JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

EBOLA VIRUS

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INTRODUCTION

The Ebola Virus is a highly contagious and deadly disease that has been responsible forseveral outbreaks in Africa since its discovery in 1976. This paper will provide an overview of the history of Ebola, its transmission, and its impact on public Health.

HISTORY OF EBOLA

The Ebola virus was first identified in 1976 in what is now Nzara, South Sudan. The virus was named after the Ebola river, which runs near the village where the outbreakoccurred.

Since then, there have been several outbreaks of Ebola in Africa, including in theDemocratic Republic of Congo, Uganda, and Guinea.

TRANSMISSION OF EBOLA

Ebola is transmitted through direct contact with blood or body fluids of an infected person.
This can occur through : -

* Touching a person who has Ebola
* Touching object contaminated with body fluids
* Contact with infected animal (such as bats)

SYMPTOMS OF EBOLA VIRUS

1. Fever
2. Fatigue
3. Headache

4. Muscles pain
5. Sore throat
6. Vomitting
7. Diarrhea
8. Rash
9. Internal and external bleeding

CAUSES OF EBOLA VIRUS

Natural Reservoir

Fruit bats (Eidolon helvum Hypsignathus monstrous, and myonycteris torquata)Other animals (non - human primates, duikers , and rodents).

Transmission to Humans

Hunting and handling infected animal (bushmeat)

Contact with contaminated animal fluids (blood, saliva , sweat)Airborne transmission

Risk factors

Age (children and older adults)Weakened immune

system Pregnancy

Malnutrition

Poor hygiene and sanitationLack of vaccination

Close contact with infected individuals

Impact of Ebola virus

Global Impact:

1. Economic loss: Estimated $2.2 billion (2014-2016 outbreak)
2. Humanitarian crisis: Displaced persons, refugees, and orphaned children
3. Healthcare systems overwhelmed: Lack of infrastructure, resources, and personnel
4. Social stigma: Fear, misinformation, and community isolation
5. Global health security: Risk of international spread and pandemics

Social Impact:

1. Community disruption: Social distancing, quarantine, and isolation
2. Psychological trauma: Fear, anxiety, and post-traumatic stress disorder (PTSD)
3. Economic instability: Loss of livelihoods, trade, and commerce
4. Education disruption: School closures and lost learning opportunities
5. Social cohesion: Community trust and relationships affected

Economic Impact:

1. GDP loss: Estimated 2-5% GDP loss in affected countries
2. Trade and commerce: Disrupted supply chains and lost revenue
3. Tourism: Decline in tourism and related industries
4. Agriculture: Disrupted food production and distribution
5. Infrastructure: Damage to healthcare infrastructure and essential services

Healthcare Impact:

1. Healthcare worker infections: Over 500 healthcare workers infected (2014-2016)
2. Healthcare infrastructure: Overwhelmed and damaged facilities
3. Resource constraints: Shortages of PPE, vaccines, and medical supplies
4. Mental health: Psychological trauma and stress among healthcare workers
5. Systemic weaknesses: Exposed vulnerabilities in global healthcare systems

Long-term Consequences:

1. Increased poverty and inequality
2. Reduced economic growth and development
3. Persistent social stigma and community trauma
4. Weakened healthcare systems and infrastructure
5. Increased risk of future outbreaks and pandemics

Lessons Learned:

1. Global coordination and preparedness
2. Investment in healthcare infrastructure and resources
3. Community engagement and education
4. Research and development of vaccines and treatments
5. Strengthened global health security measures

Other Animals Infected with Ebola

Natural Reservoir:

1. Fruit bats (Eidolon helvum, Hypsignathus monstrosus, and Myonycteris torquata)

Animals Susceptible to Ebola:

1. Non-human primates (chimpanzees, gorillas, monkeys)
2. Duikers (small antelopes)
3. Bush pigs
4. Forest antelopes
5. Rodents (e.g., mice, rats)
6. Dogs
7. Cats

Ebola in Animals:
Symptoms: Similar to humans (fever, vomiting, diarrhea, bleeding)

1. Transmission: Contact with infected animals' bodily fluids
2. Outbreaks: Linked to animal-to-human transmission

Animal-to-Human Transmission:

1. Hunting and handling infected animals (bushmeat)
2. Contact with contaminated animal fluids (blood, saliva, sweat)
3. Contact with contaminated surfaces and equipment

Ebola in Domestic Animals:

1. Dogs: Infected in 2014-2016 outbreak in West Africa
2. Cats: Experimentally infected with Ebola virus
3. Livestock: No reported cases, but potential risk

Ebola in Wildlife:

1. Great apes: Decimated by Ebola outbreaks
2. Chimpanzees: 95% mortality rate in some outbreaks
3. Gorillas: 90% mortality rate in some outbreaks

Conservation Implications:

1. Population decline: Ebola outbreaks threaten endangered species
2. Habitat disruption: Ebola outbreaks impact ecosystem balance
3. Research challenges: Studying Ebola in wildlife is difficult

Diagnosis History of Ebola

Early Diagnosis (1976)

1. First identified in Democratic Republic of Congo (formerly Zaire)
2. Initial diagnosis based on clinical symptoms and epidemiological links
3. Laboratory confirmation: Electron microscopy and virus isolation

Diagnostic Advances (1980s-1990s)

1. Enzyme-Linked Immunosorbent Assay (ELISA) developed
2. Reverse Transcription Polymerase Chain Reaction (RT-PCR) introduced
3. Antigen detection tests developed

Modern Diagnosis (2000s-present)

1. Real-time RT-PCR became standard for Ebola diagnosis
2. Point-of-Care Tests (POCTs) developed for rapid diagnosis
3. Next-generation sequencing (NGS) used for outbreak surveillance

4. Loop-mediated isothermal amplification (LAMP) for field diagnosis

Challenges and Limitations

1. Limited access to laboratory facilities
2. Delayed testing and result turnaround
3. False negatives or positives
4. Similar symptoms to other diseases (e.g., malaria, typhoid)

Notable Diagnostic Milestones

1. 2014: First Ebola case diagnosed in West Africa (Guinea)
2. 2015: WHO recommends RT-PCR as primary diagnostic method
3. 2016: WHO approves first Ebola vaccine (rVSV-ZEBOV)
4. 2019: WHO recommends use of POCTs for Ebola diagnosis

Future Directions

1. Improved point-of-care testing
2. Enhanced molecular diagnostics
3. Development of rapid, portable diagnostic devices
4. Integration of diagnostic data into outbreak response

Epidemiology of Ebola

Definition: Epidemiology is the study of the distribution, determinants, and control ofdiseases in populations.

Types of Epidemics:

1. Sporadic: Isolated cases
2. Clustered: Small outbreaks
3. Epidemic: Large outbreaks
4. Pandemic: Global spread

Epidemiological Triad:

1. Agent (Ebola virus)
2. Host (humans, animals)

3. Environment (social, economic, cultural factors)

Modes of Transmission:

1. Human-to-human (direct/indirect contact)
2. Animal-to-human (hunting/handling infected animals)
3. Contaminated environment

Risk Factors:

1. Age (children/older adults)
2. Weakened immune system
3. Pregnancy
4. Malnutrition
5. Poor hygiene/sanitation
6. Lack of vaccination
7. Close contact with infected individuals

Outbreak Patterns:

1. Clustered outbreaks (family/community)
2. Super-spreading events
3. Healthcare-associated transmission

Epidemiological Curve:

1. Initial cases (index case)
2. Exponential growth (rapid transmission)
3. Peak (highest number of cases)
4. Decline (control measures implemented)

Epidemiological Methods:

1. Surveillance (case reporting, contact tracing)
2. Seroprevalence studies (antibody testing)
3. Molecular epidemiology (genetic sequencing)

4. Mathematical modeling (transmission dynamics)

Ebola Outbreaks:

1. 1976: Democratic Republic of Congo (318 cases, 242 deaths)
2. 1995: Democratic Republic of Congo (315 cases, 254 deaths)
3. 2014-2016: West Africa (28,616 cases, 11,310 deaths)
4. 2018-2020: Democratic Republic of Congo (3,444 cases, 2,264 deaths)

Global Response:

1. World Health Organization (WHO)
2. Centers for Disease Control and Prevention (CDC)
3. Médecins Sans Frontières (MSF)
4. National health authorities

Prevention and Control ofEbola

Prevention Strategies:

1. Vaccination (Ervebo, rVSV-ZEBOV)
2. Personal Protective Equipment (PPE) use
3. Hand hygiene (washing, sanitizing)
4. Improved infection control practices
5. Screening and triage
6. Contact tracing
7. Isolation and quarantine
8. Community engagement and education
9. Improved hygiene and sanitation
10. Safe burial practices

Control Measures:

1. Case identification and reporting
2. Contact tracing and follow-up

3. Isolation and treatment of cases
4. Quarantine of exposed individuals
5. Improved infection control practices
6. Enhanced surveillance and monitoring
7. Vaccination campaigns
8. Community mobilization and engagement
9. Improved logistics and supply chain management
10. International coordination and collaboration

Infection Control Measures:

1. Use of PPE (masks, gloves, gowns)
2. Hand hygiene
3. Sterilization and disinfection
4. Proper waste management
5. Improved ventilation
6. Isolation and cohorting
7. Standard Precautions
8. Droplet Precautions
9. Contact Precautions

Community-Based Initiatives:

1. Community health worker training
2. Village health teams
3. Community-led total sanitation (CLTS)
4. Social mobilization and awareness
5. Traditional leader engagement
6. School-based education
7. Workplace-based education
8. Risk communication and community engagement

Challenges:

1. Limited resources
2. Poor infrastructure
3. Social and cultural barriers
4. Limited access to healthcare
5. Stigma and misinformation

Vaccine and treatment

Approved vaccine :

Ervebo (rVSV - ZEBOV)Ad26.ZEBOV

Experimental treatment :
ZMapp Remdesivir

Brincidofovir

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