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## Epidemiological, clinical presentation, laboratory findings and outcome of Congo hemorrhagic fever cases admitted to Al-Salama Hospital in Alameria Baghdad city retrospective study-2022

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### Abstract

The first cases reported in Iraq in 1979 in Al-yarmok hospital in Baghdad Iraq was a young female, with the time reported sporadic cases but in 2021-2022 the Iraq hit hard by a hemorrhagic fever during last two years 212 reported cases with 46% confirmed and case fatality rate was 13%, with the most common virus being Crimean-Congo hemorrhagic fever, there is collaboration between Iraqi Central Disease Control, and WHO to putting primary guidelines for Crimean-Congo hemorrhagic fever management.

**Aim:** To study the epidemiological, clinical features, laboratory findings, and outcomes of patients diagnosed with Crimean-Congo hemorrhagic fever in 2022 based on data obtained from the statistical department of Al-Salama hospital in Al-Amriya city.

**Methods:** A cross-sectional study with a total of 29 cases attending Al-Salama Hospital in Al-Ameria in 2022 used particular forms: the first form was for the collection of the following data: age, sex, occupation, residence and clinical presentation; the second form was for scoring cases, The collected data were analyzed by the software SPSS V. 26 (Statistical Package for Social Science).

**Results:** The study included 29 cases, with 14 females and 15 males. The cases ranged in age from 16 to 72 years old, with an average age of 36 +/- 16 years. The age group (16-30 years) had the most cases (48%), the age group over 50 years had the fewest (17%), eight cases were confirmed with a PCR test, five were probable, and sixteen were suspected, and the fatality rate was zero. Most cases were admitted to Al-Salama Hospital in May (34%). With regard to occupation, 41% were housewives, and none of the cases involved tick-biting-mostly laboratory. Finding thrombocytopenia in the presence of elevated all liver enzymes and INP, the leading clinical features were fever (69%), haemorrhage (59%), headache (45%), nausea, and vomiting (35%). Conclusion: If patients have bleeding manifestations, myalgia, and thrombocytopenia with an elevation of liver enzymes and a history of husbandry at endemic regions, CCHF should be considered.

**Keywords:** Crimean-Congo hemorrhagic fever, thrombocytopenia, husbandry, tick bite, liver enzymes probable case

### Introduction

Crimean-Congo hemorrhagic fever CCHF is endemic in the most part of the world. Although it is named after its early outbreaks in Crimea (1944) and Congo (1969), ([www.cdc.gov](http://www.cdc.gov)) [1] globally prevalence of CCHF is 22.5%. The case fatality rate is (10-40%) (Uzair Jafar, 2022) [2] and sometime reach up to 50% during outbreaks. (Nighat Perveen and Gulfaraz, 2022) [3] and in Iraq the case fatality rate was (44%) (Tantawi, *et al.* 1980) [4], the risk groups are butchers, slaughterhouse workers, and farmworkers and the commonest routes of infection through infected tick bites or/and contact with blood and tissues of infected livestock and The nosocomial transmission can occur in health workers through contact with the infected patients. Iraq has become an endemic area for CCHF in 1979. But the increasing disease burden raised alarms in the first half of 2022. From 1st Jan 2022 to 29 May 2022, Iraq reported 212 cases of CCHF. This is already 6 times in comparison to 2021 when only 33 cases were reported throughout the year. (Nighat Perveen and Gulfaraz, 2022) [3]. CCHF cases are typically sporadic and seasonal (Laura T, 2018) [5]. The incubation period is usually one to three days, sometime 13 days. (<https://www.afro.who>) [6].

**Main Investigations:** ([www](http://www), 2022) [7]

1. Complete blood picture (WBC, Hemoglobin, Platelet count).

2. Bleeding profile (PT, INR, a PTT, serum fibrinogen and D-dimer.
3. Liver enzymes: where.
4. Serological test.

Salama Hospital in Al-Ameria in 2022, we used special forms 1<sup>st</sup> one to collection of the demographical, clinical presentation and laboratory findings, 2<sup>nd</sup> form special form for scoring the CCHF cases clinically. The collected data were analyzed by the software SPSS V. 26 (Statistical Package for Social Science). Below the Study forms.

**Materials and Methods**

A cross-sectional study with total of (29) cases, attending Al-

**Tablet 1:** The 1<sup>st</sup> form for (demographical data and clinical presentation)

Parameters
Gender
Age
Occupation Husbandry
Marital state
Education level
Address
Fever
Headache
Nausea & vomiting
Myalgia & fatigue
Hemoptysis
Gingival bleeding
Conjunctival bleeding
Rigors
Skin rash or Ecchymosis
Abdominal pain
Cough
History of Bleeding
Chronic diseases
Admission/days (hospitalization)
Faints

**Table 2:** The 2<sup>nd</sup> form for modified criteria for lab findings and clinical feature of CCHF cases and scoring system (Criteria for clinical diagnosis of CCHF) <sup>[19]</sup>

Parameters	
Exposure history	Score
- Bitten by ticks/direct contact with blood/secretion of livestock or suspected/confirmed CCHF cases.	(3 Score)
- Resident in/visited rural area where contact with livestock or ticks was possible, but a specific exposure cannot be identified.	(2 Score)
Clinical feature	
Fever more than 38 <sup>C</sup> for 3 days	(3 Score)
Headache	(1 Score)
Myalgia & fatigue	(1 Score)
Nausea & vomiting	(1 Score)
Diarrhea	(1 Score)
Bleeding manifestations	(3 Score)
Lab. Tests	
WBC (<3 or >11x 10 <sup>9</sup> )	(1 Score)
Platite < 1000x10 <sup>9</sup>	(2 Score)
Abnormal AST > 50U/L	(1 Score)
Abnormal ALT > 50U/L	(1 Score)
Prolonged PT or INR 1.4	(1 Score)
Confirmed tests	
-PCR	
- ELISA (serum IgM/IgG detection)	
Total scoring is 21	
Suspected cases: ≥ 5	
Probable: ≥12 and indicated for initial treatment as CCHF case	
Confirmed: suspected +ve PCR or ELISA +ve test	

**Result**

In 2022, (29) cases were admitted to Al-Salama Hospital in alameria. (52%) were men, while the remaining 48% were women. The cases ranged in age from 16 to 72 years old, with an average age of 36 +/- 16 years. Most of the cases within

the age group (16-30 years) was (48%), and the least cases were seen in the age group above 50 years was (17%) as shown in graph (1), (6) of cases with a history of animal contact(Husbandry) and no any out one of the cases were related to tick bites

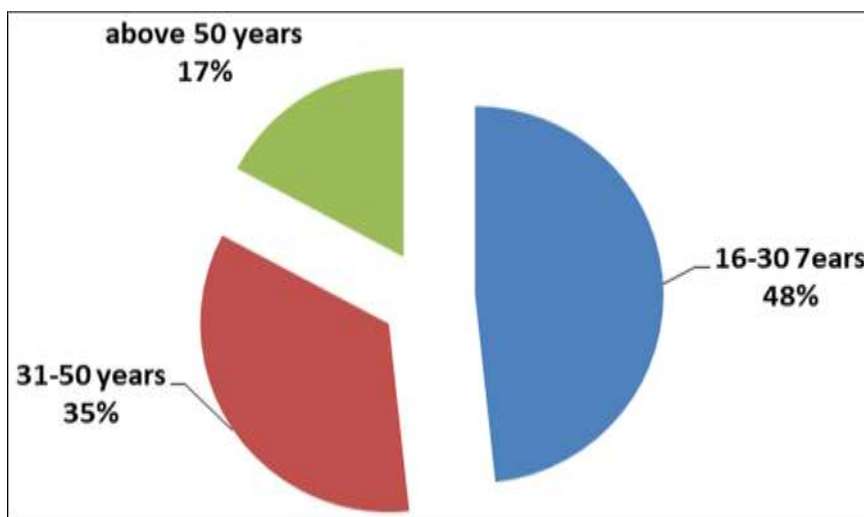


Fig 1: Age groups of CCHF cases

Regarding marital status, (52%) were single. (38%) were married, and 10% were divorced. In terms of occupation, most of the cases are housewives (41%) and others (59%), it was observed that the majority of the cases were admitted in

May (34%) and no cases were admitted in September and December during 2022 as in figure (2), (3) cases left the hospital on his own responsibility (removal by himself) within two days after administration with unknown cause

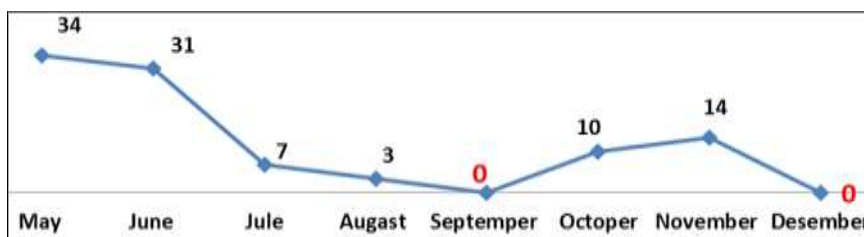


Fig 2: CCHF cases admitted according to months 2022

Regarding the cases' classification according to the scoring of the history of tick biting, clinical presentation, and lab. Finding from the total cases (29) were classified into (8) cases confirmed with positive PCR test, probable cases (5) with

scoring more than 12 points the rest were suspected (16) with scoring more than 5 points as in table and figure (3) The diagnosis of CCHF was confirmed based on clinical features, laboratory test and PCR test (Haydar, *et al.*, 2014) [8].

Table 3: CCHF cases types clinically

CCHF Cases No.	Total score	PCR	Suspected cases: ≥ 5	Probable cases: ≥ 12	Confirmed
1.	14	+VE			Confirmed
2.	15	+VE			Confirmed
3.	6		Suspected		
4.	10		Suspected		
5.	6		Suspected		
6.	11		Suspected		
7.	10			Probable	
8.	10			Probable	
9.	16	+VE			Confirmed
10.	13		Probable		
11.	6		Suspected		
12.	8			Probable	
13.	13	+VE			Confirmed
14.	10	+VE			Confirmed
15.	16		Probable		
16.	11		Suspected		
17.	11		Suspected		
18.	8		Suspected		
19.	7		Suspected		
20.	6		Suspected		
21.	6		Suspected		
22.	9		Suspected		
23.	10	+VE			Confirmed

24.	6		Suspected	
25.	7		Suspected	
26.	11	+VE		Confirmed
27.	7	+VE		Confirmed
28.	7		Suspected	
29.	10		Suspected	

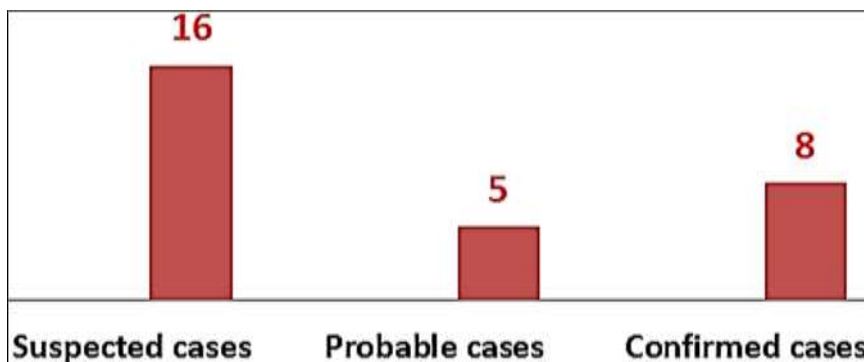


Fig 3: CCHF cases types clinically

When the cases were evaluated in terms of their residents, Baghdad. (63%) lived on the Baghdad side and the rest lived outside of

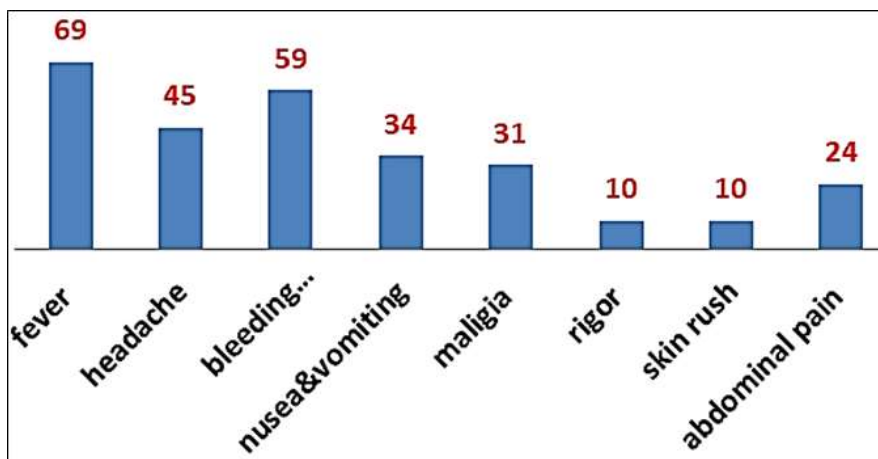


Fig 4: Clinical presentation of CCHF

Regarding the main clinical presentation, fever (69%). the bleeding manifestation was (59%), headache (45%) and so on as in figure (4), Table 4 shows that the most common hematological findings are: 41% with thrombocytopenia and leukocytosis, 43% with increased AST and ALT, respectively,

and 86% with INR. The basic marker in the diagnosis of CCHF lab reports is a decreased level of platelets and leukocytes (Figure 5). Enzymes, such as AST, ALT and LDH. Prolonged PT and at a PTT, Fibrinogen is reduced (Ergonul O, *et al.*)<sup>[9]</sup>

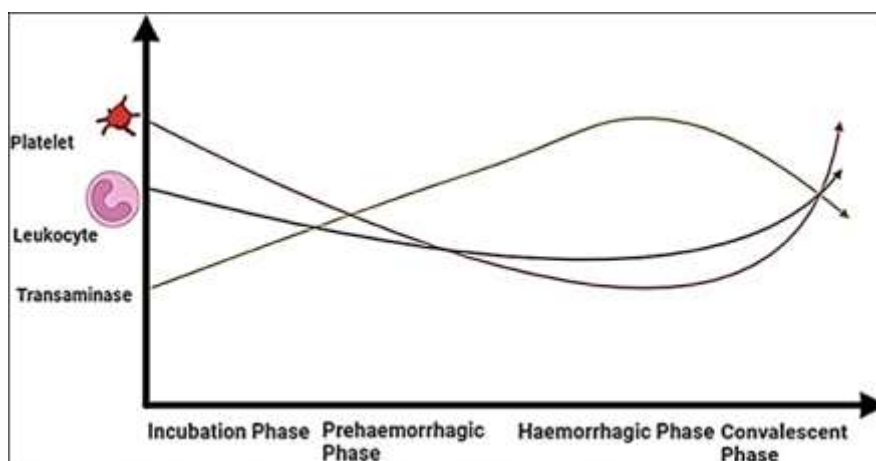


Fig 5: Dynamic of blood cells during different phases of CCHF

**Table 4:** The lab. Findings of admitted CCHF cases

Tests	Normal	Low	High
WBC	28%	31%	43%
AST	52%		48%
ALT	59%		44%
INR	14%		86%
platelets	59%	41%	

## Discussion

The first case was diagnosed with CCHF at Al-Yarmouk Hospital, Baghdad, In 1979 as explained in a study by (Nighat P, 2022) <sup>[10]</sup> which included the Arabic word. In our study males (54%) were more affected than females (48%) while the study by (Duran, *et al.*, 2013) <sup>[11]</sup> found that females were more affected (55%) The average age of cases in the same study was higher than in our study (46+/- 25) and (36+/- 16) years, respectively. Regarding the occupation in our study that there is no one in either farming or livestock related directly to CCHF, in Comparison with the study done in Oman by (Seif S. 2019) <sup>[12]</sup> found that (83%) of cases had history of contact with animals and/or butchering, but our study revealed that only one case was related to tick bites, the peak of the disease incidence occurred between May and June and not reported any cases in September as in the study in Erbil done by (Abdullah S., *et al.*, 2014) <sup>[13]</sup> found that the peak in May and June and no reported cases in September while the study in Kabul by (Hossein H, 2019) <sup>[14]</sup> revealed that occurred between August and July, the (WHO, 2022) informed us in our counter The number of cases reported in the first five months of 2022 is much higher than that reported in 2021 when 33 cases were recorded. In 2022, cases were reported in several governorates in Iraq; during the same period, 212 cases were reported, with approximately 80% of those reported in April and May alone. Of the (212) cases, (www.who.int 2022) <sup>[29]</sup>. In terms of the main clinical presentation, fever (69%) bleeding manifestation (59%) and headache (45%), whereas the study by (Seif S. 2019) <sup>[12]</sup> found that the CFR in Omanis was (30.2%) and in Bangladeshis was (55.6%). While the study by (Abdullah S., *et al.*, 2014) <sup>[13]</sup> in Erbil found that all cases (100%) with fever, malaise, (80%) with headache and (60%) with abdominal pain, myalgia, petechial, ecchymosis. Regarding the root of transmission of CCHF in our study most probably by contact with animal products such as blood from housewives through cooking, no anyone of the cases with a history of ticks bites while the result found by the study of (El-Azazy, 1998) <sup>[26]</sup> In Saudi Arabia, there is Contact with animal blood or tissue and ticks of the genus *Ixodes* are another cause of transition but the *Hyalomma* ticks are the most common source of human infections for CCHFV. (Bente A, *et al.*, 2013) <sup>[15]</sup> The 3rd root by nosocomial transmission in our hospital, we had no nosocomial transmission among any of the health care workers. Because universal precautions are being carefully extended, on the other side, there are Sporadic cases and outbreaks of CCHF have occurred in our country (Iraq) including several nosocomial reports, e.g., (i) in 1979, two confirmed fatal cases, in 1992, two confirmed cases and in 1996, one confirmed case as revealed by (Ibrahim, *et al.* 2010) <sup>[23]</sup> in Erbil and, the same result found in the study of (Kandis, *et al.*, 2012) <sup>[16]</sup> Expect some ticks bite cases to have seasonal patterns in India, occurring most frequently in the spring and summer months, particularly in livestock farmers and agriculturists, according to a study conducted there.

(Nighat P, 2022) <sup>[10]</sup> When a 60-year-old man who had worked as a butcher was brought to a hospital in 2008, a nosocomial outbreak was documented in Sudan. The virus spread to nurses who had cared for the index patient due to a lack of personal protective equipment (PPE). WHO also recommends that close contact with patients' blood, secretions, organs, or other bodily fluids may result in human-to-human transmission in healthcare settings. (Tsergouli, *et al.*,) <sup>[28]</sup> In 20 countries in Africa, Asia, and Europe, the virus has been found the source of infection by tick bites, and via percutaneous or mucosal exposure to the blood or tissues of viraemic patients or livestock. In hospitals, CCHFV transfer from person to person about (86.1%) affected healthcare professionals, including physicians, nurses, and laboratory staff. Visitors (12.7%) and hospitalized patients (1.3%). The WHO report for 2022 showed that more than half of the confirmed cases in our nation due to direct contact with animals while our study found six cases with a history of contact with animals. (www.who.int 2022) <sup>[29]</sup>

In our research, the clinical development of CCHF was divided into suspected, probable and confirmed cases. In general, patients stay in hospitals for (5-11) days. The research also demonstrates that due to early diagnosis and management, the case fatality rate in our study was zero. The study of (Esragul A, *et al.*, 2016) <sup>[17]</sup> In Turkey, it was discovered that hospitalized patients stay (9-10 days) with mortality rate of about 30%. A tiny percentage of patients may recover more slowly. The severity of CCHF is predicted by hematological and biochemical anomalies, as revealed in the study by (Mona, 2015) <sup>[25]</sup>, in Iran and the study of (Gurdal Yilmaz, 2010) <sup>[23]</sup> The risk of a severe clinical course in CCHF patients increased threefold when platelet count were below cut-off values but increased (3-4) time when INR, AST, and CRP were above the predetermined cut-off values, according to study conducted in Trabzon, Turkey's Black Sea region.

In our study, there are (8) confirmed cases with RT-PCR (real-time polymerase chain reaction), (16) suspected cases, and (5) probable cases, but we expected that when we used the serological test to detection of specific IgM antibodies, it could be done starting on day five. A CCHF IgG seroconversion or 4-fold titer increase can help the diagnosis. As CCHF is considered a highly hazardous pathogen, sample shipment and handling require specific protocol (<https://www.ecdc.europa.eu>) <sup>[30]</sup>

The study of (Hossein H) <sup>[14]</sup> when used ELISA revealed that Among the 120 patients admitted to the CCHF ward, 29 were confirmed cases and the reminders were defined as "probable cases" The (www.who.int 2022) <sup>[29]</sup> explain that between 1 January and 22 May in 2022, 212 cases of (CCHF) were reported in our country, with approximately (54%) being suspected and confirmed (46%) by PCR, with approximately (13%) death. Nearly 50% of confirmed cases were reported in Thiqr governorate, and the remainder of cases were reported from 12 different governorates; Missan (13), Muthanna (7), Wassit (6), Diwaniya (4), Baghdad Karkh (4), Kirkuk (3), Basrah (3), Najaf (3), Nineveh (3), Baghdad-Rusafa (2), Babylon (1) and Karbala (1).

Regarding the diagnosis of CCHF cases, there is a variety of laboratory assays that may be used to diagnose CCHF, and the biosafety level (BSL) requirements for performing diagnostic testing vary by assay type and by country. (Vanessa N, 2020) <sup>[27]</sup>

Early and accurate diagnosis of CCHF is reduce the case fatality. Either through molecular detection of CCHFV RNA in 1<sup>st</sup> week or later on by serological test but the combination of molecular and serological methods is the best diagnostic approach. Especially in Obtaining a detailed medical history of the case, (Gruber, *et al.*, 2019) [18] and (WHO fact sheet) [22].

A complete blood picture was obtained for the disease's diagnosis (WBC count, platelet counts, liver enzymes ALT, AST, and INR) and the diagnostic tests were performed in the clinical chemistry unit of Al-Salama Hospital (Beckman AU480).

In our study, the most common hematological findings were 43% with thrombocytopenia and 41% with leukocytosis; AST and ALT were increased (48%) and 44%, respectively; and INR was very high in 86% of the cases. While the study by (Abdullah S., *et al.*) [13] in Erbil found. the lab finding too much higher than our study include thrombocytopenia (100%), elevated liver enzymes (S.AST and S.ALT). and the study which done in Oman by (Seif S, *et al.*, 2019) [12] found (72.7%) with thrombocytopenia and the study in of (Bulent, *et al.* 2009) [31] in turkey revealed thrombocytopenia and leukopenia both (65%), and raised levels of AST and ALT both (77%). An early diagnosis is essential to reduce patient mortality, especially in the early phase (pre-hemorrhagic stage). For this reason, a history of travel to endemic regions, tick exposure, and contact with blood or body fluids from humans or other animals should be questioned (Bente DA, *et al.*, 2013) [15].

The CFR of the our study was zero, the study of (M.N. Sahak *et al.*,) [20]. There were 43% of confirmed cases and 14% of suspected cases in Afghanistan. This result is consistent with other studies such as the study of (Ahmed *et al.*, 2018) [21] in Pakistan, which found 10-40%, while in our country was a case fatality rate 36% among confirmed cases in 2022 by. (Majeed, B, *et al.* 2012) [22]. Generally the fatality rate were 30% of cases, in the second week of illness (WHO. 2013) [24]. High-risk groups in our study were housewives (41%), which is higher than the study done by (Ahmed *et al.*, 2018) [21] in Arbil was (15%), and the study of the (Mona, *et al.*, 2015) [25] was 26% This may be due to being in contact with the blood of animals while cooking and not using protection methods.

## References

1. Crimean-Congo Hemorrhagic Fever (CCHF) | CDC, <https://www.cdc.gov>
2. Uzair Jafar. The outbreak of Crimean-Congo hemorrhagic fever in Iraq-Challenges and way forward, *Ann Med Surg (Lond)*. 2022 Sep;PMC94-20463.
3. Nighat Perveen, Gulfaraz Khan. Crimean-Congo hemorrhagic fever in the Arab world: A systematic review. Published; c2022 Sep. DOI 10.3389/fvets.2022.938601
4. Tantawi HH, *et al.* Crimean-Congo haemorrhagic fever virus in Iraq: isolation, identification and electron microscopy. *Acta Virol*. 1980;24:464-7.
5. Laura T, Diagnostic tests for Crimean-Congo haemorrhagic fever: a widespread tickborne disease. *BMJ Glob Health*. 2019;4:e001-114. doi:10.1136/ bmjgh-2018-001114
6. <https://www.afro.who.int/fact-sheet-of-CCHF>
7. [www.uptodate.com/contents/crimean-congo-hemorrhagic-fever.2022](http://www.uptodate.com/contents/crimean-congo-hemorrhagic-fever.2022)
8. Haydar, *et al.*, Crimean-Congo hemorrhagic fever (CCHF) in Southern Kordofan. <https://www.researchgate.net/publication/305991169>, *Sudanese Journal of Paediatrics*, 2014, 14(1).
9. Ergonul O, *et al.* Analysis of the mortality among the patients with Crimean-Congo Hemorrhagic Fever virus infection. *Clin Microbiol Infect*. 2006;12:551-54. Doi: 10.1111/j.1469-0691.2006.01445.x
10. Nighat Perveen, Gulfaraz, Crimean-Congo hemorrhagic fever in the Arab world: A systematic review *Khan Frontiers in Veterinary Science*; c2022 Sep. DOI 10.3389/fvets.2022.938601
11. Duran, *et al.* Evaluation of patients with Crimean-Congo hemorrhagic fever in Bolu, Turkey, *African Health Sciences*. 2013;13(2):233-242. <http://dx.doi.org/10.4314/ahs.v13i2.5>
12. Seif S, *et al.*, Clinical and molecular epidemiology of Crimean-Congo hemorrhagic fever in Oman, *PLOS Neglected Tropical Diseases* |, <https://doi.org/10.1371/journal.pntd.0007100> April 25, 2019
13. Abdullah S, *et al.*, Crimean congo hemorrhagic fever management in Erbil during 2010-2011. *ESJ August Edition*. 2014;10:24.
14. Hossein H. Investigation of Crimean-Congo hemorrhagic Fever in Patients Admitted in Antani Hospital, Kabul, Afghanistan, 2017-2018-2019 *International Journal of Preventive Medicine* | Published by Wolters Kluwer-Medknow.
15. Criteria for clinical diagnosis of CCHF, <https://www.researchgate.net/figure/Criteria-for-clinical-diagnosis-Crimean-Congo-hemorrhagic-fever-appearance-in-the-north-of-Iran-Caspian-Journal-of-Internal-Medicine-2013-Sep-4-1-617-20>.
16. Bente A, *et al.*, Crimean-Congo hemorrhagic fever: History, epidemiology, pathogenesis, clinical syndrome and genetic diversity. *Antiviral Res*. 2013;100:159-89. DOI: 10.1016/j.antiviral.2013.07.006
17. Kandis, Investigation of Clinical and Laboratory Findings of 26 Cases with Crimean-Congo Hemorrhagic Fever. *Biomed Res-India*. 2012;23(4):589-595. ISSN 0970-938X Scientific Publishers of India
18. Esragul A, *et al.*, Prognostic factors, pathophysiology and novel biomarkers in Crimean-Congo hemorrhagic fever. In Turkey, *Antiviral Res*. 2016 Aug;132:233-43. DOI: 10.1016/j.antiviral.2016.06.011. Epub 2016 Jul 1.
19. Gruber, *et al.* Geographical Variability Affects CCHFV Detection by RT-PCR: A Tool for In-Silico Evaluation of Molecular Assays. *Viruses*. 2019 Oct;11(10):1800093. Available from: <https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2019.24.5...>
20. [https://www.ecdc.europa.eu/Factsheet-about-Crimean-Congo-hemorrhagic-fever\(europa.eu\)](https://www.ecdc.europa.eu/Factsheet-about-Crimean-Congo-hemorrhagic-fever(europa.eu))
21. Sahak, *et al.*, *International Journal of Infectious Diseases*. Journal homepage. 2019;88:135-140. [www.elsevier.com/locate/ijid](http://www.elsevier.com/locate/ijid)
22. Ahmed A, *et al.* Knowledge, perception, and attitude about Crimean Congo hemorrhagic fever (CCHF) among medical and pharmacy students of Pakistan. *BMC Public Health*. 2018;18(1):13-33. DOI: <http://dx.doi.org/10.1186/s12889-018-6248-1>.
23. Majeed B, *et al.* Morbidity and mortality of Crimean-

- Congo hemorrhagic fever in Iraq: Cases reported to the National Surveillance System, 1990-2010. *Trans. R. Soc. Trop. Med. Hyg.* 2012;106:480-483.
24. Gurdal Yilmaz, *et al.*, The efficacy of ribavirin in the treatment of Crimean-Congo hemorrhagic fever in Eastern Black Sea region in Turkey, *Journal of Clinical Virology.* 2010 Jan;47(1):65-68.
  25. World Health Organization. Crimean-Congo hemorrhagic fever (CCHF). World Health Organization, Geneva, Switzerland; c2013. <https://www.who.int/en/news-room/fact-sheets/detail/crimean-congo-haemorrhagic-fever>
  26. Mona, *et al.*, Epidemiological Survey of Crimean-Congo Hemorrhagic Fever (CCHF), a Fatal Infectious Disease in Khuzestan Province, Southwest Iran, During 1999-2015, *Jundishapur J Microbiol.* 2016;9(5):e30-883.
  27. El-Azazy, *et al.* Crimean-Congo hemorrhagic fever virus infection in the Western Province of Saudi Arabia Author links open overlay panel. *Transactions of the Royal Society of Tropical Medicine and Hygiene.* 1997 May-June;91(3):275-278.
  28. Vanessa N. Raabe, Diagnostic Testing for Crimean-Congo Hemorrhagic Fever, *J Clin Microbiol.* 2020 Apr;58(4):e01580-19.
  29. Tsergouli, *et al.*, Nosocomial infections caused by Crimean-Congo haemorrhagic fever virus, *Journal of Hospital Infection.* 2020 May;105(1):43-52.
  30. Crimean-Congo Hemorrhagic Fever-Iraq, Iraq; c2022 June. <https://www.who.int/CCHF>
  31. <https://www.ecdc.europa.eu>
  32. Bülent, Necmettin. The effects of slaughter weight and sex on some slaughter traits of Akaraman and Morkaraman and Turkish Merino lambs\*, *Ankara Üniv Vet Fak Derg.* 2009;56:289-164.