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Review Article

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CRIMEAN-CONGO HEMORRHAGIC FEVER FROM TICK-BORNE VIRAL DISEASE

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ABSTRACT

Crimean-Congo Hemorrhagic Fever (CCHF) is a viral disease characterized by hemorrhage (bleeding) and fever. It is a severe disease with a high mortality (death) rate. The geographical distribution of the virus, like that of the tick that carries it, is widespread. CCHF has been found in Africa, Asia, the Middle East and Eastern Europe. The CCHF virus infects a wide range of domestic and wild animals that serve as reservoirs for the virus. Ticks carry the virus from animal to animal and from animal to human. The most important source for acquisition of the virus by ticks is infected small vertebrate animals on which the ticks feed. Once infected, the tick remains infected through its lifespan. The mature tick transmits the infection to large vertebrates such as livestock (cattle, sheep and goats). Humans acquire the virus from direct contact with their blood or other infected tissues from livestock during this time, or they may become infected from a tick bite. The majority of cases of CCHF have occurred in those involved with the livestock industry, such as agricultural workers, slaughterhouse workers and veterinarians. The onset of symptoms from CCHF is sudden with fever, myalgia (aching muscles), dizziness, neck pain and stiffness, backache, headache, sore eyes and photophobia (sensitivity to light). There may be nausea, vomiting and sore throat early on, accompanied by diarrhoea and abdominal pain. Over the next few days, the patient may experience sharp mood swings and become confused and aggressive. The agitation may be replaced by sleepiness, depression and lassitude, and the abdominal pain may localize to the right upper quadrant (over top of the liver) with detectable liver enlargement. Other signs may include tachycardia (fast heart rate), lymphadenopathy (enlarged lymph nodes), and a petechial rash (a rash caused by bleeding into the skin), both on internal mucosal surfaces, such as in the mouth and throat, and on the skin. The petechiae (bleeding spots) may give way to ecchymoses (bruises, like a petechial rash, but covering larger areas) and other hemorrhagic (bleeding) phenomena such as melena (bleeding from the upper bowel, passed as altered blood in the feces), hematuria (blood in the urine), epistaxis (nosebleeds) and bleeding from the gums. There is usually evidence of hepatitis. The severely ill may develop hepatorenal (liver and kidney) failure and pulmonary (lung) failure.

Keywords: CCHF, Livestock, Bunyaviridae, Hyalomma.

HISTORY

Soviet scientists first identified the disease they called Crimean hemorrhagic fever in 1944 and established its viral etiology by passage of the virus through human "volunteers" (fatality rate unreported), but were unable to isolate the agent at that time. In June 1967, Soviet virologist Mikhail Chumakov registered an isolate from a fatal case that occurred in Samarkand (on the ancient Silk Road in Central Asia, not the Crimea) in the Catalogue of Arthropod-borne Viruses. Four months earlier, virologists Jack Woodall, D Simpson and others had published initial reports on a virus they called the Congo virus, first isolated in 1956 by physician Ghislaine Courtois, head of the Provincial Medical Laboratory, Stanleyville and Belgian Congo. Strain V3010, isolated by Courtois, was sent to the Rockefeller Foundation Virus Laboratory (RFVL) in New York City and found to be identical to another strain from Uganda, but to no other named virus at that time. Chumakov later sent his strain to the RFVL, where it was found to be identical to the Congo virus. The International Committee on Taxonomy of Viruses proposed the name Congo-Crimean hemorrhagic fever virus, but the Soviets insisted on Crimean–Congo hemorrhagic fever virus.[1] Against all principles of scientific nomenclature based on priority of publication, it was adopted as the official name in 1973 in possibly the first instance of a virus losing its name to politics and the Cold War. However, since then Congo-Crimean or just Congo virus has been used in many reports, which would be missed in searches of medical databases using the official name. These reports include records of the occurrence of the virus or antibodies to the virus from Greece, Portugal, South Africa, Madagascar (the first isolation from there), the Maghreb, Dubai, Saudi Arabia, Kuwait and Iraq.

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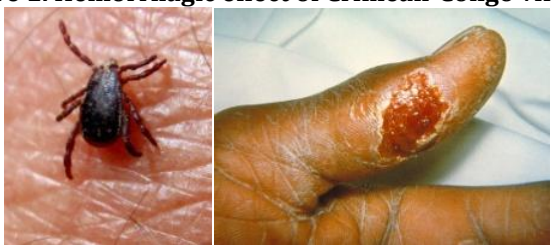
INTRODUCTION

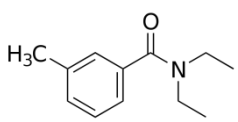
Crimean-Congo hemorrhagic fever (CCHF) is caused by infection with a tick-borne virus (*Nairovirus*) in the family

Bunyaviridae. The disease was first characterized in the Crimea in 1944 and given the name Crimean hemorrhagic fever. It was then later recognized in 1969 as the cause of illness in the Congo, thus resulting in the current name of the disease. In 1956 a similar illness was identified in the Congo. In 1969 it was recognized that the virus causing Crimean hemorrhagic fever was the same as that responsible for the illness identified in the Congo. Linkage of the 2 place-names resulted in the current name for the disease and the virus that causes it. It is a widespread tick-borne viral disease, a zoonosis of domestic animals and wild animals that may affect humans. The pathogenic virus, especially common in East and West Africa, is a member of the *Bunyaviridae* family of RNA viruses. Clinical disease is rare in infected mammals, but commonly severe in infected humans, with a 30% mortality rate. Outbreaks of illness are usually attributable to handling infected animals or people. (Figure **1**)

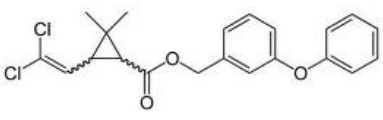
Figure 1. Hemorrhagic effect of Crimean-Congo virus



The mortality (death) rate from CCHF is about 30% with death, when it occurs, usually coming in the second week of the illness. In those patients who recover, improvement generally begins on the ninth or tenth day after the onset of illness. Diagnosis of CCHF is performed in specially-equipped biosafety laboratories by what is called enzyme-linked immunoassay (ELISA). Patients with fatal disease do not usually develop a positive ELISA test and in these individuals, as well as in patients in the first few days of illness, diagnosis is achieved by virus detection in blood or tissue samples. Treatment involves monitoring to guide volume and blood component replacement is required. The antiviral drug ribavirin has been used with apparent benefit. There is no safe and effective vaccine widely available for human use against CCHF. The tick vectors are numerous and widespread and tick control with acaricides (chemicals intended to kill ticks) is only a realistic option for well-managed livestock production facilities. Persons living in endemic areas should use personal protective measures that include avoidance of areas where tick vectors are abundant and when they are active (Spring to Fall); regular examination of clothing and skin for ticks, and their removal; and use of repellents. Persons who work with livestock or other animals in the endemic areas can take practical measures to protect themselves. These include the use of repellents on the skin (e.g. DEET) and clothing (e.g. permethrin) and wearing gloves or other protective clothing to prevent skin contact with infected tissues or blood.[2]



N,N-Diethyl-meta-toluamide



Permethrin

Permethrin

When patients with CCHF are admitted to the hospital, there is a risk of nosocomial spread of infection. In the past, serious outbreaks have occurred in this way and it is imperative that adequate infection control measures be observed to prevent this disastrous outcome. Patients with suspected or confirmed CCHF should be isolated and cared for using barrier nursing techniques. Specimens of blood or tissues taken for diagnostic purposes should be collected and handled using universal precautions. Sharps (needles and other penetrating surgical instruments) and body wastes should be safely disposed of using appropriate decontamination procedures. Healthcare workers are at risk of acquiring infection from sharps injuries during surgical procedures and, in the past, infection has been transmitted to surgeons operating on patients to determine the cause of the abdominal symptoms in the early stages of (at that moment undiagnosed) infection. Healthcare workers who have had contact with tissues or blood from patients with suspected or confirmed CCHF should be followed up with daily temperature and symptom monitoring for at least 14 days after the putative exposure.[3]

Virus classification

Group: Group V-ssRNA, Family: Bunyaviridae, Gunus: Nairovirus, Species: Crimean-Congo hemorrhagic fever virus.

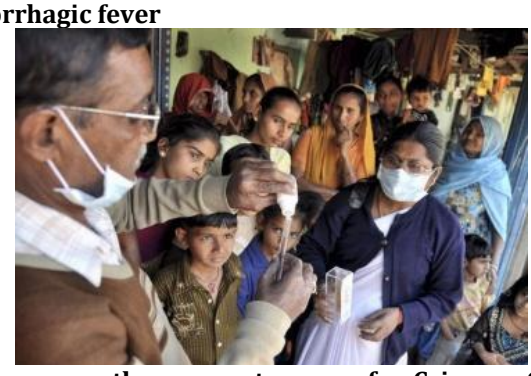
Where is the disease found?

Crimean-Congo hemorrhagic fever is found in Eastern Europe, particularly in the former Soviet Union. It is also distributed throughout the Mediterranean, in northwestern China, central Asia, southern Europe, Africa, the Middle East, and the Indian subcontinent.

How is CCHF spread and how do humans become infected?

Ixodid (hard) ticks, especially those of the genus, *Hyalomma*, are both a reservoir and a vector for the CCHF virus. Numerous wild and domestic animals, such as cattle, goats, sheep and hares, serve as amplifying hosts for the virus. Transmission to humans occurs through contact with infected animal blood or ticks. CCHF can be transmitted from one infected human to another by contact with infectious blood or body fluids. Documented spread of CCHF has also occurred in hospitals due to improper sterilization of medical equipment, reuse of injection needles, and contamination of medical supplies. (Figure **2**)

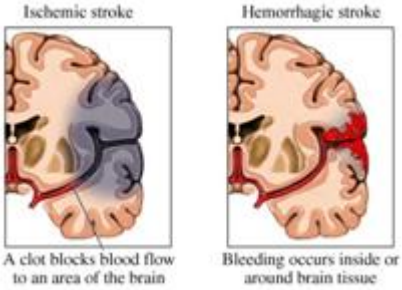
Figure 2. Safery precautions for Crimean-Congo hemorrhagic fever



What are the symptoms of Crimean-Congo hemorrhagic fever?

The onset of CCHF is sudden, with initial signs and symptoms including headache, high fever, back pain, joint pain, stomach pain, and vomiting. Red eyes, a flushed face, a red throat, and petechiae (red spots) on the palate are common. Symptoms may also include jaundice, and in severe cases, changes in mood and sensory perception. As the illness progresses, large areas of severe bruising, severe nose bleeds, and uncontrolled bleeding at injection sites can be seen, beginning on about the fourth day of illness and lasting for about two weeks. (Figure **3**)

Figure 3. Brain hemorrhagic effect



How is Crimean-Congo hemorrhagic fever diagnosed?

Laboratory tests that are used to diagnose CCHF include antigen-capture enzyme-linked immunosorbent assay (ELISA), real time polymerase chain reaction (RT-PCR), virus isolation attempts, and detection of antibody by ELISA (IgG and IgM). Laboratory diagnosis of a patient with a clinical history compatible with CCHF can be made during the acute phase of the disease by using the combination of detection of the viral antigen (ELISA antigen capture), viral RNA sequence (RT-PCR) in the blood or in tissues collected from a fatal case and virus isolation.

Immunohistochemical staining can also show evidence of viral antigen in formalin-fixed tissues. Later in the course of the disease, in people surviving, antibodies can be found in the blood. But antigen, viral RNA and virus are no more present and detectable.[4]

Are there complications after recovery?

The long-term effects of CCHF infection have not been studied well enough in survivors to determine whether or not specific complications exist. However, recovery is slow.

Is the disease ever fatal?

In documented outbreaks of CCHF, fatality rates in hospitalized patients have ranged from 9% to as high as 50%.

How is Crimean-Congo hemorrhagic fever treated?

Treatment for CCHF is primarily supportive. Care should include careful attention to fluid balance and correction of electrolyte abnormalities, oxygenation and hemodynamic support, and appropriate treatment of secondary infections. The virus is sensitive in vitro to the antiviral drug ribavirin. It has been used in the treatment of CCHF patients reportedly with some benefit.

Who is at risk for the disease?

Animal herders, livestock workers, and slaughter houses in endemic areas are at risk of CCHF. Healthcare workers in endemic areas are at risk of infection through unprotected contact with infectious blood and body fluids. Individuals and international travelers with contact to livestock in endemic regions may also be exposed.

How is the disease prevented?

Agricultural workers and others working with animals should use insect repellent on exposed skin and clothing. Insect repellants containing DEET (N, N-diethyl-m-toluamide) are the most effective in warding off ticks. Wearing gloves and other protective clothing is recommended. Individuals should also avoid contact with the blood and body fluids of livestock or humans who show symptoms of infection. It is important for healthcare workers to use proper infection control precautions to prevent occupational exposure. An inactivated, mouse-brain derived vaccine against CCHF has been developed and is used on a small scale in Eastern Europe. However, there is no safe and effective vaccine widely available for human use.

What needs to be done to address the threat of Crimean-Congo hemorrhagic fever?

Prevalence needs to be measured in animals and in at-risk humans in endemic areas; and a useful animal model needs to be developed. Further research is needed to determine the efficacy of specific treatment with ribavirin and other antiviral drugs, and develop a safe and effective vaccine for human use.

VIROLOGY

Entry & Internalization

The specific entry mechanisms of CCHFV are still not known. However, in general, viral infections initiate with the virus binding to the target cell. Attachment proteins on the virus surface attach to the specific receptors on the cell surface. In most viruses, incluing CCHFV, the attachment proteins on the virus are glycoproteins. Although the cellular receptor for CCHFV has not yet been identified, the virus has been suggested to enter the cell by clathrin-dependent endocytosis. The internalized clathrin-coated vesicles fuse with endosomes and then lysosomes where acid-triggered processes induce the necessary conformational changes to allow the virus to escape. Furthermore, Simon and colleagues have demonstrated that CCHFV entry is a pH-dependent process. It has been demonstrated for other members of the *Bunyaviridae* family that a low pH is required for productive infection. Aside from being clathrin- and pH-dependent, viral internalization has also been found to rely on the presence of intact microtubules. Within the first hour after infection, CCHFV moves along microtubuli to reach the cellular sites of viral transcription and replication.To gain a better understanding of host-cell interactions during viral entry and internalization, Connolly-Andersen and colleagues performed extensive studies on polarized epithelial cells, assuming that these cells play a major role in viral spread. Interestingly, they found both viral entry and egress to occur in the basolateral compartment of cells.

Transcription & Replication

Replication of negative-strand RNA viruses commences with the transcription of complementary positive mRNA from a viral RNA segment by the virion-associated RNA-dependent RNA polymerase in the cytoplasm of the host cell. Production of positive-sense RNA but not negative-sense RNA, can be observed during the first 6 h after an infection with CCHFV. Thus, this early phase can only be characterized by viral transcription. At this point, the integrity of microtubules is not critical. The tri-segmented bunyaviruses have an interesting 'cap-snatching' strategy: the virion-associated polymerase cleaves cellular mRNA approximately 15 nt from their 5′ ends and uses the capped leaders to prime transcription of nonpolyadenylated mRNA on the three viral RNA segments. These mRNAs are shorter than the genome segments, as transcription is apparently terminated by hairpin loops. It is not certain how bunyaviruses switch from mRNA to full-length complementary positive-sense RNA transcription. Crimean–Congo hemorrhagic fever virus replication is microtubuli dependent, as has been shown for other viruses within the *Bunyaviridae* family. Replication presumably starts when enough NP is present to encapsidate newly synthesized genomes and antigenomes. During replication, viral NP is directed to the perinuclear region and its cytoplasmic transport relies on

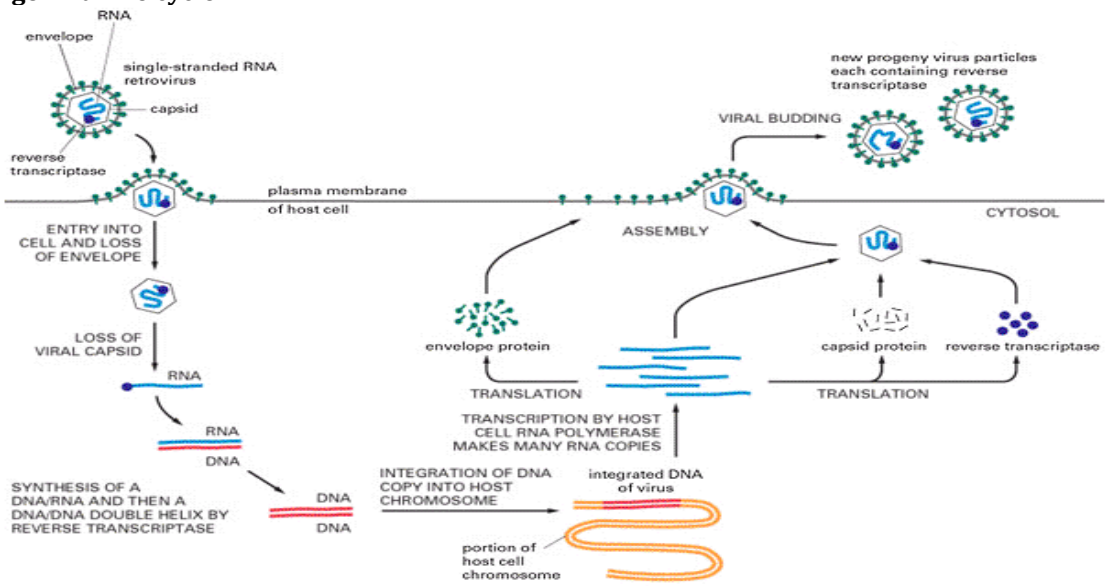
the complex cellular cytoskeleton.

The Viral Life Cycle

Assembly & Egress

Assembly pathways for members of the *Bunyaviridae* family in general and for the *Nairovirus* genus in particular are poorly understood, and CCHFV is no exception. However, previous studies of viral assembly suggest that the maturation of virions in the family of *Bunyaviridae* could occur intracellularly by budding into cisternae within the Golgi structure. During replication, viral NP is targeted to the perinuclear region of the cell, where it is involved in the viral assembly process. This process is actin-dependent and independent of the presence of virally encoded glycoproteins. CCHFV ribonucleocapsid particles are found in the Golgi structure where the late steps of viral assembly occur. The glycoproteins of CCHFV are synthesized in the endoplasmatic reticulum and transported to the Golgi complex. The G_N protein of CCHFV is associated with the membrane and contains a Golgi localization motif in its hydrophobic region within the predicted cytoplasmic tail. The G_C protein of CCHFV, however, remains in the endoplasmatic reticulum and does not relocate into the Golgi complex unless G_N is coexpressed. This suggests that the two glycoproteins have to interact and form hetero-oligomers for correct Golgi transport of G_C. In a transfected cell, the viral polymerase colocalizes with the viral NP in the perinuclear region close to the site of virus assembly, the Golgi cisternae. However, neither the polymerase nor the protease function of the L protein is required for the recruitment of the L protein by NP. In summary, viral proteins travel through the endoplasmatic reticulum and Golgi apparatus, where the mature virions eventually bud into vesicles. Finally, these vesicles are transported to the cell surface and released along the secretory pathway. Therefore, CCHFV egress depends on intact and dynamic microtubuli, since the secretory pathway from the Golgi to the plasma membrane utilizes microtubuli. (Figure **4**)

Figure 4. Congo viral life cycle



Clinical course

Typically, after a 1–3 day incubation period following a tick bite (5–6 days after exposure to infected blood or tissues), flu-like symptoms appear, which may resolve after one week. In up to 75% of cases, however, signs of hemorrhage appear within 3–5 days of the onset of illness in case of bad containment of the first symptoms: first mood instability, agitation, mental confusion and throat petechiae, then soon nosebleeds, bloody urine and vomiting, and black stools. The liver becomes swollen and painful. Disseminated intravascular coagulation may occur as well as acute kidney failure and shock, and sometimes acute respiratory distress syndrome. Patients usually begin to recover after 9–10 days from symptom onset, but 30% die in the second week of illness.

Prevention

Where mammal and tick infection is common agricultural regulations require de-ticking farm animals before transportation or delivery for slaughter. Personal tick avoidance measures are recommended, such as use of insect repellents, adequate clothing and body inspection for adherent ticks. When feverish patients with evidence of bleeding require resuscitation or intensive care, body substance isolation precautions should be taken. The United States armed forces maintain special stocks of ribavirin to protect personnel deployed to Afghanistan and Iraq from CCHF.

Treatment

Treatment is primarily symptomatic and supportive, as there is no established specific treatment. Ribavirin is effective *in-vitro* and has been used during outbreaks,[2] but there is no trial evidence to support its use.

EPIDEMIOLOGY

Vectors

Hyalomma tick: Sporadic infection of people is usually caused by *Hyalomma* tick bite. Clusters of illness typically appear after people treat, butcher or eat infected livestock, particularly ruminants and ostriches. Outbreaks have occurred in clinical facilities where health workers have been exposed to infected blood and fomites.

The causative organism is found in Asia, Eastern Europe, the Middle East, a belt across central Africa and South Africa and Madagascar. The main environmental reservoir for the virus is small mammals (particularly European hare, Middle-African hedgehogs and multimammate rats). Ticks carry the virus to domestic animal stock. Sheep, goats and cattle develop high titers of virus in blood, but tend not to fall ill. Birds are generally resistant with the exception of ostriches.[5]

OUTBREAKS

Isolated male patient diagnosed with Crimean-Congo hemorrhagic fever. During the summers of 1944 and 1945

over 200 cases of an acute, hemorrhagic, febrile illness occurred in Soviet troops rescuing the harvest following the ethnic cleansing of the Crimean Tatars. On July 28, 2005 authorities reported 41 cases of CCHF in Turkey's Yozgat Province, with one death. As of August 2008, a total of 50 people were reported to have lost their lives in various cities in Turkey due to CCHF. 3128 Crimean–Congo hemorrhagic fever cases with 5% of case-fatality rate have been reported by the Ministry of Health of Turkey between 2002-2008. On May 27, 2010 Hospitals reported 70 cases of CCHF in Kosovo 's Kosovo Polje, with 4 deaths reported so far. The Authorities are not able to deal with the disease because of the lack of advanced medication. In September, 2010 an outbreak has been reported in Pakistan's Khyber Pakhtunkhwa province. Poor diagnosis and record keeping has caused the extent of the outbreak to be uncertain, though some reports indicate over 100 cases, with a case-fatality rate above 10%. In January 2011, the disease has been reported in Gujarat, India, with 4 reported deaths, which consisted ofthe patient along with the doctor and the nurse who treated the patient.[6]

Table-1: History of Pathogenic infections

Bacterial infection	Rickettsiales	Rocky Mountain spotted fever · Ehrlichiosis (Human granulocytic, Human monocytic) · Boutonneuse fever
	Spirochaete	Lyme disease · Relapsing fever
	Thiotrichales	Tularemia
Viral infection	Colorado tick fever · Tick-borne encephalitis · **Crimean-Congo hemorrhagic fever** · Omsk hemorrhagic fever · Kyasanur forest disease · Powassan encephalitis	
Protozoan infection	Babesiosis	
Neurotoxin	Tick paralysis	
General	Tick infestation	
Vectors	Ticks	*Ixodes: Ixodes scapularis · Ixodes holocyclus · Ixodes pacificus · Ixodes ricinus* *Dermacentor: Dermacentor variabilis · Dermacentor andersoni* *Amblyomma: Amblyomma americanum · Amblyomma cajennense* *Ornithodoros: Ornithodoros moubata · Ornithodoros hermsi* *other: Rhipicephalus sanguineus*
	Mites	*Leptotrombidium deliense · Liponyssoides sanguineus*

Deadly congo fever surfaces in gujarat kills 3

Ahmedabad: The fatal Crimean-Congo Haemorrhagic Fever caused by an animal tick-borne virus has surfaced in Gujarat, claiming the lives of three people including a doctor and a nurse. In the wake of the deaths, the state health department has gone on alert and a survey has been undertaken to find out the affected people. A team from the National Institute of Communicable Diseases (NICD) is likely to arrive in Ahmedabad by Thursday. "A woman from Kolat village in Sanand taluka was the first to die in the first week of January, followed by the doctor who treated her at a private hospital here and the staff nurse who assisted in treatment, who died yesterday of CCHF," Additional Director (Health) Dr Paresh Dave said.[7] (Figure **5**)

Figure 5. Casualty Block in Hospitals

Dave, who is in-charge of the team investigating the disease, said the National Institute of Virology (NIV), Pune has also confirmed after testing the samples sent to them, that the deceased were infected with CCHF, commonly known as Congo fever. The victims have been identified as Amina Momin (30) of Kolat village in Sanand taluka of the district; Dr Gagan Sharma and nurse Asha John of a private hospital in Ahmedabad, where Momin was admitted with high fever, abdominal pain and vomitting. Dave said the state health department began surveillance in Kolat and near by villages in wake of the deaths. "A team from NIV has already landed in the city and is accompanying the team of doctors and veterinarians surveying villages to look for more suspected cases of CCHF," he said. "The virus causing CCHF is not transmitted by air and it was not an epidemic so there was no need to panic," Dave said. Dave said the relatives of the first victim of CCHF have been kept in isolation and are presently being monitored by expert doctors. "They have not tested positive of CCHF virus," he said. According to the World Health Organisation (WHO), Congo is a viral haemorrhagic fever of zoonosis nature i.e it could be transmitted from animals to humans and vice-versa. The CCHF is primarily found in animals which caused by tick-based virus. It may infect a wide range of domestic and wild animals. Animals become infected with CCHF from the bite of infected ticks. The WHO website said that humans who become infected with CCHF acquire the virus from direct contact with blood or other infected tissues from livestock during this time, or they may become infected from a tick bite. The majority of cases have occurred in those involved with the livestock industry, such as agricultural workers, slaughterhouse workers and veterinarians, it added.[8]

NIV confirms Congo virus in Gujarat: The National Institute of Virology (NIV), Pune has confirmed the positive testing of Crimean-Congo Haemorrhagic Fever (CCHF) virus, identified for the first time in India, which has claimed three lives in Gujarat. The virus at present appeared confined to Gujarat from where NIV had received the samples and the state government had started screening of all suspected cases, Dr A C Mishra, Director and NIV, said Thursday. Although the virus belongs to high risk category, there was no need for panic as its transmission is slow and can be arrested with isolation of patients in hospital, he said. "It is important that infections are prevented from spreading by isolating patients in hospitals and proper precautions are taken," Mishra added. The Congo virus, which surfaced in Ahmedabad, killed three persons including a doctor and nurse who treated the first victim--a woman from Kolat village in Sanand taluka of the district. The CCHF virus is known to be transmitted among animals through ticks. It does not produce disease in animals but kills from 20 to 40 per cent of humans who catch the virus. Typically, after

a one to three day incubation period following a tick bite, flu-like symptoms appear, which may resolve after one week. In upto 75 per cent of cases, however, signs of haemorrhage appear within 3-5 days of the onset of illness. Patients usually begin to recover after 9-10 days from symptom onset, but there could be mortality in some cases. A team of specialists from the National Institute of Communicable Diseases has already been deputed to Gujarat. The CCHF virus has earlier been reported from Africa, the Balkans, the Middle East and Pakistan. There is serological evidence of CCHF infection being present in India in animals which however do not get the disease.[9]

New Delhi: The virus causing the deadly Crimea Congo Hemorrhagic Fever (CCHF) in Ahmedabad has jumped from infected ticks to local cattle like sheep, goat and cows. Cattle samples collected from six villages around ground zero - Kolat village in Sanand whose resident Amina Momin was the first human in India to get infected with CCHF and die on January 3 - have tested positive for high viral load. Speaking to TOI, director of Pune's National Institute of Virology Dr A C Mishra said, "20% of the samples from six villages show positive CCHF infection. This means the virus has been circulating for some time in India and has just recently been detected." Mishra added, "We are therefore setting up a diagnostic laboratory in Ahmedabad to test human samples for CCHF. At present, by the time the samples reach NIV, we lose a day. Three experts from Gujarat are being trained at NIV on safe handling of the human samples and how to interpret the results. Quick diagnosis is crucial with this virus. It kills most infected humans." NIV has also picked up samples from rodents to check for the virus. "We have to immediately cut transmission of the virus from ticks to cattle by intensifying operation pesticide, cleaning the cattle and their sheds. If even 50% of the ticks are destroyed from the body of the host, the transmission can be halted," Mishra added. So does this mean the cattle infected have to be culled just like chicken were during the bird flu outbreak in India? No, said Mishra. "Once the H5N1 virus infected poultry or birds, it killed them. That's how we knew where to look for the virus and killed all poultry around the site to stop transmission. In case of CCHF, the virus sits inside an animal's body but does not harm it. So we can't collect samples from all animals in Gujarat looking for the virus. Culling is, therefore, not recommended. We have to just break the cycle of the virus jumping from ticks to cattle," he added. TOI had first reported how NIV last week found that a particular variety of ticks, Hyalomma, were carrying high quantities of CCHF virus in Ahmedabad, proving that the virus wasn't imported. "Our main recommendation, therefore, is to reduce tick population which can circulate the virus in the environment for many years. They lay their eggs and transfer the virus into it. The egg hatches and continues to infect animals," Mishra added. The CCHF virus is noted by the Union health ministry as a bio-safety level IV agent -- of maximum danger. This is for the first time that India has reported human infection with CCHF by coming in direct contact with blood or other infected tissues from livestock. Human mortality rate is a high as 90%. The CCHF virus has been reported from Africa, the Balkans, West Asia and Pakistan. "If the virus is present in the cattle, it could have spread from them as in villages, humans and cattle live in close proximity. Cutting meat infected with the virus or handling infected animal urine could lead to its spread to humans," Mishra added.[10]

CONCLUSION

At the ending of the part of Crimean-Congo Hemorrhagic Fever spread by ticks which transmits the infection to large vertebrates such as livestock (cattle, sheep and goats). Humans acquire the virus from direct contact with their blood or other infected tissues from livestock during this time. That causes hemorrhage and fever to death if necessary treatment is not provided so care must be taken for the prevention from this disease.

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