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Epidemiological Profile of Crimean Congo Hemorrhagic Fever (CCHF) Cases at a Tertiary Care Hospital Quetta, Pakistan

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ABSTRACT

Introduction: Crimean Congo hemorrhagic fever (CCHF) is a severe hemorrhagic disease caused by a tick-borne virus transmitted to humans through the bite of infected ticks or by direct contact with viremic animals or humans. It is the second most widespread arbovirus of medical importance after Dengue. The objective of this study was to assess the epidemiological profile of CCHF cases at a tertiary care hospital in Quetta, Pakistan from the year 2015 to 2020.

Methods: A cross-section study was conducted among 187 positive cases at the CCHF isolation ward of a tertiary care public hospital at Quetta between the years 2015-20 using the convenient sampling technique after the ethical clearance. Hospital was visited regularly to do active surveillance, review patients' records along with personal interviews with patients, doctors, nurses, and the medical superintendent of the hospital. Active contact tracing was undertaken among family, friends, and ward staff. Descriptive analysis of the data was done. The data collected through this study was compiled and analyzed in Epi Info® version 7.0.

Results: Out of a total of 480 suspected CCHF cases, Polymerase Chain Reaction (PCR) of 73% (n=349) cases resulted in 52% CCHF positive with a Case Fatality Rate(CFR) of 25%. Cases were mostly reported from various districts of Balochistan province, Pakistan (83%). The majority of the cases (84%) were males with a mean age of 33 years.

Conclusions: Animal contact was the most probable cause of the outbreak. Regulations of slaughterhouses and private slaughtering of animals by the municipality and district government through one health approach were recommended along with PCR laboratory services and other latest equipment at the Isolation ward urgently.

Keywords: *Afghanistan; Balochistan; CCHF; Epidemiological profile; Pakistan; Quetta.*

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INTRODUCTION

Crimean-Congo hemorrhagic fever, the second most widespread Arbovirus, is caused by the Crimean Congo hemorrhagic fever virus (CCHFV).[1,2] The most notable vectors are the Hyalomma species of tick and transmitted through tick bites, contact with infected blood or tissue of viremic livestock, and crushing.[3,4] The intensity of illness is related to the virus quantity in the blood (up to 109 genome equivalents/mL of blood).[5,6] Infection of CCHFV is reported in 30 different countries, until now with some major outbreaks in Africa, Southeast Europe, the Middle East, and Asia.[7]

In Pakistan, CCHFV was first isolated in the 1960s from ticks in the Changa-Manga forest near Lahore.[8] In 2013, 16 suspected cases of CCHF, including six deaths, were reported with a case fatality rate of 37.5%. Similarly, there were 183 confirmed cases between 2011 and 2013.[9] We aimed to study the epidemiological profile of Crimean Congo Hemorrhagic Fever (CCHF) cases at a tertiary care hospital in Quetta, Pakistan from the year 2015 to 2020.

METHODS

A cross-sectional descriptive study was conducted among 187 positive CCHF cases from Fatima Jinnah Chest and General Hospital Quetta, Pakistan after the ethical approval from the Ethical Review Board (ERB), Provincial Health Department of Balochistan province (Ref no. 12/Steno/2333). The study was conducted at the isolation ward, where weekly basis follow-up of admitted cases was done to follow up the records of cases admitted and treated during January 2015 – December 2020. All detailed histories, the contact information on the basis of risk factors, and the laboratory results of all patients were taken into account. The contacts of the cases were also followed up. A convenient sampling technique was carried out to conduct this study. All the suspected cases of the CCHF isolation ward as well as those referred from other tertiary care hospitals of Quetta were the sample population of this study.

Probable Case:

A suspected case with an acute history of febrile illness 10 days or less **AND** any two of the following:

Thrombocytopenia <50,000/mm^3, petechial or purpuric rash, epistaxis, haematemesis, gum bleeding, hemoptysis, blood in stools, ecchymosis, another hemorrhagic symptom – AND no known predisposing host factors for hemorrhagic manifestations.[7]

Contact:

Any person who has cared for the patient in the hospital, shared a house, room, or a vehicle with the patient.

A close-ended structured questionnaire including information about demographic features, clinical signs/symptoms, and possible risk factors associated with CCHF was used for data collection. Personal face-to-face interviews with the patients, concerned physicians, doctors, nursing staff, and medical superintendent of the hospital were conducted. The national professional officer was also contacted who was looking after the Disease early warning and response System (DEWS) in the province till 2013. Besides this, review of the illness history and investigations were carried out from the record of the hospital. Active contact tracing was undertaken among the staff of the Medical Intensive Care Unit (ICU) where the patients were treated by using the following operational case definition. Both probable cases and contacts were used for the study.

The CCHF cases which were reported from all over Balochistan and even from Afghanistan to an isolation ward established at Fatima Jinnah Chest and General Hospital, Quetta, Pakistan were included in the study.

Suspected cases who could not perform PCR tests because of financial issues, death of the patient, or any other cause along with negative cases were excluded.

The data collected through this study was compiled and analyzed in Epi Info® version 7.0 and the risk factors analysis was done to establish the statistical importance using appropriate statistical tests.

RESULTS

During the study duration (2015-20) a total of 480 suspected CCHF patients were admitted to Fatima Jinnah chest and general hospital's isolation ward for infectious diseases and among them 52%(n=187) were laboratory-positive for CCHF as per laboratory PCR results. Therefore, the study was done among 187 positive cases only.

Laboratory results: Among 480 total suspected cases, the laboratory test (PCR) was done for 73% of suspected cases. PCR of the remaining 27% of suspected cases was not done due to financial issues, death of the patient, or any other cause. The PCR facility was not available at the Isolation ward until 2020. Before the establishment of public health laboratories at Fatima Jinnah Hospital (FJH) Quetta, the PCR for CCHF was sent to private labs which was a costly test and a burden on the families as most of the patients are from lower middle class or poor family backgrounds. So, among the total 187 cases of CCHF which were laboratory positive and reported during 2015-20 in Baluchistan province, 68% were cured and discharged from the ward after treatment (Table 1). Furthermore, a total of 46 deaths occurred among the 187 CCHF lab positive cases during 2015-20, which made up a total CFR of 25% (i.e. 46/187*100).

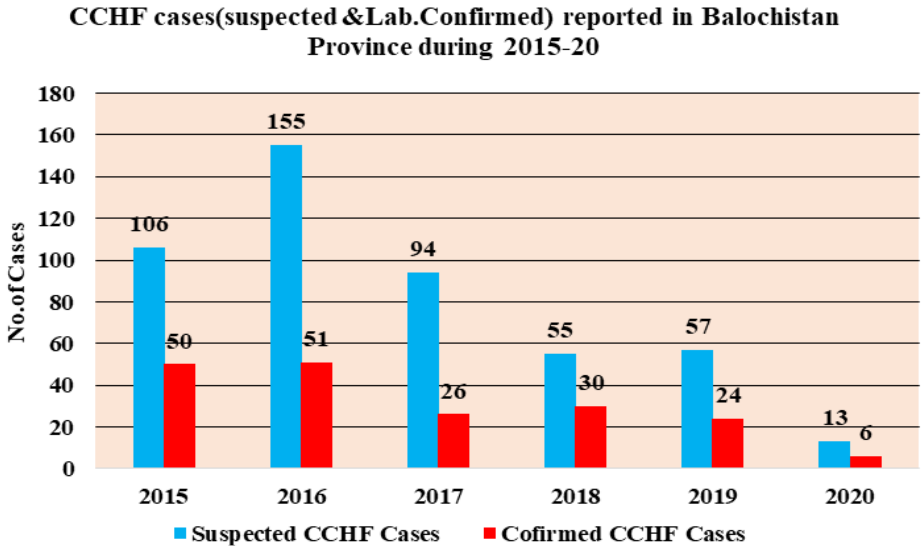

Figure 1. Suspected Cases Reported in Baluchistan Province during 2015-20

Table 1. Laboratory results

Result of CCHF PCR (n=349)	**n (%)**
CCHF Positive	187(52.0)
CCHF Negative	162(45.0)
Final outcome (n=187)	
Cured	127(68.0)
Expired	46(24.6)
Referred to tertiary hospital for further management	10(5.3)
LAMA(Leaving Against Medical Advice)	4(2.1)

As shown in table 2, the cases reported during the given time span were from different age groups, with a mean age of 33 years and a major proportion(48%) belonging to the age group of 21 to 40 years with the majority (83%) belonging to Baluchistan Province. The occupation of more than one-third (38.5%) CCHF positive patients was cattle rearing

Table 2. Socio-demographic characteristics (n=187)

Socio-demographic Characteristics	**n(%)**
Age-wise distribution(in years)	
0-20	42(22.0)
21-40	89(48.0)
41-60	43(23.0)
61-80	13(7.0)
Geographical Distribution (Province/Country wise)	
Balochistan(Pakistan)	155(83.0)
Afghanistan	32(17.0)
Occupation Wise Distribution	
Cattle rearing	72(38.5)
Housewives	28 (15.0)
Laborer	25(13.3)
Dairy farmworkers	12(6.4)
Drivers	12(6.4)
Farmers	8(4.2)
Doctors	6(3.2)
Shopkeepers	5(2.7)
Moto Mechanic	2((1.0)
Molvi	1(0.5)
Policemen	1(0.5)
Other/student/government	15(8.0)

Table 3 shows that among the 187 CCHF lab-positive cases, the majority (84%) were male.

Table 3. Gender Wise Distribution of Lab. Positive CCHF cases reported in 2015-17 Balochistan (n=187)

Year	**Total CCHF Positive cases(n)**	**Male Cases(n)**	**Female cases(n)**
2015	50	40	10
2016	51	43	8
2017	26	18	8
2018	30	27	3
2019	24	23	1
2020	6	6	0
Total	**187**	**157**	**30**

The Epi curve below shows the distribution of cases over the time. According to the month-wise number of cases reported in Baluchistan province during the years 2015-20, it is very clear that the maximum number of cases were reported during the months of August to October

in 2015-20. Since these are the months when Eid ul Adha took place and usually before, between, and after Eid, the mobilization (import/export) of animals is at the peak where thousands of animals are slaughtered, and humans come in contact with animals resulting in the increase in infectivity.

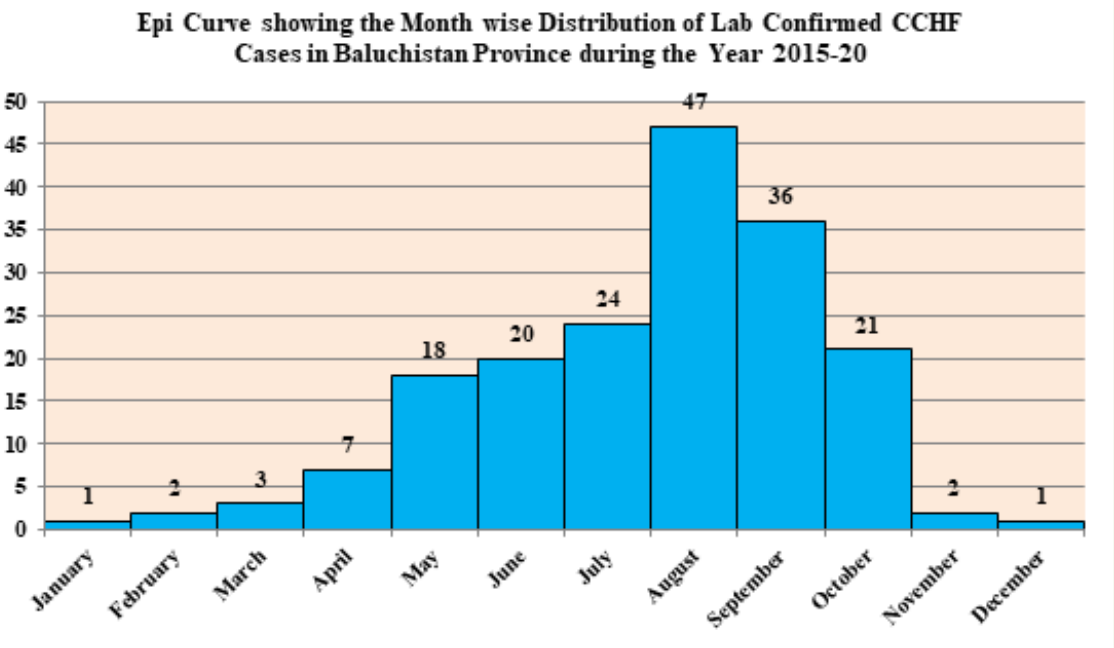

Figure 2. EPI CURVE showing distribution of CCHF cases overtime during 2015-20

DISCUSSION

The study group comprised a major proportion (48%) of patients of the age group 21-40 where the positive cases of CCHF were more in male patients. Out of 349 patients, 187 positive cases of CCHF were reported with the number of cases rising from June to September which is alike to the previous study conducted in Afghanistan.[10] The virus can be transmitted to humans through the bite of a tick or contact with blood or tissue of CCHF patients or infected animals. Therefore, farmers, veterinarians, and those handling livestock are described as at-risk groups for CCHF. This might be the reason behind the majority of cases of CCHF in our study involving cattle rearing which is similar to the study conducted in Turkey.[11]

The case fatality rate was found to be 25% which is comparatively less than the study conducted in Afghanistan in the year 2008.[12] However, a drastic improvement in the Case fatality rate was found in Afghanistan from 2017-2018 where CFR declined to 15% which is comparatively lower than our study.[10]

CCHF is a disease known to affect many people around the world and lead to a high mortality rate when not treated early.[11] One way to reduce the spread of pathogens is to use acaricides as it minimize the chance of tick infection.[13] It is best to wear gloves and other protective clothing to reduce the risk of transmission of the virus from animals to humans and close physical contact with people infected with CCHF should be also be avoided. The use of ribavirin along with hematological support is the mainstay of treatment with a good prognosis.[14] Furthermore, it also lies upon the shoulders of law enforcement and healthcare authorities to make certain that only healthy animals enter the country.

CONCLUSIONS

Animal contact was the most probable cause of the outbreak. Regulations of slaughterhouses and private slaughtering of animals by the municipality and district government through one health approach are recommended along with PCR laboratory services and other latest equipment at isolation ward urgently.

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Not applicable

CONFLICT OF INTEREST

None

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