Journal of Infectious Diseases & Therapy
ISSN: 2332-0877

Aftab et al., J Infect Dis Ther 2019, 7:4

Short Communication Open Access

Outbreak of Crimean-Congo Hemorrhagic Fever (CCHF) During Eid-ul-Azha

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Received date: June 21, 2019; **Accepted date:** July 18, 2019; **Published date:** July 27, 2019

Abstract

Crimean-Congo Hemorrhagic Fever (CCHF) is an endemic disease in parts of Africa, Asia, Eastern Europe, and the Middle East. It was first classified in the 1940's as Crimean Hemorrhagic fever due to an outbreak in Western Crimea in the former USSR. Later in 1969, it was discovered that the causative virus of this disease was antigenic ally identical with the Congo virus, discovered in Belgian Congo. Thus, the term Crimean-Congo Hemorrhagic Fever was coined. CCHF classically presents with symptoms of hemorrhage, such as petechial, ecchymosis, and hemorrhage of the gums, nose, internal organs and the gastrointestinal system. Symptoms in the earlier stages are generalized, and hence, make it difficult to produce a diagnosis. Transmission occurs due to tick bites and infestations of the virus in livestock. During Eid-ul-Azha, livestock is sacrificed in a religious ceremony. The consequent interaction of human beings with infected animals and their blood material leads to an outbreak of the disease during this period. Cases are endemic in the state of Baluchistan due to cattle herding being a common profession. Sacrificial ceremonies involving laymen with lack of awareness about the disease leads to increased incidences. No preventative measures are taken against the disease during Eid-ul-Azha. Infection control policies should be adopted among those exposed to the animal during Eid-ul-Azha. Awareness programs and methods of early diagnosis could also prevent fatality, and increase disease control.

Keywords: Crimean-Congo Hemorrhagic Fever; Crimean fever; CCHF; Religious event; Eid-ul-Azha; Congo Virus; Tick-borne; Nairovirus; Bioterrorism Agent; Hyalomma; Transstadial Transmission; Transovarial Transmission; Venereal Transmission; Cattle Herding; Sacrificial rituals; Infection control

Introduction

Crimean-Congo Hemorrhagic Fever (CCHF) is a tick-borne viral disease that can be transmitted from humans to animals, that is, a zoonosis [1]. The fatal infection has been found to occur in parts of Africa, Asia, Eastern Europe, and the Middle East [1,2]. It has been reported that that this disease has a case fatality ratio of 30% [1]. Due to the extensive distribution of the virus worldwide, high mortality rate, and its potential use as a bioterrorism agent [3], it is considered an important human infecting agent.

Background and Identification

The disease was first described in Tajikistan in the 12th century [4]. It was not until the early 1940s, that it was categorized as Crimean Hemorrhagic Fever when an outbreak occurred in the region of Western Crimea in the former USSR [5-8]. Later, a virus catalogued as Congo Virus, discovered in the region of Belgian Congo was shown by Casals [9] in 1969. This virus was shown to be antigenic ally identical to the virus responsible for Crimean fever; hence the term Crimean-Congo hemorrhagic fever virus (CCHFV) came into existence and is now routinely used.

Virology and Vector

Crimean-Congo Hemorrhagic Fever Virus (CCHFV) is a part of the genus Nairovirus which is classified in the family Bunyaviridae. Nair viruses are tick borne viruses, which are discerned from other bunya viruses due to their large L-segments [10]. These segments are close to being twice the size of the L-segments of other bunya viruses.

The vector that harbors CCHFV is mainly the ixodid tick of the genus Hyalomma [1-11]. Ticks from the family Iodide possess rigid shield or sputum; whereas those in the family Argasidae have a soft body. Although previously assumed otherwise, studies recently confirmed that ticks in the family Argasidae, cannot transmit the virus despite getting infected while feeding on virus carrying hosts [12].

Transmission

Ticks acquire the CCHFV virus by transracial transmission (passing of the virus from the larva to the adult), transovarial transmission (passage of virus to offspring), and venereal transmission. It may also be transmitted during co feeding with infected ticks on uninfected hosts. Tick larva normally climbs vegetation and attaches to the host. Domestic livestock is considered the primary host of the disease. The virus can then be transmitted to humans *via* tick bites, or *via* direct contact with the infected blood of the animals, for example, in slaughterhouses. Infected persons also impose a risk of transmission to other humans by direct/indirect contact with their skin, mucus membranes and blood [13]. It is also possible for transmission to occur in a hospital setting.

Symptoms and Clinical Presentation

CCHF has four stages: incubation, pre-hemorrhagic, hemorrhagic and convalescence [1]. The length of the incubation period depends on the route of transmission of the disease. It can last 3-6 days, with a maximum period of 9 days when spread by tick bite, whereas it lasts 5-6 days, with a maximum period of 13 days when transmitted *via* contaminated blood or other infectious material. The incubation stage is followed by the pre-hemorrhagic stage, which shows the following symptoms: fever, chills, photophobia, myalgia, nausea, and severe headache [14]. The hemorrhagic phase then manifests 3-6 days after the onset of the disease, in severe cases. This phase shows symptoms ranging from petechial to large areas of ecchymosis. It may also show hemorrhage of the gums, nose, internal organs, and gastrointestinal system. The convalescence phase occurs 15-20 days after the onset of the disease in patients that survive the preceding stages. The patient may exhibit general weakness, headache, dizziness, weak pulse, hair loss, poor appetite, poor vision, and loss of memory during this period [15-19]. Complete recovery may take up to 1 year.

Diagnosis

Clinical diagnosis is difficult to obtain before the hemorrhagic stage comes into effect due to non-specific initial symptoms, and sporadic onset of the disease. Therefore laboratory diagnosis is considered more definitive and reliable. This is based on isolation of the virus in cell culture or intra cerebral inoculation of suckling mice. It can also be confirmed by detection of viral nucleic acid, antigens, or virus-specific antibodies. The most commonly sampled biomaterials for their detection are serum or plasma [19]. Blood collected in EDTA tubes ensures highest PCR efficiency [18]. Viral genome has also been detected in saliva and urine samples of CCHF infected patients, but their diagnostic application has not yet been tested [20].

Supportive diagnostic techniques include biochemical tests and complete blood count. Thrombocytopenia is a consistent feature of CCHF, accompanied by leucopenia, and elevated levels of aspartate, alanine aminotransferase, lactate dehydrogenase, and keratinize phosphokinase [17].

Treatment and Prevention

Use of intravenous Ribavirin- a nucleoside analogue with broad spectrum antiviral activity- has been recommended for the treatment of CCHF, whereas oral ribavirin is recommended for post exposure prophylaxis [21-23].

Two vaccines have been developed to prevent CCHF contraction; however, these have not yet been involved in official randomized clinical trials. Efficient ways to prevent spread of the disease would be to avoid tick bites by wearing protective clothing that prevents tick attachment, and by wearing tick repellent. People in contact with livestock and/or exposed individuals, such as healthcare workers, and individuals employed in slaughterhouses or farms, must follow infection control guidelines, such as wearing gloves, masks, gowns, and face shields [24,25]. Patient isolation and barrier nursing are also required when in contact with CCHF patients.

Cases from Pakistan

The first case of CCHF in Pakistan was reported in 1976, with an additional 14 cases reported in the time period from 1976 to 2010 [26]. For the past two decades it is considered an endemic disease in Pakistan. Cases exist in every region of the country; however, the vast majority of them yield from the state of Baluchistan. This may be due to the common profession of cattle herding in the rural areas of the state [27]. Shepherds from Baluchistan also travel to other regions of the country on the occasion of Eid-ul-Azha to sell their livestock [28]. This creates a route of transmission of the disease to other parts of the country. During Eid-ul-Azha, which is a religious event observed by Muslims; nearly 5 million animals are sacrificed nationwide [29]. A vast majority of these sacrificial rituals are performed by poverty stricken individuals, hired to perform this task. They do not have access to proper equipment such as gloves or masks required to follow infection control guidelines. Thus, the unprotected exposure to the blood and tissue of sacrificial livestock leads to an increased number of cases of CCHF during, and following the time of the year when Eid-ul-Azha occurs. So far, 4 cases (out of 11 nationwide) of CCHF have been reported in Karachi, Pakistan in 2018 [30]. Out of the 4 confirmed diagnoses currently admitted in Jinnah Post Graduate Medical Centre (JPMC), Karachi, two hailed from Baluchistan, whereas the others belonged to Karachi, Sindh [31]. Recently, 2 additional lives were claimed at the hands of this virus on September 1st, 2018 and September 2nd, 2018. These occurred in Islamabad hospital and Lady Reading hospital, Peshawar, respectively [32]. The National Institute of Health (NIH) has issued an official warning against the disease. Private hospitals have also begun to issue warnings and release educational posters regarding disease preventative measures.

Conclusion

Lack of awareness, education, and poverty has led to the continual transmission of CCHF in Pakistan. This is furthered by the lack of diagnostic techniques commonly available within hospitals, preventing early diagnosis of the disease. Survival is difficult, with mortality rates being described as up to 50% within local hospitals. While institutions like NIH do continue to issue warnings, no large scale measures are being taken to reduce incidence of the disease.

An initiative needs to be taken, especially during the latter part of the year around the time of Eid-ul-Azha, to reduce exposure to the virus carried by livestock, along with any blood and bio hazardous material that may come into contact with individuals during this part of the year. Proper legislature, and methods to ensure accountability are needed to ensure that sacrificial ceremonies occur in sealed off and controlled environments, instead of in the open, and on the streets. Slaughterers who are hired to perform these ceremonies also need to be educated about the risks and appropriate infection control methods. Furthermore, an efficient disposal system needs to be created to dispose of animal remains after the ceremony, without contaminating the already existing disposal units in place.

Lastly, educational and awareness programmers also need to be established to inform the general public of preventative measures against the disease.

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