases presenting with high fever, diarrhoea, abdominal pain, respiratory systems in parts of Africa, but as the days goes on, and physicians starts to witness loss of lives in this cases ,the public health departments in different countries rose to the alarm and realize that it is something out of ordinary ,later upon investigation ,both laboratory and epidemiological surveillance the culprit is nabbed and the loss of life attributed to a single stranded RNA virus belong to filoviridae family, with biosafety level 4 ,but by then quite a damage is done ,both loss of life and deleterious effect on financial burden came to notice ,geographical barrier is crossed , surveillance measures are beefed up across continents and global health community acknowledge it as an emergency that threatened mankind like never before.

Copyright © 2015 Bhattacharya et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

The first quarter of 2014 witnessed surge of cases presenting with high fever, diarrhoea, abdominal pain, respiratory systems in parts of Africa ,but as the days goes on, and physicians starts to witness loss of lives in this cases ,the public health departments in different countries rose to the alarm ,and realize that it is something out of ordinary ,later upon investigation ,both laboratory and epidemiological surveillance the culprit is nabbed ,and the loss of life attributed to a single stranded RNA virus belong to filoviridae family ,with biosafety level 4 ,but by then quite a damage is done ,both loss of life and deleterious effect on financial burden came to notice ,geographical barrier is crossed , surveillance measures are beefed up across continents and global health community acknowledge it as an emergency that threatened mankind like never before . In March 2014, the World Health Organization (WHO) reported a major Ebola outbreak in Guinea, a western African nation (Guidelines for Evaluation of US Patients Suspected of Having Ebola Virus Disease, 2014). Researchers traced the outbreak to a two-year-old child who died December 2013 (Baize *et al.*, 2014; WHO, 2014). The disease then rapidly spread to the neighboring countries of Liberia and Sierra Leone. It is the largest Ebola outbreak ever documented, and the first recorded in the region (Guidelines for Evaluation of US Patients Suspected of Having Ebola Virus Disease, 2014).

In a 26 September statement, the WHO said, "The Ebola epidemic ravaging parts of West Africa is the most severe acute public health emergency seen in modern times. Never before in recorded history has a biosafety level four pathogen infected so many people so quickly, over such a broad geographical area, for so long (Media centre, 2014)." As of 31 March 2015, 25,263 suspected cases and 10,477 deaths had been reported; (Ebola Response Roadmap Situation Report, 2014) however, the WHO has said that these numbers may be underestimated (Ebola Response Roadmap Situation Report, 2014). On 8 August 2014, the WHO declared the epidemic to be an international public health emergency.

By mid-August 2014, Doctors Without Borders reported the situation in Liberia's capital Monrovia as "catastrophic" and "deteriorating daily". They reported that fears of Ebola among staff members and patients had shut down much of the city's health system, leaving many people without treatment for other conditions (In Liberia's Ebola-Stricken Villages, Residents Face 'Stark' Choices, 2014). By late August 2014, the disease had spread to Nigeria, and one case was reported in Senegal (Ebola virus disease update, 2014; Senegalese minister of health confirms 1st case of Ebola virus in the West African country, 2014; First case of Ebola virus is confirmed in Senegal, 2014; Disease outbreak news, 2014). On 30 September 2014, the first confirmed case of Ebola in the United States was diagnosed (Severin Carrell, 2014). The patient died 8 days later (Bustillo *et al.*, 2014). On 29 December 2014 the first case was confirmed in the United

*Corresponding author: Bhattacharya, M. K.,
National Institute of Cholera & Enteric Disease, Kolkata, India.

Kingdom (Severin Carrell, 2014). As of 15 October 2014, there have been 17 cases of Ebola treated outside of Africa, four of whom have died (<http://www.nytimes.com/interactive/2014/07/31/world/africa/ebola-virus-outbreak-qa.html>). The largest outbreak to date is the ongoing 2014 West Africa Ebola virus outbreak, which is affecting Guinea, Sierra Leone, Liberia, Mali, and Nigeria (CDC, 2014). Alip Das, a 26-year-old man who returned from Liberia, is suspected to have contracted the deadly disease. He has been admitted to the Raiganj District Hospital in West Bengal for testing (<http://www.thehealthsite.com/news/ebola-in-india-first-suspected-ebola-case-in-west-bengal/>).

Although it is not entirely clear how Ebola initially spreads from animals to humans, the spread is believed to involve direct contact with an infected wild animal or fruit bat (Transmission, 2014). Besides bats, other wild animals sometimes infected with EBOV include several monkey species, chimpanzees, gorillas, baboons and duikers (Ebola virus, 2014). Between people, Ebola disease spreads only by direct contact with the blood or body fluids of a person who has developed symptoms of the disease (Funk and Kumar, 2014; Ebola, 2014; Drazen *et al.*, 2014). Body fluids that may contain Ebola viruses include saliva, mucus, vomit, faces, sweat, tears, breast milk, urine and semen. The WHO states that only people who are very sick are able to spread Ebola disease in saliva, and whole virus has not been reported to be transmitted through sweat. Most people spread the virus through blood, faces and vomit (Donald and McNeil, 2014). Entry points for the virus include the nose, mouth, eyes, open wounds, cuts and abrasions. Ebola may be spread through large droplets; however, this is believed to occur only when a person is very sick. This can happen if a person is splashed with droplets (<http://www.independent.co.uk/news/world/africa/ebola-virus-clinical-trials-of-three-new-treatments-for-disease-to-start-in-west-africa-9857729.html>).

Contact with surfaces or objects contaminated by the virus, particularly needles and syringes, may also transmit the infection (Chowell *et al.*, 2014). The virus is able to survive on objects for a few hours in a dried state, and can survive for a few days within body fluids. The Ebola virus may be able to persist for up to 8 weeks in the semen after recovery, which could lead to infections via sexual intercourse (Ebola virus disease Fact sheet, 2014). Ebola may also occur in the breast milk of women after recovery, otherwise, people who have recovered are not infectious. Ebolaviruses contain single-stranded, non-infectious RNA genomes, belong to filo virus (Ansari, 2014) classified as a biosafety level 4 agent, as well as a Category A bioterrorism agent by the Centres for Disease Control and Prevention (MacNeil and Rollin, 2012; Ansari, 2014). It has the potential to be weaponized for use in biological warfare (Salvaggio and Baddley, 2004; Borio *et al.*, 2002), EVD has a high risk of death in those infected which varies between 25 percent and 90 percent of those infected (Fauquet, 2005). Symptoms usually begin with a sudden influenza-like stage characterized by feeling tired, fever, weakness, decreased appetite, muscular pain, joint pain, headache, and sore throat (Goeijenbier *et al.*, 2014). The fever is usually higher than 38.3 °C (101 °F).

This is often followed by vomiting, diarrhoea and abdominal pain (<http://www.thehealthsite.com/news/ebola-in-india-first-suspected-ebola-case-in-west-bengal/>). Next, shortness of breath and chest pain may occur, along with swelling, headaches and confusion. In about half of the cases, the skin may develop a maculopapular rash, a flat red area covered with small bumps, 5 to 7 days after symptoms begin. In some cases, internal and external bleeding may occur. This typically begins five to seven days after the first symptoms. All infected people show some decreased blood clotting. Bleeding from mucous membranes or from sites of needle punctures has been reported in 40–50 percent of cases. This may cause vomiting blood, coughing up of blood, or blood in stool. Bleeding into the skin may create petechiae, purpura, ecchymosis or hematomas (especially around needle injection sites (Appendix, ?). Recovery may begin between 7 and 14 days after first symptoms. Death, if it occurs, follows typically 6 to 16 days from first symptoms and is often due to low blood pressure from fluid loss (Ruzek *et al.*, 2014).

The specific diagnosis of EVD 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)¹ and detecting proteins by enzyme-linked immunosorbent assay (ELISA) are methods best used in the early stages of the disease and also for detecting the virus in human remains. Detecting antibodies against the virus is most reliable in the later stages of the disease and in those who recover. IgM antibodies are detectable two days after symptom onset and IgG antibodies can be detected 6 to 18 days after symptom onset. During an outbreak, isolation of the virus via cell culture methods is often not feasible. In field or mobile hospitals, the most common and sensitive diagnostic methods are real-time PCR and ELISA (Grolla *et al.*, 2005). In 2014, with new mobile testing facilities deployed in parts of Liberia, test results were obtained 3–5 hours after sample submission (Liberia, 2014). In 2015 a rapid antigen test which gives results in 15 minutes was approved for use by WHO. It is able to confirm Ebola in 92% of those affected and rule it out in 85% of those not affected (First Antigen Rapid Test for Ebola through Emergency Assessment and Eligible for Procurement, ?; Goeijenbier *et al.*, 2014).

On 29 November 2014, a new 15-minute Ebola test was reported that if successful, "not only gives patients a better chance of survival, but it prevents transmission of the virus to other people." The new equipment, about the size of a laptop and solar-powered, allows testing to be done in remote areas. The equipment is currently being tested in Guinea (Ebola outbreak, ?) On December 29, 2014, the FDA approved LightMix (R) Ebola Zaire rRT-PCR Test on patients with symptoms of Ebola. The report indicates it could help health care authorities around the world (Marta Falconi, 2014). washing hands, isolation of patients for 21 days, treating with aspirin and ibuprofen as part of supportive therapy, wearing protective clothing, contact tracing, disposal of needle and syringes, disposal of wastes, safe burial practices, employing biosafety level 4 practices are steps employed to treat and contain ebola infection (Ebola, 2014)

There is as yet no known effective medication or vaccine, number of experimental treatments are being considered for use in the context of this outbreak, and are currently or will soon undergo clinical trials, but it will still be some time before sufficient quantities have been produced for widespread trials. On 13 November, Médecins Sans Frontières announced that trials of possible treatments would start during November in Ebola treatment centres (<http://www.independent.co.uk/news/world/africa/ebola-virus-clinical-trials-of-three-new-treatments-for-disease-to-start-in-west-africa-9857729.html>).

In September 2014, an Ebola vaccine was used after exposure to Ebola and the person appears to have developed immunity without getting sick (Lai *et al.*, 2015).

The experience that is learned that it is imperative to put stress on public health practices across the world and especially in developing countries. Continuous emphasis should be made to develop newer vaccines and treatment modalities, and infectious disease epidemiology should be given utmost priority as in no time it can spread very fast particularly in developing world and among low socioeconomic strata. Health education and healthy life practices like scientific hand washing will be cost effective simple measures that can save huge loss of lives and financial burden cut across geographical barrier emphasis should be given on public health, infectious disease, research on vaccines and drugs, so the loss can be limited to minimum.

REFERENCES

- "Ebola Outbreak in West Africa – Case Counts". 2014. *2014 Ebola Outbreak in West Africa*. CDC (Centers for Disease Control and Prevention). 2014.
- "Appendix A: Disease-Specific Chapters". *Chapter: Hemorrhagic fevers caused by: i) Ebola virus and ii) Marburg virus and iii) Other viral causes including bunyaviruses, arenaviruses, and flaviviruses*. Ministry of Health and Long-Term Care
- "Disease outbreak news August 2014. Ebola virus disease, West Africa – update 28 August 2014". *Epidemic & Pandemic Alert and Response (EPR) – Outbreak News* (WHO). Retrieved 28.
- "Ebola (Ebola Virus Disease) Transmission". *CDC*. 5 November 2014
- "Ebola Facts: How Many Ebola Patients Are Being Treated Outside of West Africa?" <http://www.nytimes.com/interactive/2014/07/31/world/africa/ebola-virus-outbreak-qa.html>
- "Ebola Response Roadmap Situation Report". 1 October 2014. World Health Organization.
- "First Antigen Rapid Test for Ebola through Emergency Assessment and Eligible for Procurement". *who.int*
- "First case of Ebola virus is confirmed in Senegal". 29 August 2014. *ITV*. 29 August 2014. Retrieved.
- "Guidelines for Evaluation of US Patients Suspected of Having Ebola Virus Disease". 5 August 2014. *CDC*. 1 August 2014. Retrieved.
- "In Liberia's Ebola-Stricken Villages, Residents Face 'Stark' Choices". 20 August 2014. *n Liberia's Ebola-Stricken Villages, Residents Face 'Stark' Choices*. Common Dreams. 18 August 2014. Retrieved.
- "Liberia: New Ebola mobile lab speeds up diagnosis and improves care". *WHO.int*. W.H.O. October 2014
- "Senegalese minister of health confirms 1st case of Ebola virus in the West African country". 29 August 2014. *Washington Post*. 29 August 2014. Retrieved .
- "The first cases of this Ebola outbreak traced by WHO" (png). *who.int*. WHO. 2014
- "Transmission". *CDC*. 17 October 2014. Retrieved 18 October 2014
- Ansari, A.A. September 2014. "Clinical features and pathobiology of Ebolavirus infection". *J Autoimmun*. S0896-8411 (14): 00130–9
- Baize, S., Pannetier, D., Oestereich, L., Rieger, T., Koivogui, L., Magassouba, N., Soropogui, B., Sow, M.S., Keita, S., De Clerck, H., Tiffany, A., Dominguez, G., Loua, M., Traoré, A., Kolié, M., Malano, E.R., Heleze, E., Bocquin, A., Mély, S., Raoul, H., Caro, V., Cadar, D., Gabriel, M., Pahlmann, M., Tappe, D., Schmidt-Chanasit, J., Impouma, B., Diallo, A.K., Formenty, P., Van Herp, M. and Günther, S. October 2014. "Emergence of Zaire Ebola Virus Disease in Guinea". *New England Journal of Medicine* 371 (15): 1418–25
- Borio, L., Inglesby, T., Peters, C.J., Schmaljohn, A.L., Hughes, J.M., Jahrling, P.B., Ksiazek, T., Johnson, K.M., Meyerhoff, A., O'Toole, T., Ascher, M.S., Bartlett, J., Breman, J.G., Eitzen, E.M., Hamburg, M., Hauer, J., Henderson, D.A., Johnson, R.T., Kwik, G., Layton, M., Lillibridge, S., Nabel, G.J., Osterholm, M.T., Perl, T.M., Russell, P. and Tonat, K. May 2002. "Hemorrhagic fever viruses as biological weapons: medical and public health management". *Journal of the American Medical Association* 287 (18): 2391–405.
- Bustillo and Miguel, 8 October 2014. Campoy, Ann; Hinshaw, Drew. "Dallas Ebola Patient Dies". *The Wall Street Journal Online*. Retrieved.
- CDC urges all US residents to avoid nonessential travel to Liberia, Guinea and Sierra Leone because of an unprecedented outbreak of Ebola". *CDC*. 31 July 2014
- Chowell, G., Nishiura, H. October 2014. "Transmission dynamics and control of Ebola virus disease (EVD): a review". *BMC Med.*, 12 (1): 196.
- Donald, G. McNeil Jr. 3 October 2014. "Ask Well: How Does Ebola Spread? How Long Can the Virus Survive?". *The New York Times*
- Drazen, J.M., Kanapathipillai, R., Campion, E.W., Rubin, E.J., Hammer, S.M., Morrissey, S. and Baden, L.R. November 2014. "Ebola and quarantine". *N Engl J Med* 371 (21): 2029–30
- Ebola 2014 — New Challenges, New Global Response and Responsibility". *NEJM*. New England Journal of Medicine
- Ebola outbreak: New 15-minute test offers hope for thousands". *The Independent*
- Ebola virus disease Fact sheet No. 103". *World Health Organization*. September 2014
- Ebola virus disease update, West Africa – update 28 August 2014". *Epidemic & Pandemic Alert and Response (EPR) – Outbreak News* (WHO). Retrieved 28 August 2014
- Ebolavirus 22 August 2014. Pathogen Safety Data Sheets". Public Health Agency of Canada. Retrieved .
- Fauquet, C.M. 2005. *Virus taxonomy classification and nomenclature of viruses; 8th report of the International Committee on Taxonomy of Viruses*. Oxford: Elsevier/Academic Press. p. 648

- Funk, D.J. and Kumar, A. November 2014. "Ebola virus disease: an update for anesthesiologists and intensivists". *Can J Anaesth* **62** (1): 80–91
- Goeijenbier, M., van Kampen, J.J., Reusken, C.B., Koopmans, M.P., van Gorp, E.C. November 2014. "Ebola virus disease: a review on epidemiology, symptoms, treatment and pathogenesis". *Neth. J. Med.*, **72** (9): 442–8
- Goeijenbier, M., van Kampen, J.J., Reusken, C.B., Koopmans, M.P., van Gorp, E.C. November 2014. "Ebola virus disease: a review on epidemiology, symptoms, treatment and pathogenesis". *Neth. J. Med.*, **72** (9): 442–8
- Grolla, A., Lucht, A., Dick, D., Strong, J.E., Feldmann, H. September 2005. "Laboratory diagnosis of Ebola and Marburg hemorrhagic fever". *Bull SocPatholExot* **98** (3): 205–9
- <http://www.independent.co.uk/news/world/africa/ebola-virus-clinical-trials-of-three-new-treatments-for-disease-to-start-in-west-africa-9857729.html>
- <http://www.thehealthsite.com/news/ebola-in-india-first-suspected-ebola-case-in-west-bengal/>
- Lai, Lilin, Davey, Richard, Beck, Allison, Xu, Yongxian, Suffredini, Anthony F.; Palmore, Tara, Kabbani, Sarah, Rogers, Susan; Kobinger, Gary, Alimonti, Judie, Link, Charles J., Rubinson, Lewis, Ströher, Ute, Wolcott, Mark; Dorman, William, Uyeki, Timothy, M., Feldmann, Heinz, Lane, H. Clifford; Mulligan, Mark J. 5 March 2015. "Emergency Postexposure Vaccination With Vesicular Stomatitis Virus–Vectored Ebola Vaccine After Needlestick". *JAMA* **313** (12): 1249.
- MacNeil, A. and Rollin, P.E. June 2012. "Ebola and Marburg hemorrhagic fevers: neglected tropical diseases?". *PLoS Negl Trop Dis* **6** (6): e1546.
- Marta Falconi 29 December 2014. "Roche Secures Emergency Approval by U.S. Regulators for Ebola Test" Media centre, 26 September 2014. "Experimental therapies: growing interest in the use of whole blood or plasma from recovered Ebola patients (convalescent therapies)". World Health Organization. Retrieved 28 September 2014.
- Ruzek, edited by Sunit K. Singh, Daniel 2014. *Viral hemorrhagic fevers*. Boca Raton: CRC Press, Taylor & Francis Group. p. 444
- Salvaggio, M.R. and Baddley, J.W. July 2004. "Other viral bioweapons: Ebola and Marburg hemorrhagic fever". *Dermatologic clinics* **22** (3): 291–302
- Severin Carrell, Libby Brooks and Lisa O'Carroll, 29 December 2014. "Ebola case confirmed in Glasgow". The Guardian Staff, (30 September 2014). "CDC and Texas Health Department Confirm First Ebola Case Diagnosed in the U.S.". *CDC*. Retrieved 30 September 2014
