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Journal of Advance Research in Nursing Science
Volume 1 Issue 1

Crimean-Congo Hemorrhagic Fever a Threat to Public Health

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ABSTRACT

Crimean–Congo hemorrhagic fever is a tick borne zoonotic infection caused by the arbo-virus, which is a member of the genus Nairovirus and is characterized by a sudden onset of high fever, chills, severe headache, dizziness, malaise, abdominal and back pains also in some cases diarrhea, nausea, vomiting, muscle aches, sore throat and thrombocytopenia. In severe cases, hemorrhagic expressions, grading from petechiae to huge areas of ecchymosis, may also raise. CCHF is a challenge for the people of endemic rural regions, and for veterinary and health care personnel, and shows a significant mortality. In modern era, main progresses in the molecular recognition of CCHF- virus, mainly the usage of real-time PCR, in clinics and fields for tick samples have been allowed for quick diagnosis of infection and molecular epidemiological research. CCHF have limited treatment choices. During sporadic outbreaks of disease Ribavirin and Immuno-therapy have been attempted with unreliable degrees of achievement. Therefore, currently no anti-viral treatment approved by the U.S Food and Drug Administration for the treatment of CCHF. But, changed concerned in CCHFV, besides better understanding of its fundamental biology, might possibly contribute to enhanced therapies in the coming future.

Key Words: *CCHF, Virus, Tick borne infection.*

INTRODUCTION

Crimean–Congo hemorrhagic fever is one of the major important ticks-borne infection causes by virus, inducing intermittent occurrence of serious disease in a vast geographical region. The is maintain in horizontal and vertical spread cycles needing ixodid types ticks in a range of domestic and wild animals, with no indication of disease signs. Congo virus mobilizes in numeral genera of ticks, however Hyalomma are the main cause of human being illness, possibly as equally adult as well as immature types vigorously try to find hosts, to obtained blood meals from that hosts necessary for its all phase of growth. Commonly this disease occurs amongst farming personnel succeeding the bite off of contaminated tick, and also to a smaller degree amongst butchers naked to the tissues or blood of infected farm animals and health employees when exposed to the patient's body fluids. CCHF for the first time was detected in 1940's, eminent degrees of genomic variety dispute against a modern origin. The transmission of the virus is through the bite of a contaminated tick or by direct contact with infected patients or the products of affected animals (Figure 1). It has been discovered in at least thirty-one ticks' species of the soft tick and also hard ticks. The ticks have sexual transovarial virus transmission i.e., transmission from

infected mother to egg phase, and Trans staidly spread means, transmission from larval stage to nymph and from nymph stage to adult one.

OCCURENCE IN GUJARAT

It firstly occurs in Africa, the Balkans, the Middle East, and Asia. Often it occurs in outbreaks. In 2013 Iran, Russia,Turkey, and Uzbekistan documented more than fifty cases. The risk of death among those affected is between 10 and 40%. It was first detected in the 1940s. In the South-East Asian Region, the first laboratory confirmed case was reported on January 19, 2011, in Gujarat. Subsequent outbreaks were reported from different districts of Gujarat every year. During 2012-2015, several outbreaks and cases of CCHF transmitted by ticks via livestock and several nosocomial infections were reported in the states of Gujarat. In 2019, the new cases have been reported at Jamda village near Limdi and two others near Halvad village at Surendranagar District.

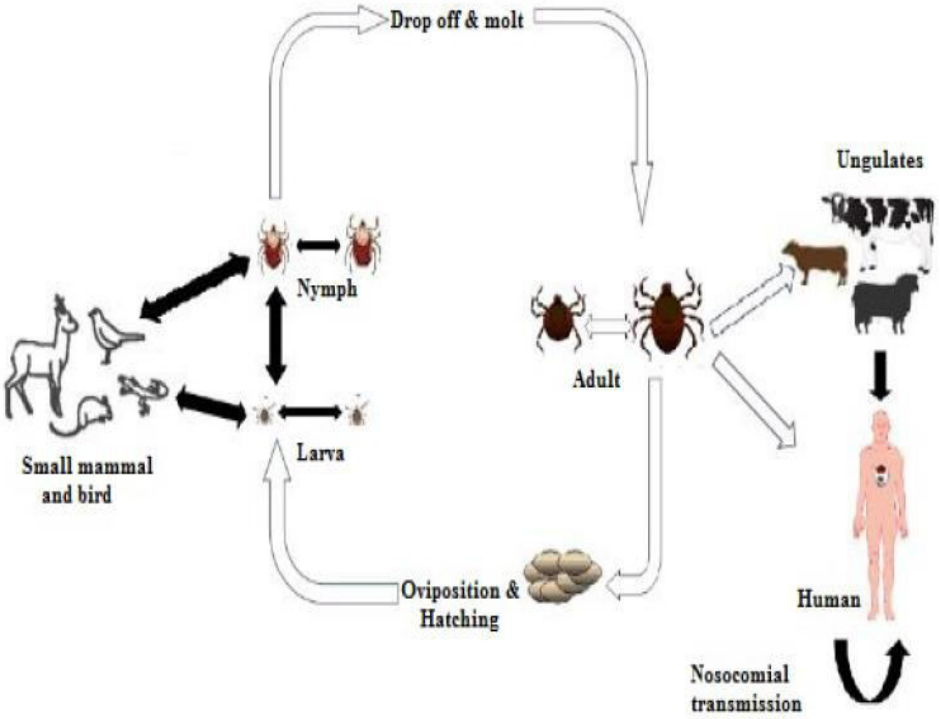

Fig. 1. Explain Life Cycle of Hyalomma Ticks spp. and Horizontal and Vertical Transmission of CCHFV.

Human beings become affected by CCHFV contaminated ticks bites, which retain a lifetime illness and is capable to be reservoirs, or through contact with viral contaminated blood or tissues. In adding to zoo-notic spread, this virus is able to circulate from individual to individual and consider one of the infrequent hemorrhagic fever viruses capable to start nosocomial occurrences in health care centers through elevated standard of sanitation and cleanness. Humans are the single famous hosts of the virus of CCHF, in which illness is evidenced as a severe febrile sickness accompanied by a lethal hemorrhagic syndrome having up to 50% mortality rates.

Agricultural workers, shepherds, campers, veterinarians, slaughter houses human resources, and people in contact with farm animals and ticks are consider to be at greater threat of infectivity.

In animals, the disease is generally subclinical and goes from a few days to weeks. CCHF has been accounted in roughly thirty (30) countries and has one of the mainly wide geographic dispersions of all major tick borne viral illnesses, closely similar to the known worldwide distribution of Hyalomma ticks specie. Outbreaks of this disease usually occur when the Hyalomma ticks. spp are on their highest point of activity. However, Hyalomma ticks are thought to be the most vital role in the epidemiology and distribution of CCHF.

Fig. 2. Crimean–Congo Hemorrhagic Fever

Table 1. Epidemiology of CCHF

Specialty	Infectious disease
Symptoms	Fever, muscle pains, headache, vomiting, diarrhea, bleeding into the skin
Complications	Liver failure
Usual onset	Rapid
Duration	Two weeks
Diagnostic Method	Detecting antibodies, the virus's RNA, or the virus itself
Differential Diagnosis	Dengue fever, Q fever, Ebola virus disease
Treatment	Supportive care, ribavirin
Prognosis	Risk of death -25%

DIAGNOSIS

- Early diagnosis of CCHF is necessary, Patient history and Clinical symptoms, particularly history of tick bite or exposure to tissues or blood of animals or human patients and travel to endemic regions, are the first indicators of CCHF.
- Serologic tests such as hemagglutination inhibition, immune diffusion and complement fixation, suffered from a lack of sensitivity and reproducibility.
- In recent times, latest immunological assays containing recombinant CCHFV nucleoprotein have been originated and applied in an immuno-fluorescence assay or to identify serum antibodies from infected patients in an ELISA.
- Currently the frontline diagnostic tools used for the confirmation is RT-PCR.

ISOLATION OF VIRUS

To culture and isolate virus BSL-4, bio-containment labs are required. However

conventional technique to isolate CCHFV has been undertaken via intra peritoneal or intra-cranial inoculation of a sample (e.g. blood sample from a patient in acute- stage) into newborn infant mice. Isolation in cell culture is future less complicated and gives a more rapid outcome or result, but is normally thought to be less sensitive method. Depending on the strain and cell line, the virus possibly will develop no or little cytopathic effect also into a non-cytopathic infectivity of the cells. Though, virus can be recognized through IFA (Immuno-fluorescence assay) by particular antibodies.

TREATMENT

1) There are limited options for the treatment of CCHF.
2) Ribavirin and Immunotherapy are attempted having changing levels of achievement during sporadic outcomes of disease, but there is no evidence of conducting case-controlled trials.
3) As a result, there is presently no antiviral treatment for CCHF accepted by the U.S. Food and Drug Administration (FDA).
4) While, renewed interested in CCHFV fundamental biology may lead towards improvement in therapies.

PREVENTION AND CONTROL

Risk factors

The main risk factor for CCHF is the spread of contaminated Hyalomma ticks species in the population and peoples from the endemic region are at greater risk. Particularly individuals working outdoor with large number of domestic animals, personnel working in hospitals and caring CCHF infected patients, individuals crushing infected ticks and butchering infected animals have also been a frequent source of CCHFV infection.

Incidence of nosocomial infection occurred in Pakistan, during January 1976 in the CGH (Central Government Hospital). A person by occupation shepherd was admitted having distinctive indications of disease and pass away at that time. The patient's father, who looks after his son at home, was admitted in the hospital and died two days later even with repeated blood transfusions and intensive care. A female medical officer, who admitted the disease affected patient, when the doctor was contaminated by patient vomited blood, showed signs of CCHF and was also admitted in the same hospital, but luckily recovered. The surgeon died of CCHF two weeks later, while operating to cut the finger of the patient in the hospital.

A junior medical doctor (surgeon) also infected by CCHF virus while cutting his finger at the time of operation and admitted to the hospital; he then recovered later. An attendant nurse helping during an operation also passes away due to CCHF, after three days. The anesthesia specialist also infected and bleeding starts from his gums, but fortunately recovered.

Five other people also infected through CCHFV in the hospital, they were hospitalized and all the five individuals were recovered. Out Of 12, ten staff members of the hospital became infected, while attending the shepherd in the hospital; out of ten, 2 passed away and 8 after rigorous sickness get recovery. In tygerberg hospital of South Africa, another nosocomial outbreak takes place. In which 33% of hospital staff were infected by CCHFV through unplanned prick of needle and about 8.7% were infected by the disease through contacts with blood of the patient (Figure 3).

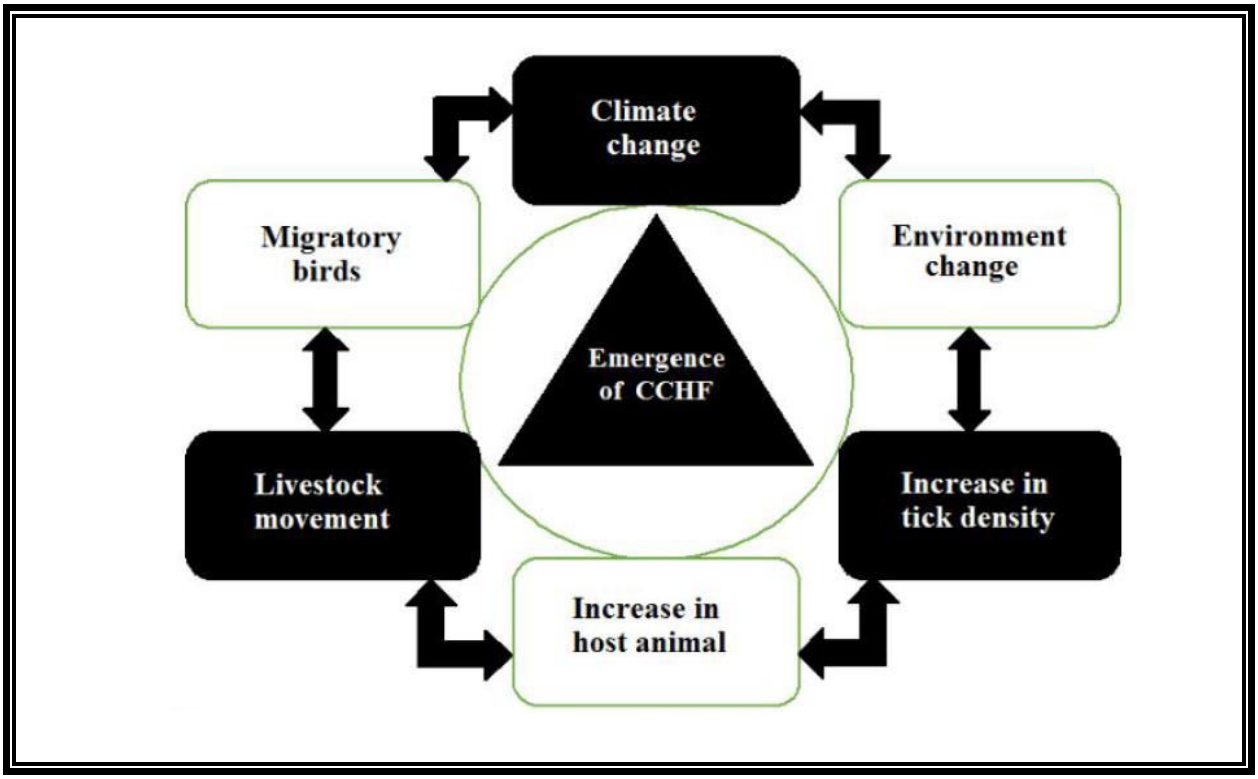

Fig. 3. Factors for Emergency of Crimean-Congo Hemorrhagic Fever (CCHF)

HOW TO PREVENT AND CONTROL CCHF?

The most excellent way to prevent infection is to reduce or avoid contact to the etiological agent (virus). This can only be achieved by various techniques. Individuals who are at highest risk of disease are veterinarians, sheep herders, butchers, etc. must have to get all preventative measure to keep away from contact to virus contaminated ticks or viral-infected blood of animals *e.g.,* wearing of gloves and minimizing contact to exposed body surface, tissues as well as blood of animals are successful trials to control the practically. Similarly, healthcare workers also must have to adopt standard preventive measure protocol and techniques, while attending supposed CCHF infected persons. Acaricidal treatment of domestic animals in CCHFV prevalent regions is successful to minimize the of contaminated ticks population. In the Soviet Union formalin inactivated mouse-brain vaccine of CCHF was originated and accepted for use in 1970.

PUBLIC HEALTH HAZARDS

Crimean-Congo hemorrhagic fever (CCHF) is a threat to public health. Cases of CCHF occurring as an expected consequence in endemic regions should be notified to practitioners in the global neighborhood. Therefore community should be attentive about the chance of importation of CCHF cases from enzootic (endemic) areas, of man-to-man transmission, mainly in the nosocomial situation, and of the probable transmission of the pathogen (virus) *via* tick-infested and contaminated imported livestock/farm animals. The report of geographic distribution of CCHF is a challenge for the scientific community of epidemiologists, medical microbiologists, medical entomologists, and veterinarians that could be adopted by acceleration of a European Standardized Response (ESR) at

the regional, national and international level.

CONCLUSION

Explaining the potential impact of CCHF on public health, this review summarizes the recent perceptive of CCHFV to demonstrate a broad basis for the evaluation of threat to public health and the development of prevention strategies. In respect to the extensive distribution of CCHFV, the wide host diversity of its vectors, the excellent adjustment of the virus to the vector population collectively with its potential to be transmissible from individual to individual (*e.g.* by nosocomial transmissions), rate make CCHFV a major public health threat.

By summarizing distinct features of CCHFV related to public health, this review highlights the motivation for further research studies and points out gaps in existing knowledge. It emphasizes the importance to make stronger public health preparedness in general, and to refine or establish satisfactory diagnostic tools for systematic veterinary, human, pathogen and vector surveillance, particularly in regions where CCHF is predictable to arise in the future. In order to prevent the introduction of CCHFV into new regions and to protect the community, this review provides strategy for classifying the risk/threat of every country and region as a foundation for managing the risk presented by CCHF virus. These guiding principles for the management levels and classification can also be adjusted and used for other tick-borne infections. As the awareness of CCHFV as a severe threat to public health has originated, the primary large-scale approaches in regard to risk estimation, surveillance and diagnostics research studies have been in progress. Further international interactions about this vital public health problem are definitely required in future.

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