

Clinical and Epidemiologic Features of Crimean-Congo Hemorrhagic Fever Patients in Giresun Province

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Abstract

Aim: Crimean-Congo hemorrhagic fever (CCHF) is an endemic disease in our country that can result in mortality. This study aimed to investigate the clinical and epidemiological characteristics of CCHF cases in our province.

Methods: A retrospective analysis was conducted on 92 adult CCHF cases diagnosed in our province between 2021 and 2024. The demographic, clinical, and laboratory data of these patients were evaluated, along with the geographical and seasonal distribution of the disease.

Results: The mean age of the 92 patients diagnosed with CCHF was 52.7 ± 14.9 years. Of the patients, 53.3% were male. The vast majority had a history of tick exposure, farming, or animal husbandry. The most common symptoms were fatigue, fever, and muscle-joint pain. The majority of the cases were reported from the districts of Şebinkarahisar, Alucra, and Çamoluk, in that order. Cases began to appear in April, with distribution throughout the year ending in August. Most cases were admitted in May, June, and July. Mortality occurred in 3 patients (3.3%).

Conclusions: CCHF cases in Giresun Province are predominantly seen in individuals living in rural areas and engaged in agricultural activities, with a marked seasonal distribution. The concentration of cases in specific districts indicates the need to intensify public health measures in these areas. The findings of this study may contribute to understanding the regional spread of CCHF and to the development of preventive strategies.

Keywords: Crimean-Congo hemorrhagic fever; epidemiology; Giresun

1. Introduction

Crimean-Congo Hemorrhagic Fever (CCHF) is a viral infection with zoonotic characteristics caused by the Crimean-Congo Hemorrhagic Fever Virus (CCHFV), an RNA virus belonging to the *Nairoviridae* family. The disease can result in a severe hemorrhagic fever in humans and is most commonly transmitted through the tick bite, particularly those of the *Hyalomma* genus. Individuals in endemic areas such as farmers, animal husbandry handlers, veterinarians, and healthcare workers are considered high-risk groups.

CCHF typically begins with non-specific symptoms such as fever, headache, and myalgia. In some patients, it can progress to serious clinical manifestations including petechiae, ecchymosis, bleeding, and organ failure, which may result in death. While the case fatality rate in global outbreaks of CCHF can be as high as 40%, the reported mortality rate in our country is approximately 5%.^{1,2}

Turkey is among the endemic regions for CCHF.^{3,4} The southern

part of the Black Sea Region, along with Central Anatolia and Eastern Anatolia, has a high incidence of the disease.^{5,6} Giresun Province is one of the high-risk areas for CCHF, both because it lies within an endemic zone and due to its large population engaged in agriculture and animal husbandry. Epidemiological studies that reveal the regional distribution, annual and seasonal variations, demographic characteristics, and mortality rates of the disease are crucial for both disease management and the development of prevention strategies.

In this study, we aimed to retrospectively analyze CCHF cases seen in Giresun between 2021 and 2024 to determine the clinical and epidemiological characteristics of the disease and to map its geographical distribution. The findings from this study are expected to contribute to the recognition of CCHF in the region, increase awareness, and support the development of forward-looking prevention strategies.

2. Materials and Methods

Our study is an observational and descriptive research that retrospectively examines CCHF cases diagnosed in Giresun Province between 2021 and 2024. The study included patients over the age of 18 who were followed at Giresun Training and Research Hospital and received a confirmed diagnosis of CCHF either by detecting CCHFV RNA through reverse transcriptase polymerase chain reaction (RT-PCR) or CCHFV IgM antibodies via enzyme-linked immunosorbent assay (ELISA), after being clinically suspected of CCHF. Patients whose diagnosis of CCHF was not confirmed, who were diagnosed with alternative conditions, had missing data, or were under the age of 18 were excluded from the study.

The following data were retrospectively collected and recorded from the electronic medical records: patients' demographic information (age, sex, history of tick bite, history of animal husbandry or farming, residence in an endemic area, date of disease onset, district, neighborhood or village), day of hospital admission after symptom onset, complaints at admission, development of bleeding during follow-up, need for blood product replacement, length of hospital stay, mortality, need for intensive care unit (ICU) admission, and initial laboratory parameters [white blood cell count, platelet count, lactate dehydrogenase (LDH), creatine kinase (CK), alanine aminotransferase (ALT), aspartate aminotransferase (AST), international normalized ratio (INR)]. The annual and seasonal distribution, as well as the geographical distribution, of the disease in Giresun Province was also investigated.

Data were analyzed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Mean, standard deviation, minimum-maximum values, and percentages were used

to describe the variables.

The study was approved by the Giresun Training and Research Hospital Ethics Committee with the decision number and date 16.04.2025/22.

3. Results

A total of 139 patients were identified who were tested for suspected CCHF during the study period. Among them, 92 patients received a confirmed diagnosis of CCHF. The annual distribution of patients who tested positive or negative for CCHF diagnostic tests is shown in Figure 1. The mean age of patients with confirmed CCHF was 52.7 ± 14.9 years (range: 19–80), and 53.3% of the patients were male. Diagnosis was made via ELISA in 9 patients and RT-PCR in 83 patients. A history of tick bite prior to symptom onset was reported by 70 patients (76.1%). All patients reported being in an endemic area; 81.5% were involved in animal husbandry and 73.9% in crop farming. The most common presenting symptoms were fatigue, fever, and myalgia. Eight patients had bleeding on admission and 25 patients had bleeding in various foci during hospital follow-up. The most common site of bleeding at admission was abnormal vaginal bleeding, seen in 3 patients. During follow-up, the most frequent bleeding sites were hematuria and subcutaneous hemorrhages. The most common laboratory abnormalities were thrombocytopenia, leukopenia, and elevated ALT, AST, and LDH levels. The demographic and clinical data of the patients are presented in Table 1.

Figure 1

Annual distribution of CCHF positive and negative cases

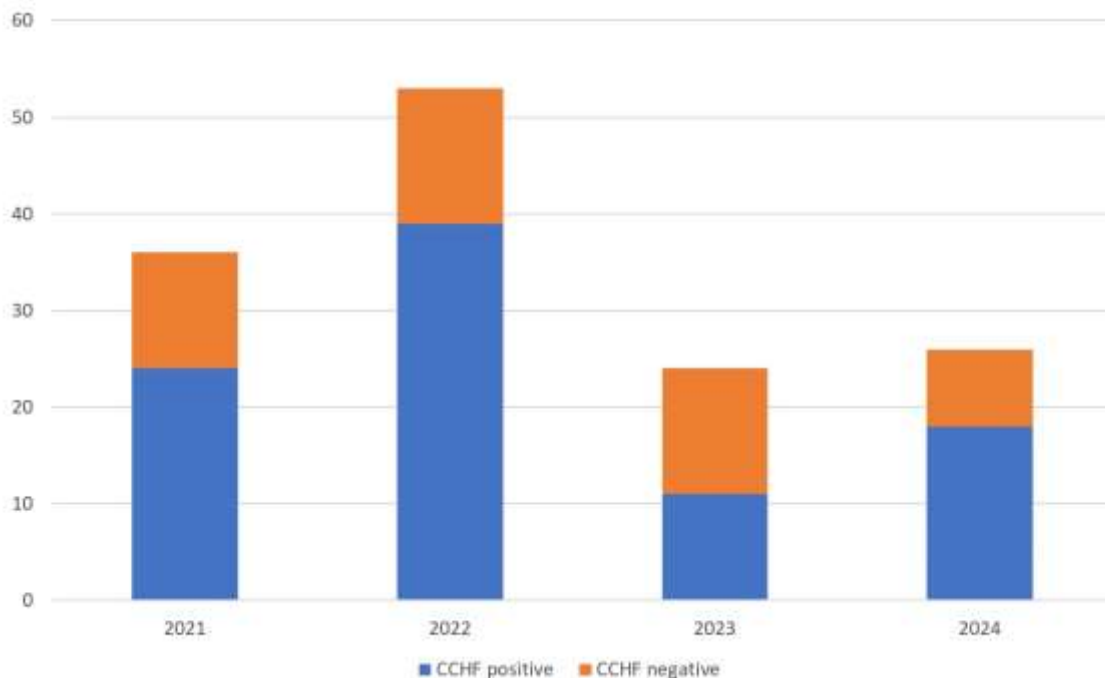
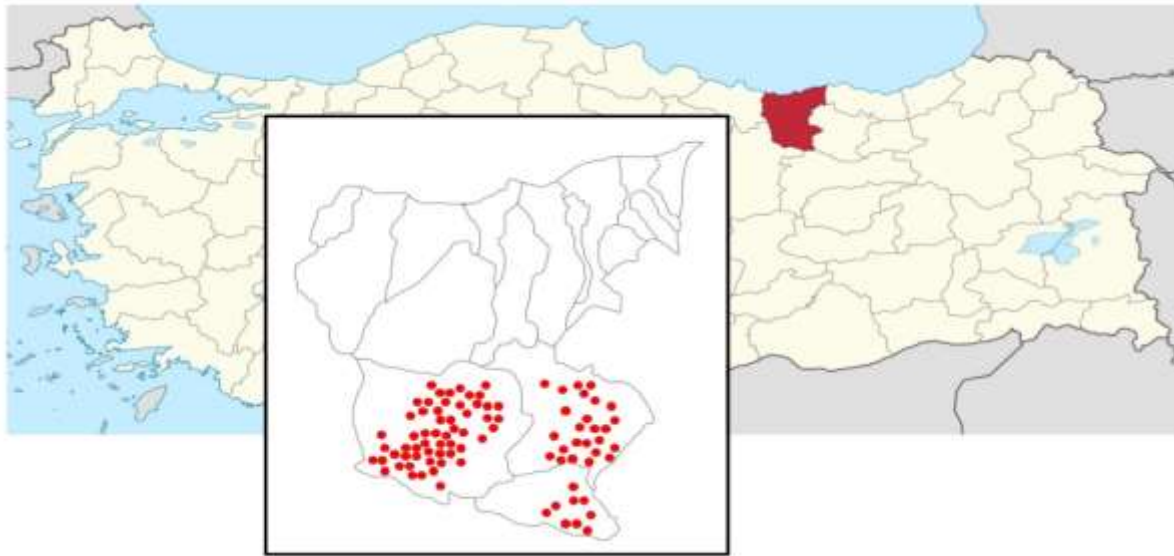


Figure 2

Geographical distribution of cases in Giresun province



Of the 92 confirmed CCHF cases, 90 were determined to have acquired the disease within Giresun Province. One patient contracted the disease during travel to Erzincan, and another during travel to Artvin. Among the 90 locally acquired cases, the geographic distribution by district showed that 56 cases were from Şebinkarahisar, 25 cases from Alucra, and 9 cases from Çamoluk. A map showing the geographic distribution of these 90 cases by district and village within Giresun is provided in Figure 2.

Over the four-year period in Giresun, the highest number of cases occurred in 2021 and 2022. The monthly distribution of cases showed that admissions began in April and ceased in August, with the majority of cases occurring in May, June, and July. The monthly distribution of cases is illustrated in Figure 3.

Figure 3

Monthly and annual distribution of CCHF cases

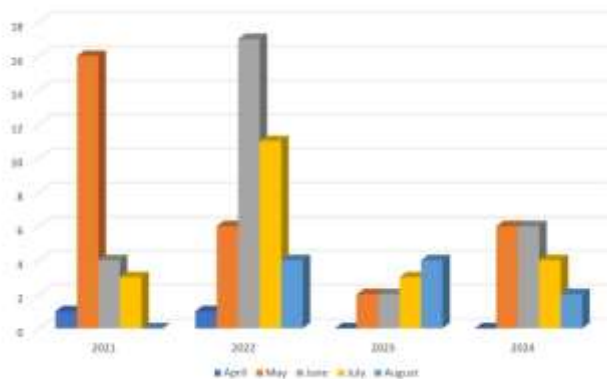


Table 1

Sociodemographic Features of Patients

Table 1. Demographic and clinical characteristics of patients diagnosed with CCHF

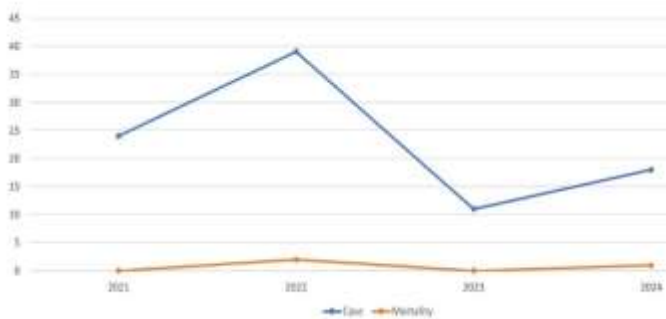
Variable	CCHF patients (n=92)
Age, mean±SD (min-max)	52.7±14.9 (19 – 80)
Male gender, n (%)	49 (53.3)
History of tick bite, n (%)	70 (76.1)
Admission day after symptom onset, mean±SD (min-max)	3.3±1.6 (1 – 7)
Animal husbandry, n (%)	75 (81.5)
Crop farming, n (%)	68 (73.9)
Being in an endemic area, n (%)	92 (100.0)
Living in rural area, n (%)	85 (92.4)
Fatigue, n (%)	81 (88.0)
Fever, n (%)	75 (81.5)
Myalgia, n (%)	54 (58.7)
Nausea – vomiting, n (%)	38 (41.3)
Headache, n (%)	34 (37.0)
Loss of appetite, n (%)	31 (33.7)
Diarrhea, n (%)	13 (14.1)
Abdominal pain, n (%)	5 (5.4)
Bleeding at admission, n (%)	8 (8.7)
Bleeding during follow-up, n (%)	25 (27.2)
Leukopenia (<4000/mm ³), n (%)	78 (84.8)
Thrombocytopenia (<150000/mm ³), n (%)	92 (100.0)
LDH elevation (>225 U/L), n (%)	87 (94.6)
ALT or AST elevation (>40 U/L), n (%)	84 (91.3)
CK elevation (>190 U/L), n (%)	46 (50.0)
INR elevation (>1.2), n (%)	13 (14.1)
Blood product replacement, n (%)	31 (33.7)
Length of hospital stay, mean±SD (min-max)	7.8±6.1 (2 – 56)
Need for intensive care unit, n (%)	6 (6.5)
Mortality, n (%)	3 (3.3)

ALT: alanine aminotransferase, AST: aspartate aminotransferase, CCHF: Crimean-Congo hemorrhagic fever, CK: creatine kinase, INR: international normalized ratio, LDH: lactate dehydrogenase, SD: standard deviation

Among all patients, 3 cases (3.3%) resulted in mortality. All fatal cases were male and over 55 years of age. Each of these patients presented late—5 to 6 days after symptom onset—and developed bleeding at various sites during hospitalization. Overall, six patients required admission to the ICU during their hospital stay. All patients admitted to the ICU had severe thrombocytopenia. The indications for ICU in these patients included massive bleeding, cardiac arrhythmia (severe bradycardia, AV block, etc.), and organ failure such as renal or pulmonary failure. Three of these cases resulted in death, while the remaining three survived after receiving intensive supportive treatment. A graph showing the number of cases and mortalities by year is presented in Figure 4.

Figure 4

Graph of case and death counts



4. Discussion

CCHF, a tick-borne viral hemorrhagic fever commonly seen worldwide, is endemic in our country. Cases are more frequently reported from regions where animal husbandry is common and where ticks that pose a transmission risk are widespread. Giresun is one of the provinces where such characteristics are present, making it one of the regions where the disease occurs. According to data from the Ministry of Health, 17,132 CCHF cases were reported in Turkey between 2002 and 2024, and Giresun has been among the provinces with an incidence rate above the national average⁷. In Turkey, many studies have investigated the regional epidemiology of CCHF, particularly in the Black Sea and Eastern Anatolia regions⁸⁻¹¹. In our study, CCHF cases diagnosed in Giresun between 2021 and 2024 were retrospectively analyzed to evaluate the epidemiological, geographical, and seasonal characteristics of the disease in the region.

The presence of a tick contact history in 76.1% of our patients suggests that the classic transmission route of CCHF remains largely valid. This has also been emphasized in previous studies and highlights the importance of increasing public awareness about transmission routes¹¹⁻¹³. All of our cases reported a history of being in an endemic area, and a high proportion were involved in animal husbandry (81.5%) and crop farming (73.9%). This finding is consistent with previously defined risk factors^{8,10,11}. Rural living conditions, working outdoors, and close contact with animals are considered important risk factors for CCHF. A recent study identified residing in endemic areas and tick contact as the strongest predictors of CCHF¹⁴.

In CCHF patients, symptoms typically emerge in the pre-hemorrhagic phase, which follows transmission and the incubation period. This phase often includes nonspecific symptoms such as

fever, fatigue, myalgia, and nausea. In the subsequent hemorrhagic phase, patients may develop bleeding symptoms such as petechiae, ecchymosis, hematuria, epistaxis, melena, or hematochezia. In our study, the most common complaints were fatigue, fever, and myalgia, consistent with findings from many other studies^{9,15,16}. The rate of bleeding at admission was relatively low (8.7%). This may be due to patients seeking care early, before the hemorrhagic phase developed, and having prompt access to healthcare services. Other studies that reported higher bleeding rates at admission also noted later presentations after symptom onset, supporting this interpretation¹⁷. Similarly, some studies have linked delayed presentation with increased risk of bleeding^{18,19}. Leukopenia, thrombocytopenia, and elevated ALT, AST, LDH, and CK levels are common laboratory abnormalities reported in CCHF^{6,20}, and our findings were consistent with these reports.

Giresun has 16 districts. The southern districts of Şebinkarahisar, Alucra, and Çamoluk are located within the Kelkit Valley, a region in Turkey known for frequent CCHF case reports. In our study, all cases determined to have acquired the disease in Giresun either lived in or had a travel history to one of these three districts. This highlights that these districts, due to their natural environment and agriculture-livestock based lifestyle, are high-risk areas for CCHF. The highest number of cases was reported from Şebinkarahisar, likely due to its large settlement size and higher population density. Of the two cases from outside the province, one had traveled to Erzincan and lived on the Black Sea coast, while the other was a resident of Artvin and developed the disease during a visit to Giresun Central District.

In terms of seasonal distribution, cases began in April and ended in August, with a peak in May, June, and July. This pattern reflects the active period for ticks in the Northern Hemisphere and aligns with the seasonal trends reported in previous studies^{10,11,21}. This finding underlines the need for increased vigilance among both healthcare workers and the public during these months. However, in highly endemic areas, cases have also been reported in colder months such as February and November^{8,22}. It is also noteworthy that this seasonal peak overlaps with the main agricultural and harvest period in the region, during which outdoor exposure to ticks is increased. This temporal relationship should be considered when planning preventive public health measures such as community education and protective equipment distribution.

Severe cases of CCHF may require intensive care management due to rapid clinical deterioration, massive bleeding, and multi-organ dysfunction. In our series, six patients required ICU admission, all of whom had severe thrombocytopenia. Three patients survived with aggressive supportive therapy, underscoring the importance of timely escalation of care in severe cases. In most of these ICU-admitted patients, the need for critical care was triggered by the development of serious complications such as cardiac arrhythmias, massive bleeding, and renal or pulmonary failure. These life-threatening manifestations highlight the multisystemic nature of severe CCHF and the necessity for close monitoring to enable rapid intervention when organ dysfunction emerges.

In our study, the mortality rate was 3.3%. Nationally reported mortality rates for CCHF in Turkey range between 1.3% and 16.6%^{8,9,21,23}, while some international studies have reported even higher mortality rates^{15,17,24-26}. Our study's mortality rate is near the lower end of the national range, possibly reflecting early diagnosis, appropriate supportive treatment, and effective access to healthcare services. Several studies investigating mortality risk factors in CCHF have reported that older age, delayed hospital presentation, and the presence of hemorrhagic findings are more common among fatal cases^{21,27-29}. In our study, all three fatal cases

were over 55 years of age, presented 5–6 days after symptom onset, and developed bleeding in various sites (Gastrointestinal tract, subcutaneous tissue, urinary tract, etc.). These factors were considered to have negatively influenced disease prognosis. This suggests that late presentation may delay diagnosis and supportive treatment, increasing the risk of bleeding and, consequently, mortality. Possible causes of delayed presentation in these cases may include socioeconomic factors such as limited health literacy, and geographical factors such as transportation difficulties in rural areas. Considering these factors may help in designing targeted public health interventions to encourage earlier hospital admissions. In addition, some studies have identified high viral load as an independent predictor of mortality in CCHF^{27,30}. However, this effect could not be investigated in our study due to the lack of data on viral load.

Among the limitations of this study are its retrospective design and the relatively limited sample size. Additionally, since only hospital-admitted cases were examined, mild cases that did not seek medical attention may have been excluded. Another potential limitation is underreporting; some CCHF cases may not have been captured in official records due to lack of healthcare access, misdiagnosis, or failure to present to medical facilities. Such underreporting could result in underestimation of the true disease incidence and potentially influence the observed epidemiological patterns.

5. Conclusion

In conclusion, CCHF is a potentially serious infectious disease that is frequently observed in rural areas of Giresun, particularly during the summer months. The widespread history of tick bite and the fact that most patients were engaged in animal husbandry and agriculture support the idea that agricultural activities play a significant role in the transmission of the disease. The pattern of cases starting in spring and peaking during the summer months is consistent with the seasonal pattern of the disease in the Northern Hemisphere. The fact that all cases originated from three districts located in the southern part of Giresun and within the Kelkit Valley suggests that the disease exhibits endemic characteristics in this region. The findings of this study are important for raising awareness among both healthcare professionals and residents of the region, and for guiding the development of appropriate preventive and management strategies.

Statement of ethics

The study received approval from the Giresun Training and Research Hospital Ethics Committee on 16.04.2025/22.

genAI

No artificial intelligence-based tools or generative AI technologies were used in this study. The entire content of the manuscript was originally prepared, reviewed, and approved by both authors.

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Conflict of interest statement

The authors declare that they have no conflict of interest.

Availability of data and materials

This Data and materials are available to the researchers.

Author contributions

Both authors contributed equally to the article. Both authors read and approved the final manuscript.

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